

# **Mountain Ash Limited Partnership Summit Pit**

SLR Project No: 212.06650.00006

June 2021





# Groundwater Monitoring Plan Mountain Ash Limited Partnership

Rocky View County, Alberta

SLR Project No: 212.06650.00006

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for

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June 23, 2021

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# **Table of Contents**

1.0	INT	RODUCT	TION	1
2.0	SITE	DESCR	RIPTION	1
	<ul><li>2.1</li><li>2.2</li><li>2.3</li></ul>	Propos	Uses	
3.0	GEC	LOGY		3
	3.1 3.2		ial Geologyck Geology	
4.0	HYD	ROGEO	DLOGY	4
	4.1	Aquife 4.1.1 4.1.2	er Properties Surficial Unconsolidated Deposits Paskapoo Formation Bedrock	4
	4.2	Groun <i>4.2.1</i>	ndwater Levels and Flow	
	4.3	4.3.1 4.3.2 4.3.3	ne Water Quality Assessment Surficial Deposits Paskapoo Formation Bedrock Big Hill Springs	
	4.4	Regior	nal and Local Water Users	11
5.0	REG	ULATOI	RY FRAMEWORK	15
6.0	PRC	POSED	GROUNDWATER MONITORING WELL NETWORK	15
	6.1 6.2 6.3	Groun	ndwater Monitoring Objectives ndwater Monitoring Approach ndwater Monitoring Network Description	15
7.0	GRC	OUNDW	/ATER MONITORING PROGRAM	16
	7.1	7.1.1 7.1.2 7.1.3 7.1.4 7.1.5	odology  Groundwater Monitoring  Monitoring Wells  Residential Wells  Groundwater Sampling  Groundwater Analytical Program  Ty Assurance and Quality Control (QA/QC)	
	7.3		sed Monitoring Schedule	



8.0	GROUND	WATER RESPONSE PLAN	22
	8.1 Base	line Groundwater Sampling	22
	8.2 Estal	olish Control Limits	22
		ual Groundwater Monitoring	
		ual Groundwater Monitoring Report	
		ce Identification	
9.0	SUMMAR	Υ	23
10.0	REFERENC	CES	24
11.0	STATEME	NT OF LIMITATIONS	24
EM	BEDDI	ED TABLES	
Table	1	Water Quality Summary	8
Table	2	Water Wells within 800 Metres	13
Table	3	Proposed Baseline Monitoring Schedule	20
Table	4	Proposed Phase 1 Monitoring Schedule	21
API	PENDE	D TABLES	
Table	A1	Sand and Gravel Monitoring Well Groundwater Quality Results	
Table	A2	Paskapoo Formation Residential Well Groundwater Quality Results	
Table	A3	Big Hill Springs Water Quality Results	
DR	AWING	GS	
Draw	ing 1:	Site Location and Study Area	
Draw	ing 2:	Current and Historical Potential Sources of Groundwater Contamination	
Draw	ing 3:	Monitoring Well and Water Well Location Plan	
Draw	ing 4:	Schematic Geological Section A-A'	
Draw	ing 5:	Groundwater Elevations (July 3, 2019)	
Draw	ing 6:	Phase 1 Monitoring Location Plan	
Draw	ing 7:	Groundwater Response Plan	



# **APPENDICES**

Appendix A Groundwater Hydrographs

Appendix B Alberta Water Well Records

Appendix C Residential Well Assessment Questionnaires

Appendix D Monitoring Well Construction Logs



### 1.0 INTRODUCTION

Mountain Ash Limited Partnership (Mountain Ash) is planning to develop the Summit Pit (the Project) along Highway 567 within NW and SW 31-026-03 W5M, northeast of the Town of Cochrane, in Rocky View County (RVC), Alberta (Drawing 1). The Project will encompass approximately 208 acres (84 ha) excluding existing road rights-of-way. Mountain Ash is applying for Phase 1 of a six-phase mining plan. This land is currently owned by 1410266 Alberta Ltd. (a general partner of Mountain Ash). Summit Pit received land use and a master site development plan (MSDP) approval on March 2, 2021 (Land Use Bylaw C-8051-2020).

A hydrogeological assessment was undertaken as part of the MSDP application to assess the potential for groundwater impacts from the Project operations in relation to nearby groundwater users. The report concluded that there is little risk of impact to adjacent well users because aggregate extraction occurs above the water table, and the nearest wells residential wells are located more than 490 metre (m) away when the operations are located at its nearest point to the off-site residential well. As a requirement for the Code of Practice (COP) for Pits and Development Permit (DP) applications, this report details the Groundwater Monitoring Plan (GMP) in relation to the operation of the Summit Pit. The objective of this GMP is to ensure the effects of site operations on groundwater resources in the vicinity of the site are monitored and negative impacts prevented wherever possible. This is also consistent with a condition required as part of the land re-designation and MSDP. Ongoing monitoring and assessment of groundwater levels and quality will be determined for effective monitoring of the lack of effect of operations on groundwater, and to plan and manage mitigation should un-anticipated impact occur.

Several potential groundwater receptors including residential water wells and groundwater springs exist near the proposed Project area which the Hydrogeological Assessment (SLR 2020c) concluded would be unaffected by the Project. This GMP is designed to monitor Project effects to ensure this is the case. This GMP provides a description of:

- local geology and hydrogeology
- potential historical and future sources of contamination
- the proposed groundwater monitoring program including monitoring locations and parameters
- groundwater response plan

## 2.0 SITE DESCRIPTION

#### 2.1 Land Uses

The site is currently being used for agricultural purposes, previously referred to as Ranch/Farm. There are two large wetlands in the northwest corner which have been classified as Class II Gramminoid Marsh Wetlands and a number of other, smaller wetlands mainly classified as Class I Farmed through Wetlands. A detailed description of the wetlands on site is provided in SLR (2020a; 2020b), namely the Wetland Assessment and Impact Report and Biophysical Impact Report. The site location and surrounding land use is shown on Drawing 1.

#### 2.2 Proposed Site Activities

The property will be operated and permitted in six phases of similar size excluding Phase 4 and Phase 6 which are smaller than Phases 1 through 5, with operations and permitting commencing initially for the



southeast parcel. This is called Phase 1 and comprises about 14.4 ha (35.5 acres) and is expected to take 5 to 7 years to deplete, depending on market demand. Each of the subsequent phases is anticipated to take approximately 5 to 7 years to deplete, depending on market demand. The proposed phasing is shown on Drawing 2.

Based on drilling investigations at the site, there is 3 m to 6 m of glacial till overburden overlying approximately 20 m of sand and gravel, on average. The till and organic topsoil will be stripped and stockpiled for future use in the post-development restoration. The sand and gravel is the target deposit for extraction/processing and lies immediately above the underlying bedrock. Groundwater in assessment boreholes was noted at between 20 m and 24 m below ground surface (m bgs) and above the bedrock in most wells. It is anticipated that the site will be excavated to a depth, not exceeding 1.0 m above the highest recorded groundwater level within the targeted gravel deposit and will therefore be considered a dry excavation, with no requirement for operational or permanent dewatering. Actual depths will be determined with progressive investigation of water levels as the aggregate resource is developed (see Section 7.1.1).

#### 2.3 Potential Sources of Groundwater Contamination

An assessment of the potential sources for contamination was undertaken by SLR and several potential sources, which could impact groundwater at the site, have been identified as described below and are shown on Drawing 2.

#### 2.3.1 Historical

A search of historical records for potential sources of contamination using the Alberta Environment and Parks (AEP) Environmental Site Assessment Repository (ESAR) indicated that no investigations on the public record had been carried out within the boundaries of the site which is common for rural settings.

A review of historical air photos on Google Earth back as far as May 2002 indicates that the site was undeveloped and consisted of rough grazing land as is the current situation. There is no evidence of previous land uses which may have been contaminating.

#### 2.3.2 Current and Future

The following current and future operations at and adjacent to the site have been identified which have the potential to impact soil and groundwater quality onsite:

- Oil and gas infrastructure is currently located in close proximity to the site and is likely the biggest contamination risk to groundwater in the area. This infrastructure includes several operational oil wells with associated pump jacks located along Highway 567 north of the site, and a pipeline which runs north/south along the western boundary of the site.
- Septic systems are present at the three residences on site and could be a potential hazard to groundwater quality if not functioning correctly.
- Future Highway Maintenance Facility (10 acre) located adjacent to SW31-26-3-W5M, to the west. The facility will be operated by Volker Stevin Highways.
- Diesel fuel, equipment refueling, equipment and lubricants will be stored on-site adjacent to the scale building. Fuels and lubricants will be stored in accordance with current regulations and, as per the recommendations in the Hydrogeological Assessment (SLR 2020c), be located in an area



where thick clay overburden is still present. The location of the storage, refueling and maintenance area is shown on Drawing 2.

There are no significant quantities of chemicals involved in the site operation and incidental hazardous and non-hazardous wastes will be shipped off site for disposal as is common with other rural land uses.

# 3.0 GEOLOGY

The geology and hydrogeology in the vicinity of the site has been compiled from site specific drilling data, available published documents, and the AEP water well database. Drawing 3 shows the line of a vertical cross-section (Drawing 4) that runs northwest to southeast along the direction of groundwater flow towards the springs (A-A'). It has been prepared to illustrate the relationship between the various geological units at the site and is referred to in the following subsections.

# 3.1 Surficial Geology

Surficial geology in the vicinity of the Project has been determined from the published geology maps (Shetsen 1987). Two primary layers are found as can be seen in the cross-section in Drawing 4. The upper strata are predominantly comprised of Pleistocene-age moraine draped over the underlying sand and gravel. This moraine consists of an unsorted mixture of clay, silt, sand and gravel with local water-sorted material and is called a glacial till. The till in the vicinity of the site is of a relatively consistent thickness with a flat to undulating topography which reflects the topography of underlying deposits which in turn reflect the shape of the bedrock surface below. Underlying the draped moraine at the site is sand and gravel of glaciofluvial origin, which formed on the slopes and base of meltwater channels draining melting ice sheets (Shetsen 1981).

Borehole logs from the site indicate that surficial deposits over the majority of the site include approximately 3 m to 6 m of silty, sandy or gravelly clay till and approximately 0.5 m of organic topsoil (this overburden and topsoil will have to be removed to expose the underlying aggregate deposit). Beneath the clay till is the sand and gravel deposit of interest, which is generally a well graded mixture of sand and gravel containing occasional beds of pure sand or pure gravel up to 2 m thick. The sand and gravel unit varies in thickness, with an average thickness of approximately 20 m in those areas investigated by 31 test holes.

# 3.2 Bedrock Geology

Consolidated bedrock underlies the unconsolidated sand and gravel layer as indicated on Drawing 4. The bedrock represents the basement to site operations where the sand and gravel is not saturated. Structurally, the site is located several kilometres (km) east of the furthest extent of the main Cordilleran Deformation. As such, the bedrock is relatively flat-lying with little folding or faulting compared to older bedrock further west in the Disturbed Belt. The bedrock beneath the sand and gravel at the site consists of Tertiary, Paleocene age (55 to 65 million years old) sedimentary rocks of the Upper Paskapoo Formation. The Paskapoo formation comprises grey to greenish grey, thickly bedded, calcareous sandstone interbedded with siltstone or mudstone and minor conglomerate or thin limestone beds (Alberta Geological Survey 1999). The test drilling at this site found grey sandstones and siltstones directly underlying the sand and gravel. The bedrock was derived from sediments eroded from the Rocky Mountains during a period of uplift and erosion and carried east by river systems which drained melting ice from the mountains west of the site. The sandstones within the Paskapoo are a complex series of stacked river channel deposits separated by floodplain siltstone and mudstone deposits (Hamblin 2004).



Outcrops of the Paskapoo Formation sandstone can be seen in the steep slopes of the Big Hill Springs Provincial Park southeast of the site. A number of domestic well records from the immediate vicinity identify sandstone and shale<sup>1</sup> beneath and surrounding the site.

#### 4.0 HYDROGEOLOGY

The hydrogeological regime at the application site and the surrounding area is described in the following sub sections:

- aguifer properties
- groundwater levels and flow
- baseline water quality assessment
- regional and local water users

The hydrogeological data is drawn from the Hydrogeological Assessment (SLR 2020c). This data has been used to develop a conceptual site model that has in turn been used to develop the monitoring system used to assess potential impacts associated with the proposed development.

# **4.1** Aquifer Properties

A number of different geological units with different hydraulic properties are present in the study area. The distinct units are discussed here progressively with depth from surface (and increasing geological age). The testing of two monitoring wells and two residential wells was undertaken and a summary of the work is provided below. Hydraulic conductivity testing methodology and analysis are provided in the Hydrogeological Assessment (SLR 2020c) and are not reproduced here.

#### 4.1.1 Surficial Unconsolidated Deposits

Surficial deposits of unconsolidated soils consist of till overlying sand and gravel deposits as described in Section 3.1 above. Groundwater flows in the intergranular pores in these soils, and the rate of flow is proportional to the hydraulic conductivity of the soil. For example, the hydraulic conductivity is low where clay rich material infills these pores but is significantly higher where clean sand and gravel is present.

Since the upper **glacial till** that caps the site is not saturated, no groundwater monitoring wells were installed and therefore no field testing for hydraulic conductivity was undertaken. These soils are not typically aquifers, as their hydraulic conductivity is in the range of  $10^{-8}$  to  $10^{-7}$  m/s (Freeze and Cherry 1979), but they do act as a protective layer for underlying deposits.

As detailed in the Hydrogeological Assessment (SLR 2020c) a number of slug and pumping/recovery tests were undertaken on monitoring wells MW14-101 and MW14-103 which are screened in the **sand and gravel**. The testing determined hydraulic conductivities of approximately  $1 \times 10^{-4}$  m/s to  $3 \times 10^{-4}$  m/s. These values fall in a narrow range and are typical of sand and gravel aquifers.

Mountain Ash Limited Partnership Summit Pit | Groundwater Monitoring Plan

<sup>&</sup>lt;sup>1</sup> It is common for drillers to use the term "shale" to describe mudstones and siltstones, as the differences are subtle, and they all share a common fine-grained appearance to the untrained eye.



#### 4.1.2 Paskapoo Formation Bedrock

The Paskapoo Formation is the most significant aquifer formation in western Alberta and potentially the Prairie region, and although of regional importance as a whole, the isolated nature of the main sandstone units can provide variable success for residential wells. Only the sandstone facies of the Paskapoo Formation demonstrate any significant intergranular porosity; however, the pore spaces may be filled with calcareous cement in some areas. Bedding planes, joints and structural fractures contribute to a secondary permeability of the bedrock as well. Based on water well records in the area and the drilling at this site, much of the formation in this area is primarily comprised of fine-grained bedrock such as siltstone, mudstone and shale which demonstrate low intergranular porosity. Secondary fracture porosity is likely to be responsible for the yields obtained from residential wells in the vicinity of the site. Lower yields are recorded from wells completed within mudstone and siltstone than from the sandstone (Geological Survey of Canada, 2007; Ozaray and Barnes 1977). The majority of residential wells in the area are drilled into the Paskapoo Formation indicating that the aquifer is locally important for groundwater supplies.

A short term pumping and recovery test was undertaken on WW2 as described in the Hydrogeological Assessment (SLR 2020c). The test results showed that the Paskapoo Formation sandstone and shale penetrated by WW2 has an approximate hydraulic conductivity of  $2 \times 10^{-7}$  m/s. The hydraulic conductivity value obtained reflects this fractured bedrock. When purging the wells, WW2 had drawdown of >7 m at a flow rate of approximately 12 Litres per minute (L/min) and WW4 had drawdown of just 0.09 m at a flow rate of approximately 39 L/min. The contrast between the performances of the two wells demonstrates the variability of the hydraulic properties of the bedrock in the Paskapoo Formation.

#### 4.2 Groundwater Levels and Flow

A total of ten groundwater monitoring wells have been installed in the sand and gravel at the site since 2014. The wells are variably screened from the bedrock up into the base of the sand and gravel.

The locations of these monitoring wells and their groundwater elevations (on July 3, 2019) are presented on Drawing 5. The well construction details are found in Appendix A. The information from these wells have historically been supplemented with groundwater level information from residential wells WW2 and WW4 also presented in Drawing 5.

The groundwater monitoring points completed at the site have been subject to periodic groundwater elevation monitoring between October 2014 and September 2019. Sand and gravel monitoring wells MW14-101 and MW14-103 and bedrock residential wells WW2 and WW4 have been equipped with dataloggers recording continuous groundwater levels on a daily basis since October 2014. Groundwater hydrographs of monitoring data to September 2019 are presented in Appendix B, a review of which shows:

- A downward vertical gradient between the sand and gravel deposits and the underlying Paskapoo
  Formation was demonstrated in SLR 2020c. Therefore, there is a component of downward
  vertical groundwater flow from the sand and gravel to the bedrock. The amount of downward
  groundwater flow is probably limited due to the relatively lower hydraulic conductivity of the
  underlying bedrock, inhibiting drainage to depth; however, the recharge is enough to locally
  sustain single wells drilled into the bedrock.
- Minimal fluctuation in the groundwater levels within the sand and gravel indicates negligible or
  no influence from pumping within residential wells in the area. Groundwater levels within the
  sand and gravel have been gradually falling over the initial years of monitoring, with a drop of



- approximately 0.9 to 1.3 m during the period. Levels rebounded somewhat (0.1 m) in the months between July and September 2019 due to the higher than average rainfall totals in the area in spring and summer 2019.
- A variable response to the pumping from normal use in residential wells, with the wells
  recovering within a few hours of extended pumping. The degree of response between wells is
  indicative of the differing performance of the wells due to variability of the hydraulic conductivity
  within the Paskapoo Formation.

Using site groundwater observation data, Drawing 5 shows the inferred potentiometric groundwater surface (drawn in blue) in the sand and gravel at site as recorded on 3 July 2019. Drawing 5 shows that the horizontal flow direction in the sand and gravel is towards the south-southeast and the Big Hill Springs valley.

The potentiometric surface within the Paskapoo Formation cannot be drawn based on just two far apart data points (WW2 and WW4). Examination of historical water levels at other wells based on the water well records show that the elevation of the potentiometric surface is between about 1,266 and 1,268 metres above sea level (masl) in the area of the site, which is near the bedrock surface. If one assumes the bedrock potentiometric surface is near ground level at the Big Hill Springs, which is about 1,240 masl, then there is strong lateral gradient southeast towards the springs at which point groundwater is observed discharging to the surface.

#### 4.2.1 Groundwater / Surface Water Interactions

Two large wetlands located in the northwestern corner of the site have a surface elevation of approximately 1,290 masl and are perched on the 6 m of low permeability fine grained till. The presence of freestanding water is seasonal based on observations made at the site, with water levels generally decreasing through summer and autumn. Monitoring well MW14-101 located close to one of the wetlands has a groundwater elevation in the sand and gravel of approximately 1,274 masl, which is well below the base of the till (at about 1,284 masl). This demonstrates that the wetlands are not fed by groundwater from the sand and gravel. Thus, it is inferred that the wetlands are fed by rainfall and snowmelt from the local catchment and from the catchment across Highway 567 transported by the culvert located beneath the highway. These wetlands will be retained on the landscape.

Since groundwater from beneath this site flows southeasterly towards the Big Hill Springs, and it represents an offsite interaction of groundwater with surface water in the area. Bedrock outcrops can be seen on the valley walls surrounding the stream and springs and thus it is inferred that the host valley is incised into the bedrock. Ozaray & and Barnes (1977) reports that spring flow is in the order of 40 L/s and water temperature is typically less than 5°C.

#### 4.3 Baseline Water Quality Assessment

Groundwater samples have been collected from the accessible residential wells in the Paskapoo Formation bedrock, the sand and gravel monitoring wells and the furthest publicly accessible upstream discharge point at Big Hill Springs as part of the baseline water quality assessment. A detailed comparison of the water quality in the Hydrogeological Assessment (SLR 2020c) concluded that this is the same water type for the sand and gravel, the Paskapoo bedrock, and the discharge from Big Hill Springs. The groundwater and spring water chemistry supports the conclusion that the groundwater within the saturated sand and gravel recharges the Paskapoo Formation bedrock and also provides baseflow to the



Big Hill Springs. A summary of the water quality is provided in Table 1 with details provided in appended Tables A1, A2 and A3.

#### 4.3.1 Surficial Deposits

Table A1 (appended) indicates that groundwater in the sand and gravel deposit is of marginally poor quality for drinking. The Canadian Drinking Water Quality (CDWQ) standards set maximum allowable concentrations (MAC) for 16 parameters for drinking water purposes. A number of these were exceeded in several sand and gravel monitoring wells, including trace metals arsenic, barium, cadmium, chromium, lead, manganese and mercury, and microbiological parameters total coliforms and *E.Coli*. Other CDWQ guidelines that were exceeded were the aesthetic objective parameters aluminum and iron. The pH was moderately alkaline at 7.8 to 8.2, and groundwater from a number of the monitoring wells exceeded guidelines for turbidity, which is a parameter that is included because it shows when water is not clear, may contain sediment, and can also mask bacteria counts.

#### 4.3.2 Paskapoo Formation Bedrock

Table A2 (appended) indicates that groundwater in the Paskapoo Formation is of relatively good quality for drinking, with all parameters meeting the CDWQ guidelines except a single exceedance of total coliforms in WW4. *E.Coli* was not detected in WW4 which indicates that the coliforms were not related to fecal contamination, however they do indicate that the well could be vulnerable to bacterial contamination. pH values were moderately high (7.9 to 8.1) in all samples, indicating slightly more alkaline conditions within the bedrock as compared to the sand and gravel.



**Table 1** Water Quality Summary

			Gro	9	Surface Water				
Parameter	Units	Guideline	Sand and	Gravel	Paskapoo F	ormation	Guideline	Big Hill Springs	
		(CDWQ)	min	max	min	max	(CWQG PAL Freshwater)	min	max
Total Aluminum	mg/L	0.1 (OG)	0.109	95	0.0041	0.011	0.1	0.0144	0.3
Total Antimony	mg/L	0.006 (MAC)	<0.0006	0.006	<0.00050	0.00088	NV	<0.00050	<0.00060
Total Arsenic	mg/L	0.01 (MAC)	0.000336	0.071	0.000121	0.00032	0.005	0.000146	0.00061
Total Barium	mg/L	1 (MAC)	0.332	7.2	0.11	0.391	NV	0.21	0.313
Bicarbonate (as HCO3)	mg/L	NV	310	390	340	391.6	NV	240	376.1
Total Boron	mg/L	5 (MAC)	<0.020	0.087	<0.020	0.032	1.5	<0.020	0.024
Total Cadmium	mg/L	0.005 (MAC)	<0.000005	0.01	<0.000005	0.00004	0.00009	0.000008	0.000034
Dissolved Calcium	mg/L	NV	62	77	55	80	NV	48	74.1
Chloride	mg/L	<250 (AO)	7.83	29	1.38	12	120	8.2	10.12
Total Chromium	mg/L	0.05 (MAC)	<0.0010	0.19	<0.0010	0.0012	0.001	<0.0010	0.001
Total Copper	mg/L	2 (MAC) / 1 (AO)	<0.0010	0.29	0.0016	0.125	0.004	<0.0010	0.0013
Total Iron	mg/L	<0.3 (AO)	0.22	190	<0.010	0.3	0.3	0.019	0.25
Total Lead	mg/L	0.005 (MAC)	0.00031	0.15	<0.00030	0.011	0.007	<0.00020	<0.00030
Total Mercury	mg/L	0.001 (MAC)	<0.00010	0.00208	<0.0000020	<0.00020	0.000026	0.0000025	<0.00020



			Gro	Surface Water						
Parameter	Units	Guideline	Sand and	Gravel	Paskapoo F	ormation	Guideline	Big Hill Springs		
		(CDWQ)	min	max	min	max	(CWQG PAL Freshwater)	min	max	
Dissolved Magnesium	mg/L	NV	30	37	30	39.9	NV	20	36.7	
Total Manganese	mg/L	0.12 (MAC) / 0.02 (AO)	0.0144	8.9	<0.0010	0.012	NV	0.0012	0.0019	
Total Molybdenum	mg/L	NV	0.0008	0.023	0.00065	0.00222	0.073	0.00038	0.00141	
Total Nickel	mg/L	NV	<0.00050	0.41	<0.00050	0.00174	0.15	<0.00050	0.00088	
Nitrate-N	mg/L	10 (MAC)	0.97	5.22	0.37	3.314	2.9	1.4	3.037	
Nitrite-N	mg/L	1 (MAC)	<0.005	0.098	<0.005	<0.05	0.06	<0.005	<0.05	
Dissolved Potassium	mg/L	NV	2.7	6.3	2	3.3	NV	3.3	4.8	
На		7.0 -10.5	7.8	8.19	7.9	8.13	6.5-9	8.07	8.2	
Total Selenium	mg/L	0.05 (MAC)	0.00049	0.0013	0.00052	0.0018	0.001	0.00068	0.00218	
Total Silver	mg/L	NV	<0.000070	0.0025	<0.00007	0.00012	0.00025	<0.000070	<0.00010	
Dissolved Sodium	mg/L	<200 (AO)	5.7	18	6.5	17	NV	5	7.8	
Sulphate	mg/L	<500 (AO)	5.8	26	5.9	20	NV	4.7	9.36	
Total Thallium	mg/L	NV	<0.00020	0.0026	<0.00020	<0.00020	0.0008	<0.00020	<0.00020	
Total Dissolved Solids (calculated)	mg/L	<500 (AO)	290	360	300	349	NV	210	342	



			Gro	Surface Water					
Parameter	Units	Guideline	Sand and	Gravel	Paskapoo F	ormation	Guideline	Big Hill S	Springs
		(CDWQ)	min	max	min	max	(CWQG PAL Freshwater)	min	max
Turbidity	NTU	1 (OG)	8	3100	0.2	1.23	NV	0.8	5.1
Total Uranium	mg/L	0.02 (MAC)	0.001563	0.016	0.00091	0.0021	0.015	0.0013	0.001953
Total Zinc	mg/L	<5 (AO)	<0.020	1.2	0.024	0.99	0.007	<0.0030	<0.020
Total Coliforms	MPN/100 mL	<1 (MAC)	<1	120000	<1	11	NV	>2400	2420
E.Coli	MPN/100 mL	<1 (MAC)	<1	100	<1	<1	NV	1600	1733



#### 4.3.3 Big Hill Springs

Table A3 (appended) summarizes the water quality results of the water samples taken from the creek downstream from the springs at Big Hill Springs Provincial Park on October 30, 2014, August 4, 2015 and July 10, 2019. Since this groundwater discharge is the source for a surface water stream, and at the point of sampling is within that stream, it is compared to the CWQG Protection for Aquatic Life (PAL) guideline. The PAL has guidelines for 20 parameters of the sampling suite. The sample met 17 of the guidelines for these parameters indicating that water discharging from the spring is generally of good quality. It is noted that total coliforms and E.Coli concentrations exceed the CDWQ drinking water guidelines; however, there is no CWQG bacteria guideline for the protection of aquatic life. The high concentrations are consistent with the presence of livestock in the stream catchment and of which evidence was abundant adjacent to the property line at the sampling location. Only aluminum and selenium exceeded the PAL guideline in these natural waters. Of minor note, the laboratory detection limit for mercury (0.001 mg/L) in 2014 and 2015 exceeded the guideline (0.000026 mg/L) and thus the "non-detect" reported in Table A3 may or may not meet the lower guideline. Mercury sources in this geologic setting are not common, nor will the proposed aggregate operation be a source of mercury. Mercury concentrations measured in 2019 fell below the guideline. Since this water is the source for the stream, the downstream biota will be acclimatized to this form of the natural water quality.

#### 4.4 Regional and Local Water Users

As part of the original hydrogeologic study (SLR 2020c), a field verified water well survey was conducted to establish residential well use, baseline water quality conditions and to provide an assessment of the hydraulic parameters within the aquifers used by local residences adjacent to the site. Initially, a water well record search was undertaken by obtaining records from the Alberta Water Wells database which are presented in Appendix C (updated in 2019). This was followed by a door-to-door survey (October to December 2014) of residences within a 500 m radius of the site with visits on a number of occasions to those houses where no resident was at home. Where possible, the formal well records were correlated with the actual wells in the field. It was considered that the 1,600 m radius required for a *Water Act* application is not appropriate as no groundwater body is to be disturbed by the Project which will be worked dry, and much of that greater area is not in the same groundwater flow field. A number of properties were surveyed and sampled and/or yield tested in order to further assess the relevant aquifer units. At each residential well, a questionnaire was completed to determine the type of well, well completion details, water levels and whether the well user has any issues with water quality or quantity. The questionnaires completed at the residential wells are provided in Appendix D.

The majority of local wells (for which there are records) are used for domestic or commercial purposes. The Alberta records indicated a total of 17 wells within 500 m of the Project with two of those decommissioned (391599 and 391600) and one with very little available detail (395793). Drawing 3 presents the locations of the wells identified from the records search and the door-to-door survey for which Table 2 summarizes the information collected. The majority of drilled wells are drilled to between 30 m and 75 m bgs and are screened within the Paskapoo Formation.



Two drilled wells (WW1 and WW4) are on the site at the residences of the current tenants; however, all of the other drilled wells recorded are greater than 100 m from the site boundary. With respect to the WW1 property, there is a well listed in the records for this property (494800); however, the geology recorded in this record is completely different than the rest of the area. It had been concluded that the available log is for a different well and has been misfiled in the digital records kept by AEP. Therefore, the log has not been used in the analysis.

Dug wells identified at location WW5 (four wells in total) are between 6.1 m and 7.6 m deep according to details provided by the householder. This location is in the bottom of the valley at the southeast end of Section 31. No lithological logs are available for the dug wells; however, based on their estimated depth and the lithological details provided in nearby drilled wells to the east, it is inferred that they are completed in the sand and gravel deposits. The well owners reported that the static water level is 3 m bgs. Although this was unconfirmed by direct measurement, it is a reasonable estimate, given the shallow nature of the wells.



Table 2 Water Wells within 800 Metres

Water Well Number	Alberta Water Well Record Number	No. of Wells	Well Owner	Easting (UTM)	Northing (UTM)	Well Depth (m)	Drilled / Dug	Distance (m) and Direction from Site
WW1	Unknown	1	Waterman	6805591	5682875	Unknown	Drilled	On Site
WW2	1475699	1	Rawn	6809881	5682770	50.9	Drilled	200 E
WW3	1475698	1	Rawn	6811731	5682907	36.0	Drilled	400 E
WW4	350194	1	Nugter	6802571	5682091	35.1	Drilled	On Site
WW5	N/A	4	Burnco	6815471	5681568	6.1 – 7.6	Dug	800 SE
WW6	Unknown	1	Unknown	See Note2	SW Quarter, S32-T26-R3	Unknown	Drilled	900 E
WW7	Unknown	1	Unknown	See Note2	SW Quarter, S32-T26-R3	Unknown	Drilled	900 E
WW8	395786	1	Hodgson	See Note2	NE Quarter, S31- T26-R3	62.5	Drilled	690 E
WW9	360164	1	Carroll	6807441	5683480	67.1	Drilled	350 N
WW10	Unknown	1	Unknown	See Note2	SE Quarter, S6- T27-R3	Unknown	Unknown	800 N
WW11	391000	1	Unknown	6799323	5683339	39.6	Drilled	350 N
WW12	Unknown	1	Unknown	See Note2	NE Quarter, S36- T26-R4	Unknown	Unknown	270 W
WW13	Unknown	1	Big Hill Estates	See Note2	SW Quarter, S30-T26-R3	Unknown	Drilled	1,800 S
N/A	1022436	1	Lafarge Canada Inc.	6796823	5682526	30.5	Drilled	



Water Well Number	Alberta Water Well Record Number	No. of Wells	Well Owner	Easting (UTM)	Northing (UTM)	Well Depth (m)	Drilled / Dug	Distance (m) and Direction from Site
N/A	387449	1	Lafarge Canada Inc.	See Note4	NE Quarter, S36- T26-R4	33.8	Drilled	
N/A	494773	1	Lafarge Canada Inc.	See Note4	NE Quarter, S36- T26-R4	30.5	Drilled	
N/A	2095665	1	Unknown	See Note <sup>4</sup>	SW Quarter, S6- T27-R3	25.6	Drilled	
N/A	390998	1	Unknown	See Note <sup>4</sup>	SE Quarter, S6- T27-R3	65.5	Drilled	
N/A	390999	1	Unknown	See Note <sup>4</sup>	SE Quarter, S6- T27-R3	73.2	Drilled	
N/A	391598	1	Unknown	See Note <sup>4</sup>	NW Quarter, S3- T26-R3	39.6	Drilled	
N/A	395786	1	Unknown	See Note <sup>4</sup>	NE Quarter, S31- T26-R3	62.5	Drilled	

<sup>1.</sup> Location based on GPS measurement in the field.

<sup>2.</sup> Plotted by AEP at quarter centre centroid, adjusted to likely location, subject to field confirmation.

<sup>3.</sup> Location based on Abacus Datagraphics database.

<sup>4.</sup> Wells plotted at quarter-section centroid in Abacus Datagraphics database. Not likely actual location.



### 5.0 REGULATORY FRAMEWORK

The site will operate under a Development Permit issued by RVC and an Approval under the COP for Pits. A requirement of the Development Permit is to prepare a groundwater monitoring program for assessing whether site operations are impacting groundwater quality and levels. This document is intended to meet this latter requirement.

It is proposed that for the first year, groundwater quality at the onsite monitoring wells be assessed initially by comparing groundwater monitoring results with the Alberta Tier 1 and/or 2 Soil and Groundwater Remediation Guidelines (updated January 2019) and herein referred to as the Tier 1 or Tier 2 Guidelines. The Tier 1 Guidelines contain guidelines which are protective of all receptors and potential exposure pathways, whereas the Tier 2 Guidelines can be modified to exclude those pathways or receptors which don't apply. Monitoring results will be compared to guidelines for Agricultural land use based on the current site and surrounding land uses. The site is coarse-grained with respect to contaminant migration in the surficial deposits.

Water quality results obtained from the residential wells which opt to join the monitoring program will be assessed against the Guidelines for CDWQ and the equivalent Alberta potable groundwater guidelines.

Background groundwater chemistry would be established using historical groundwater monitoring data and additional data collected during a monitoring and sampling event prior to development of the site. In the first annual monitoring report, control limits setting upper and lower acceptable bounds for parameters will be derived for each sampling point and subsequent data will be compared to these control limits.

# 6.0 PROPOSED GROUNDWATER MONITORING WELL NETWORK

# 6.1 Groundwater Monitoring Objectives

The objectives of the groundwater monitoring program are twofold:

- To enable understanding of the groundwater flow regime at the site and adapt the basal elevation of the pit in response to observed groundwater levels.
- To confirm the site is having only the effects predicted, but also to enable the gathering of sufficient information to identify and provide solutions to any unanticipated groundwater problems should they arise through the life of the site.

# 6.2 Groundwater Monitoring Approach

The site monitoring program is designed to provide data to enable the assessment of potential impacts to groundwater quality in the vicinity of the site. By extrapolation it can be inferred what the likely effects of any observed changes will be at potential receptors such as private residential wells. In addition, potential receptors will also be monitored directly as a precaution to assess potential changes. All monitoring wells installed within the boundaries of the site will receive the earliest warning possible of any changes in the groundwater system.



Background monitoring provides a key benchmark for the assessment of change within the groundwater system, both temporally, before development commences, and spatially, in up-gradient locations. Downgradient wells provide information on what changes, if any, may be occurring as the groundwater passes beneath the site. By this method, early warning is attained on site, long before any problem could manifest itself in the more distant private wells.

# **6.3 Groundwater Monitoring Network Description**

The groundwater monitoring network for the site will comprise three main elements:

- Existing onsite sentinel monitoring wells to monitor groundwater flowing directly beneath the site in upgradient, downgradient and cross-gradient locations from the actively working areas.
- Monitoring of adjacent residential wells as part of a precautionary water well protection program
  which protects both the operator and the local residents.
- Sampling of water quality within Big Hill Springs to confirm no negative effects are being seen.

The locations of the proposed groundwater monitoring points for the baseline monitoring are presented in Drawing 3 and the monitoring wells for Phase 1 monitoring are presented in Drawing 6.

Ten monitoring wells have been installed onsite. The monitoring wells are screened either at the base of the sand and gravel unit or across the upper bedrock / sand and gravel interface to ensure the water table could be measured. The wells are constructed of 50 mm diameter polyvinyl chloride (PVC) pipe with a hydrated bentonite chip seal placed around the annulus of the solid section of standpipe above the screened section. An above ground steel protective cover with a lockable lid was concreted in place above the top of the wells. Borehole geological information and monitoring well construction details are provided in the SLR well logs in Appendix A.

As indicated in Section 4.4 and Table 2, several residential wells are located within or close to an 800 m radius of the site (WW1 to WW12), and it has been offered by the Developer that these wells be included in the monitoring program as a precautionary measure to confirm the quality and quantity of water available in these wells is unimpacted by the Project. WW13 (Big Hill Creek Estates Water Coop) is approximately 1.8 km to the south of the site, and unlikely to be affected by the Project because it falls on the other side of a groundwater divide; however, a commitment was made during the Public Hearing to review data from this well as part of the monitoring program. It is our understanding that this well is monitored by others and Mountain Ash proposes to enter into a data sharing agreement.

Confirmatory sampling from the furthest publicly accessible upstream point of the stream flowing from Big Hill Springs will be sampled within the Big Hill Springs Provincial Park.

# 7.0 GROUNDWATER MONITORING PROGRAM

# 7.1 Methodology

#### 7.1.1 Groundwater Monitoring

Each onsite groundwater monitoring well will be measured for depth to groundwater using an electronic water level tape on a monthly basis during operating months (April to November). Prior to the day's monitoring, the water level probe will be inspected and tested for proper operation. The depth to the nearest millimetre from the highest point of the well pipe (which has been surveyed for geodetic



elevation) will be observed and recorded. The depth to the bottom of each well will also be measured and noted if any soil particles are present. The water level probe will be cleaned with an Alconox and water solution, rinsed with clean tap water, neutralized with isopropyl alcohol and then rinsed with distilled water between each well to minimize the potential for cross contamination between wells.

Additional simple piezometers will be installed within the pit once the base of extraction reaches within approximately 3 m of the proposed extraction depth to confirm that no extraction takes place within 1 m of the groundwater table. These will be installed approximately every 200 m as the excavation moves laterally and will be removed as the area is worked out and prepared for restoration.

Groundwater levels will only be measured within residential wells where safe access to the wellhead can be provided. Water levels will be measured using the same methodology outlined above for the onsite monitoring wells. Pressure transducers with built in data loggers will also be installed in available residential wells to establish the normal range of water level fluctuation due to daily use. Twelve private wells have been identified (WW1 to WW12) within or near the 800 m limit as described above. Each owner has been approached to see if they wish to be included. Some decline as they do not wish to be disturbed by monitoring staff or due to their great distance from the operation. Participation will be based on owner's willingness. All owners within 800 m have been approached, and the monitoring details will be provided to them upon issuance and approval of the development permit. Owners initially were given an overview of the program's intentions, process, procedures, and pending approval by the development authority. Monitoring of wells within an 800 m radius of the active area of the pit will commence once DP approval has been obtained and will continue for a period of 5 years or until the Phase 1 DP expires.

#### 7.1.2 Monitoring Wells

Prior to groundwater sampling, each monitoring well will be purged using using the low-flow parameter stabilization method. As the groundwater within the monitoring wells is below the effective depth of a peristaltic pump (approximately 8 m), an electric submersible or bladder pump will be used to conduct the low-flow purge. While purging, the following geochemical parameters will be monitored and recorded periodically with a minimum of three minutes between readings: temperature, pH, electrical conductivity (EC). The time, flow rate and cumulative volume purged will also be recorded with qualitative observations such as colour, odour and sheen, if any.

Stabilization will be considered achieved after all parameters have stabilized for three successive readings. The following stabilization criteria will be used:

• pH: +/- 0.2 units

• Temperature: +/- 0.2°C

• EC: +/- 5%

Each well will be purged until field parameters have stabilized.

#### 7.1.3 Residential Wells

Residential well samples will be collected from a point within the household system before any water quality treatment. The sample will be taken after a purge of 15 minutes or until field parameters are deemed to have stabilized. Attention will be paid to ensure that static water from the pressure tank is not inadvertently sampled.



#### 7.1.4 Groundwater Sampling

Samples will be collected from the dedicated sample tubing (for monitoring wells) or the sampling tap (for residential wells) and transferred directly to clean, laboratory prepared sample containers that will be labelled prior to sample collection. A clean pair of disposable nitrile gloves will be worn during sample collection and a new pair of gloves used at each sample location. Upon collection, the sample containers will be placed immediately into sealed coolers with ice packs and delivered directly under Chain-of-Custody (COC) to the laboratory the same day.

#### 7.1.5 Groundwater Analytical Program

The proposed analytical program includes the following parameters as parameters of potential concern:

- Routine parameters: pH, Total Dissolved Solids (TDS), chloride, nitrate, alkalinity, electrical conductivity, hardness and major cations and anions
- Hydrocarbon parameters: benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1 and F2 (to be conducted in the onsite sentinel wells only)
- Tier 1 dissolved metal suite

These parameters take into account all those likely indicator parameters which would indicate impacts to the groundwater from the operations. Full details of the parameters to be tested are provided in Tables 3 and 4, below.

# 7.2 Quality Assurance and Quality Control (QA/QC)

Field procedures will be implemented to minimize the potential of cross contamination between sampling locations. Sample handling protocols will be established to track and maintain the integrity of the samples. Disposable Nitrile gloves will be used at all times and will be changed between sampling locations. Sampling will progress from up-gradient locations to down-gradient locations, reducing the potential for cross contamination from potentially impacted areas to un-impacted or background locations.

Field duplicates will be submitted at a rate of 1 per every 10 samples collected or a minimum of one per sampling event. A field or equipment blank will be run through the sampling equipment and then submitted to the laboratory for analysis to assist in assessing the effect of field sampling and sample shipping methodologies on the accuracy and precision of the analytical results. For volatile parameters, a travel or trip blank prepared by the laboratory will accompany the sample bottles and be submitted for analysis.

For each duplicate, a relative percent difference (RPD) is calculated for each parameter analysed for comparison to SLR's standard QA/QC acceptance limits. RPD will be calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Where: C1 is the concentration in the original sample; and

C2 is the concentration in the duplicate.

Analytical error increases near the reported detection limit (RDL); therefore, the RPD is not normally calculated unless the concentrations of both the original and duplicate samples are greater than five times the RDL. If the RPD for a sample and its duplicate do not meet SLR's RPD standards (60% for organic



parameters or 40% for inorganic parameters) for the parameters analysed, an explanation is required to qualify the difference in values.

Chain-of-custody forms will be completed for all samples submitted to the laboratory and will accompany each sample shipment. Sample temperatures will be maintained between 0°C and 10°C at all times by being kept in sealed coolers on ice. Samples will be shipped for analyses within the recommended time requirements.

All samples will be submitted to a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory that uses AEP recognized methods to conduct laboratory analyses. Laboratories accredited by CALA are required to be ISO17025 compliant. Method blanks, control standards samples, certified reference material standards, method spikes, replicates, duplicates and instrument blanks are routinely analysed as part of the analytical laboratory's QA/QC programs.

# 7.3 Proposed Monitoring Schedule

Historical water quality from the residential wells shows that the water is of consistent quality between the residential wells collected at different times and at various depths within the bedrock. Water quality within the sand and gravel is likewise consistent between the monitoring wells (excluding the outliers due to high turbidity within the samples). This historical data (excluding outliers) will be used to form the baseline groundwater quality with the addition of one more confirmatory sample prior to the commencement of stripping and excavation. This additional sample will be collected for all onsite monitoring wells, participating residential wells and the spring sampling point. This baseline data will then be used to establish control limits in the first annual monitoring report. Details of the baseline sampling is provided in Table 3, with the monitoring point locations presented in Drawing 3.

Once baseline water quality has been established for all sampling points the program will be reduced to annual sampling of only those monitoring wells surrounding the working areas (i.e., those stripped areas. those extracting sand and gravel, or those being actively restored), plus those residential wells within 800 m of the working areas. Monthly water level monitoring will continue at onsite monitoring wells during operating months. The Phase 1 monitoring and sampling schedule is provided in Table 4 and the monitoring point locations presented in Drawing 6.



**Table 3** Proposed Baseline Monitoring Schedule

Parameter	Monitoring Point	Frequency
Water Level	Onsite Monitoring Wells  MW14-101, MW14-102*, MW14-  103, MW18-104, MW18-105,  MW18-106, MW18-107,  MW19-108, MW19-109,  MW19-110	Monthly during Operating Months (April -November)
	Residential Wells WW1, WW2, WW3, WW4, WW5**, WW6**, WW7**, WW8**, WW9**, WW10**, WW11**, WW12**, WW13**	Manual readings twice in the baseline period (June and November). Data loggers installed and recording normal usage and seasonal trends.
Field Parameters: Temperature, pH, specific conductance  Routine Potability: alkalinity, bicarbonate (HCO3), electrical conductivity (EC), ion balance, dissolved calcium (Ca), iron (Fe), potassium (K), manganese (Mn), magnesium (Mg), sodium (Na), chloride (Cl), sulphate (SO4), nitrite (NO2), nitrate (NO3), pH, hardness, total dissolved solids  Tier 1 dissolved metals: Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K,	Onsite Monitoring Wells  MW14-101, MW14-102*, MW14- 103, MW18-104, MW18-105, MW18-106, MW18-107, MW19-108, MW19-109, MW19-110  Residential Wells  WW1, WW2, WW3, WW4, WW5**, WW6**, WW7**, WW8**, WW9**, WW10**, WW11**, WW12**, WW13**	Once before excavation commences
Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Si, Sn, Sr, Ti, Tl, U, V, Zn  Petroleum Hydrocarbons:  Benzene, toluene, ethyl-benzene, xylenes, petroleum hydrocarbon fractions F1 & F2	Surface Water BHS1	

<sup>\* -</sup> MW14-102 has been dry since it was drilled, it will be monitored as per the schedule and only sampled should groundwater levels rise above the end of hole.

<sup>\*\* -</sup> Pending well owner agreement for inclusion in the monitoring program



 Table 4
 Proposed Phase 1 Monitoring Schedule

Parameter	Monitoring Point	Frequency
Water Level	Onsite Monitoring Wells  MW14-101, MW14-102*, MW14- 103, MW18-104, MW18-105,  MW18-106, MW18-107,  MW19-108, MW19-109,  MW19-110	Monthly during Operating Months (April -November)
	Residential Wells	
	WW1, WW2, WW3, WW4, WW5**, WW6**, WW7**, WW8**, WW9**, WW10**, WW11**, WW12**, WW13**	Manual readings twice annually (April and November). Data loggers installed and recording daily usage.
<b>Field Parameters:</b> Temperature, pH, specific conductance		
Routine Potability: alkalinity, bicarbonate (HCO3), electrical conductivity (EC), ion balance, dissolved calcium (Ca), iron (Fe), potassium (K), manganese (Mn), magnesium (Mg), sodium (Na), chloride (Cl), sulphate (SO4), nitrite (NO2), nitrate (NO3), pH, hardness, total dissolved solids	Onsite Monitoring Wells  MW14-102*, MW19-108,  MW19-109, MW19-110	Annually
Tier 1 dissolved metals: Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Si, Sn, Sr, Ti, Tl, U, V, Zn		
As Above	Residential Wells WW1, WW2, WW3, WW4, WW5**, WW6**, WW7**, WW8**, WW13**	Annually until Phase 1 DP expires
As above with the exception of water level	BHS1	Annually
Petroleum Hydrocarbons: Benzene, toluene, ethyl-benzene, xylenes, petroleum hydrocarbon fractions F1 & F2	Onsite Monitoring Wells MW14-102*, MW19-108, MW19-109, MW19-110	Annually

<sup>\* -</sup> MW14-102 has been dry since it was drilled, it will be monitored as per the schedule and only sampled should groundwater levels rise above the end of hole.

<sup>\*\* -</sup> Pending well owner agreement for inclusion in the monitoring program



# 8.0 GROUNDWATER RESPONSE PLAN

The groundwater response plan is presented schematically in Drawing 7. The following sections describe the components of the plan.

# 8.1 Baseline Groundwater Sampling

Groundwater sampling has been conducted previously at the site only to establish existing conditions and perform an impact assessment. Additional data is required to reliably establish a baseline and develop site-specific control limits. To establish the baseline, historical data plus data collected as per Table 3 above, will be aggregated for the onsite monitoring wells and residential wells to define the baseline groundwater quality in the sand and gravel and the bedrock, respectively. This allows the natural seasonal and annual variability of the groundwater quality to be established. Routine sampling frequencies will revert to the proposed schedule in Table 4 after the baseline is established. All water quality taken from private wells will be shared with homeowners.

#### 8.2 Establish Control Limits

The initial baseline groundwater monitoring will be used to develop "control limits" (described in Section 5) that can be used to identify groundwater quality issues at the site. Exact upper and lower control limits will be provided after the baseline groundwater sampling in the first year. The control limits will be dependent on the parameter considered for each aquifer and will incorporate statistically significant deviation from background groundwater quality if natural concentrations are above applicable guideline values. Consideration of natural seasonal variability in measured concentrations will be made so that observed results that are perfectly natural do not inadvertently trigger unnecessary remedial action.

In addition to the control limits developed above, annual monitoring data will be reviewed to determine the presence of increasing or decreasing trends in groundwater quality and elevations using Mann-Kendall analysis or equivalent statistical method once a sufficient data set has been established. Increasing trends in parameters of concern will initiate source identification and flag a given well for follow up during subsequent monitoring events.

# 8.3 Annual Groundwater Monitoring

Annual groundwater monitoring and sampling for Excavation Phase 1 will occur as described in Table 4 after the baseline sampling period. Groundwater monitoring data will be entered and stored in a format suitable for identifying control limit exceedances and trends. If an exceedance of a control limit or increasing trend is detected at a given well, the well will be re-sampled for the full suite of parameters. If the re-sampling confirms the initial result, AEP will be notified of the result. Please be aware that this program will be extended in breadth for each successive Phase; however, those steps are subject to renewed approvals at that time.

# 8.4 Annual Groundwater Monitoring Report

An annual groundwater monitoring report will be prepared and submitted to RVC by April 30 of the year following the year in which the information on which the report is based was collected. It will include data summaries and an interpretation of the results with respect to the environmental performance of the site.



The report will also highlight any recommended changes to the monitoring program to make it more effective or recommendations for any risk management measures to be undertaken in the subsequent year. Once the baseline data collection has been completed, the control limits will be defined in the annual report for that year, and subsequent reports will examine the recent results in that context.

Individual well owners will receive a summary of the data for their well privately each year.

#### 8.5 Source Identification

Once a control limit exceedance or increasing trend is confirmed, attempts will be made to identify potential sources and remove or manage them if feasible. Source removal might include such activities as removal of surficial soil impact, repair of leaks, etc., however, the operator will be doing daily inspections of equipment, routine maintenance and monitoring at the site which will likely flag issues before impacts show up at the sentinel wells. Depending upon the situation, a detailed investigation of the source zone may be necessary and will be included as part of the Risk Management Plan (Section 8.6).

# 8.6 Risk Management Plan

A risk management plan will be developed for this site. This plan will be implemented if exceedances or increasing trends are confirmed and source removal is not feasible.

The first step in any risk management plan will be a preliminary risk assessment to identify any potential receptors and applicable pathways. The preliminary risk assessment will determine if there are any immediate risks to receptors.

After the preliminary risk assessment is completed, a specific risk management and mitigation process will be developed and implemented to reduce the potential risk to any receptors to levels acceptable to AEP. Such activities will be commensurate with the problem at hand. For example, a spill of hydrocarbons would entail containment with soaker pads and the subsequent removal of impacted soils as appropriate depending on the nature of the impact.

# 9.0 SUMMARY

The foregoing groundwater monitoring plan has been developed using both industry standard techniques and enhancements based on the unique setting of this site. Monitoring of both groundwater levels (as they might conceptually affect private well performance) and groundwater quality (given the local use of the underlying aquifer by others as a potable water source) will be undertaken. It is expected that the monitoring program will confirm and refine the interpretation of the site found in the supporting hydrogeological report (SLR 2020c). It will also serve to identify unanticipated problems, first and foremost at the site by way of the sentry monitoring well network. Private wells are a much greater distance from the excavation and given that the pit development is above the water table, there is little likelihood of impacts there. The monitoring program is intended to periodically confirm this and provide that data to the pit operator and private well owners alike. A groundwater response plan has been presented that outlines the steps that will be taken should unanticipated conditions develop.



# **10.0 REFERENCES**

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SLR. 2020b. Mountain Ash Limited Partnership Aggregate Operation – Wetland Assessment and Impact Report

SLR. 2020c. Mountain Ash Limited Partnership Aggregate Operation – Hydrogeological Assessment Report

#### 11.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Mountain Ash Limited Partnership, hereafter referred to as the "Client". It is intended for the sole and exclusive use of Mountain Ash Limited Partnership. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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# **Groundwater Monitoring Plan**

Mountain Ash Limited Partnership

Summit Pit

SLR Project No.: 212.06650.00006



Table A1
Sand and Gravel Monitoring Well Groundwater Quality Results

	Sand and Gravel Monitoring Well Groundwater Quality Results  Guideline MW14-101 MW14-103 MW18-104 MW18-105 MW18-106 MW18-107 MW19-108 MW19-109 MW19-110													
Parameter	Guideline	Units	MW14-101	MW1	4-103	MW18-104	MW18-105	MW18-106	MW18-107	MW19-108	MW19-109	MW19-110		
arameter	(CDWQ)	Ullita	20-Nov-14	20-Nov-14	4-Aug-15	4-Jul-19	4-Jul-19	4-Jul-19	4-Jul-19	4-Jul-19	5-Jul-19	10-Jul-19		
Total Aluminum <sup>1</sup>	0.1 (OG)	mg/L	0.164	5.57	0.109	3.7	5.4	13	7	15	95	10		
Total Antimony	0.006 (MAC)	mg/L	<0.00050	< 0.00050	< 0.00050	0.0049	0.006	0.0048	0.00079	0.0022	0.0034	<0.00060		
Total Arsenic	0.01 (MAC)	mg/L	0.00035	0.007858	0.000336	0.0044	0.0056	0.017	0.0076	0.0086	0.071	0.0084		
Total Barium	1 (MAC)	mg/L	0.424	0.7	0.332	0.61	2.8	1.1	0.79	1.1	7.2	2.2		
Bicarbonate (as HCO3)	NV	mg/L	382	380	375	310	320	360	370	390	350	330		
Total Boron	5 (MAC)	mg/L	<0.020	<0.020	<0.020	0.025	0.021	<0.020	<0.020	0.029	0.087	< 0.020		
Total Cadmium	0.005 (MAC)	mg/L	0.000016	0.00029	< 0.000005	0.00036	0.0055	0.00095	0.00033	0.00095	0.01	0.0042		
Dissolved Calcium	NV	mg/L	76	75	73	63	69	73	71	74	77	62		
Chloride	<250 (AO)	mg/L	10.5	7.8	8.8	29.0	13.0	9.3	10.0	14.0	18	8.4		
Total Chromium	0.05 (MAC)	mg/L	<0.0010	0.0076	0.0016	0.018	0.0046	0.081	0.025	0.038	0.19	0.019		
Total Copper	2 (MAC) / 1 (AO)	mg/L	<0.0010	0.0093	0.0013	0.064	0.11	0.11	0.018	0.038	0.29	0.032		
Total Iron	<0.3 (AO)	mg/L	0.28	12	0.22	7.6	49	37	17	29	190	10		
Total Lead	0.005 (MAC)	mg/L	0.00031	0.00464	< 0.00030	0.0049	0.025	0.019	0.0075	0.024	0.15	0.019		
Total Mercury	0.001 (MAC)	mg/L	<0.00010	<0.00010	<0.00020	0.00003	0.0013	0.00032	0.000048	0.000067	0.00208	0.000002		
Dissolved Magnesium	NV	mg/L	33.7	33.4	32.6	30	32	31	32	32	37	30		
Total Manganese	0.12 (MAC) / 0.02 (AO)	mg/L	0.02	0.93	0.01	0.62	2.90	1.90	0.60	0.74	8.9	7.3		
Total Molybdenum	NV	mg/L	0.0008	0.00184	0.00086	0.015	0.0014	0.005	0.0021	0.0065	0.023	0.0015		
Total Nickel	NV	mg/L	<0.00050	0.01196	0.00051	0.02	0.015	0.036	0.014	0.047	0.41	0.065		
Nitrate-N	10 (MAC)	mg/L	1.19	5.22	1.801	0.97	2.6	2.3	2	2.4	1.7	1.9		
Nitrite-N	1 (MAC)	mg/L	< 0.05	< 0.05	< 0.005	0.098	<0.010	<0.010	0.034	0.048	0.065	< 0.010		
Dissolved Potassium	NV	mg/L	4.8	4.3	3.9	4.1	2.9	3.3	3	3.4	6.3	2.7		
pH <sup>2</sup>	7.0 -10.5		7.9	7.8	8	7.91	8.05	7.87	7.8	7.91	8.19	7.82		
Total Selenium	0.05 (MAC)	mg/L	<0.00060	0.00112	0.00087	0.00049	0.00093	0.0011	0.00094	0.0013	0.00059	0.00096		
Total Silver	NV	mg/L	<0.000070	<0.000070	<0.000070	0.00044	<0.00010	0.0017	0.0001	0.0003	0.0025	< 0.00010		
Dissolved Sodium	<200 (AO)	mg/L	6	8.8	7.9	13	5.7	9	6.6	12	18	6		
Sulphate	<500 (AO)	mg/L	8.88	11.9	10.56	9.2	5.8	7.6	6.6	17	26	8.1		
Total Thallium	NV	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00023	0.0002	<0.00020	0.00028	0.0026	0.00024		
Total Dissolved Solids (calculated) <sup>3</sup>	<500 (AO)	mg/L	337	354	333	310	300	320	320	350	360	290		
Turbidity	1 (OG)	NTU	9.6	680	8	130	>4000	3100	53	670	>4000	<0.10		
Total Uranium	0.02 (MAC)	mg/L	0.001697	0.002014	0.001563	0.0019	0.012	0.003	0.0027	0.0047	0.016	0.006		
Total Zinc	<5 (AO)	mg/L	<0.020	0.033	<0.020	0.072	0.012	0.003	0.0027	0.0047	1.2	0.14		
Total Coliforms	<1 (MAC)	MPN/100 mL	-	-	<1	>24000	<100	1100	>2400	<10	120000	180		
E.Coli	<1 (MAC)	MPN/100 mL	-	-	<1	10	<100	<10	<1.0	<10	100	63		

Notes:

NV = no value

OG = Operational Guidance

AO = Aesthetic Objective

MAC = Maximum Allowable Concentration

Canadian Drinking Water Quality CDWQ Guidelines: September 2019

1. Aluminum Aesthetic Objective (CDWQ - AO): Conventional Treatment Plants <0.1 mg/L (100 ug/L), Other Treatment Systems <0.2 mg/L (200 ug/L)

2. pH Objective (CDWQ): 7.0 - 10.5

3. Calculated result only includes measured parameters. Actual TDS may be higher.

BOLD RED - Exceeds guideline

Table A2
Paskapoo Formation Residential Well Groundwater Quality Results

	Guideline		w\	•		WW2		•	N3		WW4	
Parameter	(CDWQ)	Units	29-Oct-14	4-Aug-15	29-Oct-14	4-Aug-15	10-Jul-19	29-Oct-14	4-Aug-15	30-Oct-14	4-Aug-15	5-Jul-19
Total Aluminum <sup>1</sup>	0.1 (OG)	mg/L	0.0068	0.011	<0.0050	<0.0050	0.006	0.0061	<0.0050	<0.0050	<0.0050	0.0041
Total Antimony	0.006 (MAC)	mg/L	0.00088	<0.00050	0.00059	<0.00050	<0.00060	<0.00050	<0.00050	<0.00050	<0.00050	<0.00060
Total Arsenic	0.01 (MAC)	mg/L	0.000126	0.000132	0.000165	0.000205	<0.00020	0.000143	0.000121	0.000192	0.000194	0.00032
Total Barium	1 (MAC)	mg/L	0.282	0.284	0.128	0.142	0.11	0.221	0.225	0.385	0.391	0.36
Bicarbonate (as HCO3)	NV	mg/L	366.6	359.6	380.6	375.1	350	391.6	377.7	371.8	365.2	340
Total Boron	5 (MAC)	mg/L	0.022	<0.020	0.032	<0.020	0.023	<0.020	<0.020	<0.020	<0.020	<0.020
Total Cadmium	0.005 (MAC)	mg/L	0.000013	<0.00005	0.000016	0.000024	0.000029	0.00004	0.000024	0.000008	<0.000005	<0.000020
Dissolved Calcium	NV	mg/L	70.3	68.2	63.6	63.4	55	73.2	69.7	75.3	72	80
Chloride	<250 (AO)	mg/L	4.29	4.49	1.38	1.93	2	10.31	5.88	10.86	10.95	12
Total Chromium	0.05 (MAC)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012
Total Copper	2 (MAC) / 1 (AO)	mg/L	0.0317	0.013	0.0022	0.0016	0.0045	0.125	0.0057	0.0017	0.0018	0.034
Total Iron	<0.3 (AO)	mg/L	0.015	0.014	0.018	0.04	<0.060	<0.010	<0.010	0.017	0.044	0.3
Total Lead	0.005 (MAC)	mg/L	0.00127	0.00048	<0.00030	<0.00030	0.00054	0.00302	<0.00030	<0.00030	<0.00030	0.011
Total Mercury	0.001 (MAC)	mg/L	<0.00010	<0.00020	<0.00010	<0.00020	<0.0000020	<0.00010	<0.00020	<0.00010	<0.00020	<0.0000020
Dissolved Magnesium	NV	mg/L	35.1	31.8	37.3	35	30	39.9	35.5	35.2	31.5	35
Total Manganese	0.12 (MAC) / 0.02 (AO)	mg/L	<0.0010	<0.0010	0.004	0.0042	0.012	0.0014	<0.0010	<0.0010	<0.0010	<0.0040
Total Molybdenum	NV	mg/L	0.00148	0.00147	0.00222	0.00193	0.0014	0.00113	0.00104	0.00076	0.00066	0.00065
Total Nickel	NV	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.0006	0.00174	<0.00050	<0.00050	<0.00050	<0.00050
Nitrate-N	10 (MAC)	mg/L	1.67	1.658	0.78	1.054	0.37	1.87	1.889	3.02	3.314	3.2
Nitrite-N	1 (MAC)	mg/L	< 0.05	<0.005	<0.05	<0.005	<0.010	<0.05	<0.005	<0.05	<0.005	<0.010
Dissolved Potassium	NV	mg/L	3.3	3.2	2.8	2.6	2	3.1	3	3.1	2.9	3
pH <sup>2</sup>	7.0 -10.5		8.1	8	8	8.1	7.95	7.9	8	8	8	8.13
Total Selenium	0.05 (MAC)	mg/L	0.00084	<0.00060	0.00112	0.00105	0.00052	0.0007	0.00085	0.0018	0.00096	0.00093
Total Silver	NV	mg/L	<0.000070	<0.00007	<0.00007	<0.00007	<0.00010	<0.00007	<0.00007	<0.00007	<0.00007	0.00012
Dissolved Sodium	<200 (AO)	mg/L	7.2	7	13.8	9.3	17	7.8	7.6	7.1	6.5	7.7
Sulphate	<500 (AO)	mg/L	6.95	7.51	15.82	12.85	20	10.33	11.09	7.66	6.77	5.9
Total Thallium	NV	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Total Dissolved Solids	<500 (AO)	mg/L	318	310	328	317	300	349	330	339	328	330
(calculated) <sup>3</sup>	<500 (AO)	rng/L		310		317	300	349	330	338	328	330
Turbidity	1 (OG)	NTU	0.2	0.31	0.2	1.23	0.31	0.2	0.25	0.6	0.23	0.66
Total Uranium	0.02 (MAC)	mg/L	0.001299	0.001241	0.001023	0.001214	0.00091	0.001744	0.001688	0.001785	0.001672	0.0021
Total Zinc	<5 (AO)	mg/L	<0.020	<0.020	0.024	<0.020	0.046	0.205	<0.020	0.029	0.031	0.99
Total Coliforms	<1 (MAC)	MPN/100 mL	-	<1	-	<1	1	-	<1	-	<1	11
E.Coli	<1 (MAC)	MPN/100 mL	-	<1	-	<1	<1	-	<1	-	<1	<1

#### Notes:

NV = no value

OG = Operational Guidance

AO = Aesthetic Objective

MAC = Maximum Allowable Concentration

Canadian Drinking Water Quality CDWQ Guidelines: September 2019

- 1. Aluminum Aesthetic Objective (CDWQ AO): Conventional Treatment Plants <0.1 mg/L (100 ug/L), Other Treatment Systems <0.2 mg/L (200 ug/L)
- 2. pH Objective (CDWQ): 7.0 10.5
- 3. Calculated result only includes measured parameters. Actual TDS may be higher.

**BOLD RED** – Exceeds guideline

Table A3
Big Hill Springs Water Quality Results

SLR Project No.: 212.06650.00006

June 2021

Parameter	Guideline (CWQG	Units		BHS1	
Parameter	PAL Freshwater)	Units	30-Oct-14	4-Aug-15	10-Jul-19
Hardness (as CaCO3)	NV	mg/L	336	317	200
Total Aluminum <sup>1</sup>	0.1	mg/L	0.0182	0.0144	0.3
Total Antimony	NV	mg/L	<0.00050	<0.00050	<0.00060
Total Arsenic	0.005	mg/L	0.000153	0.000146	0.00061
Total Barium	NV	mg/L	0.304	0.313	0.21
Bicarbonate (as HCO3)	NV	mg/L	376.1	371	240
Total Boron <sup>2</sup>	1.5	mg/L	0.024	<0.020	<0.020
Total Cadmium <sup>3</sup>	0.00009	mg/L	0.000032	0.000008	0.000034
Dissolved Calcium	NV	mg/L	74.1	72	48
Chloride⁴	120	mg/L	9.6	10.12	8.2
Total Chromium <sup>5</sup>	0.001	mg/L	<0.0010	<0.0010	0.001
Total Copper <sup>6</sup>	0.004	mg/L	<0.0010	0.001	0.0013
Total Iron	0.3	mg/L	0.027	0.019	0.25
Total Lead <sup>7</sup>	0.007	mg/L	<0.00030	<0.00030	<0.00020
Total Mercury	0.000026	mg/L	<0.00010	<0.00020	0.0000025
Dissolved Magnesium	NV	mg/L	36.7	33.3	20
Total Manganese	NV	mg/L	0.0019	0.0012	<0.0040
Total Molybdenum	0.073	mg/L	0.00141	0.00089	0.00038
Total Nickel <sup>8</sup>	0.15	mg/L	<0.00050	<0.00050	0.00088
Nitrate-N <sup>9</sup>	2.9	mg/L	2.83	3.037	1.4
Nitrite-N	0.06	mg/L	<0.05	< 0.005	<0.010
Dissolved Potassium	NV	mg/L	3.4	3.3	4.8
рН	6.5-9		8.2	8.2	8.07
Total Selenium	0.001	mg/L	0.00218	0.0013	0.00068
Total Silver	0.00025	mg/L	<0.000070	<0.000070	<0.00010
Dissolved Sodium	NV	mg/L	7.8	7.5	5
Sulphate	NV	mg/L	9.36	8.36	4.7
Total Thallium	0.0008	mg/L	<0.00020	<0.00020	<0.00020
Total Dissolved Solids (calculated) <sup>10</sup>	NV	mg/L	342	334	210
Turbidity	NV	NTU	0.8	1.07	5.1
Total Uranium <sup>11</sup>	0.015	mg/L	0.001953	0.001875	0.0013
Total Zinc	0.007	mg/L	<0.020	<0.020	<0.0030
Total Coliforms	NV	MPN	-	2420	>2400
E.Coli	NV	MPN	-	1733	1600

#### Notes:

NV = no value

Canadian Water Quality Guidelines (CWQG) Protection for Aquatic Life (PAL) Freshwater Guidelines Updated to September 2019

- 1. Aluminum Guideline (CWQG Aquatic Life Freshwater): if pH < 6.5 then 0.005 mg/L (5 ug/L), else if pH >= 6.5 then 0.1 mg/L (100 ug/L)
- 2. Boron Guideline value is for long term exposure. Short term exposure value is 29 mg/L
- 3. Cadmium Guideline value is for long term exposure. Short term exposure value is 0.001 mg/L  $\,$
- 4. Chloride Guideline value is for long term exposure. Short term exposure value is 640 mg/L
- 5. Chromium Guideline value is for hexavalent chromium as conservative value. Trivalent chromium guideline is 0.0089 mg/L.
- 6. Copper Guideline (CWQG Aquatic Life Freshwater): if hardness (as CaCO<sub>3</sub>) < 82 mg/L then 0.002 mg/L (2 ug/L),
- $if \ CaCO3 = 83-180 \ mg/L \ then \ is \ calculated \ using \ an \ equation, if \ CaCO3 > 180 \ mg/L \ then \ 0.004 \ mg/L \ (4 \ ug/L),$
- 7. Lead Guideline (CWQG Aquatic Life Freshwater): if hardness (as CaCO3) < 60 mg/L then 0.001 mg/L (1 ug/L), if CaCO3 = 60-180 mg/L then is calculated using an equation, if CaCO3 = >180 mg/L then 0.007 mg/L (7 ug/L)
- 8. Nickel Guideline (CWQG Aquatic Life Freshwater): if hardness (as CaCO3) < 60 mg/L then 0.025 mg/L (25 ug/L), if CaCO3 = 60-180 mg/L then is calculated using an equation, if CaCO3 > 180 mg/L then 0.150 mg/L (150 ug/L),
- 9. Nitrate Canadian Water Quality Guidelines (CWQG) for Aquatic Life represents lower value for "Long Term Exposure". Short Term exposure value is 124 for Freshwater
- 10. Calculated result only includes measured parameters. Actual TDS may be higher.
- 11. Uranium Guideline value is for long term exposure. Short term exposure value is  $0.033 \ mg/L$

**BOLD RED** – Indicates Exceeds guideline

SLR 1 of 1 CONFIDENTIAL



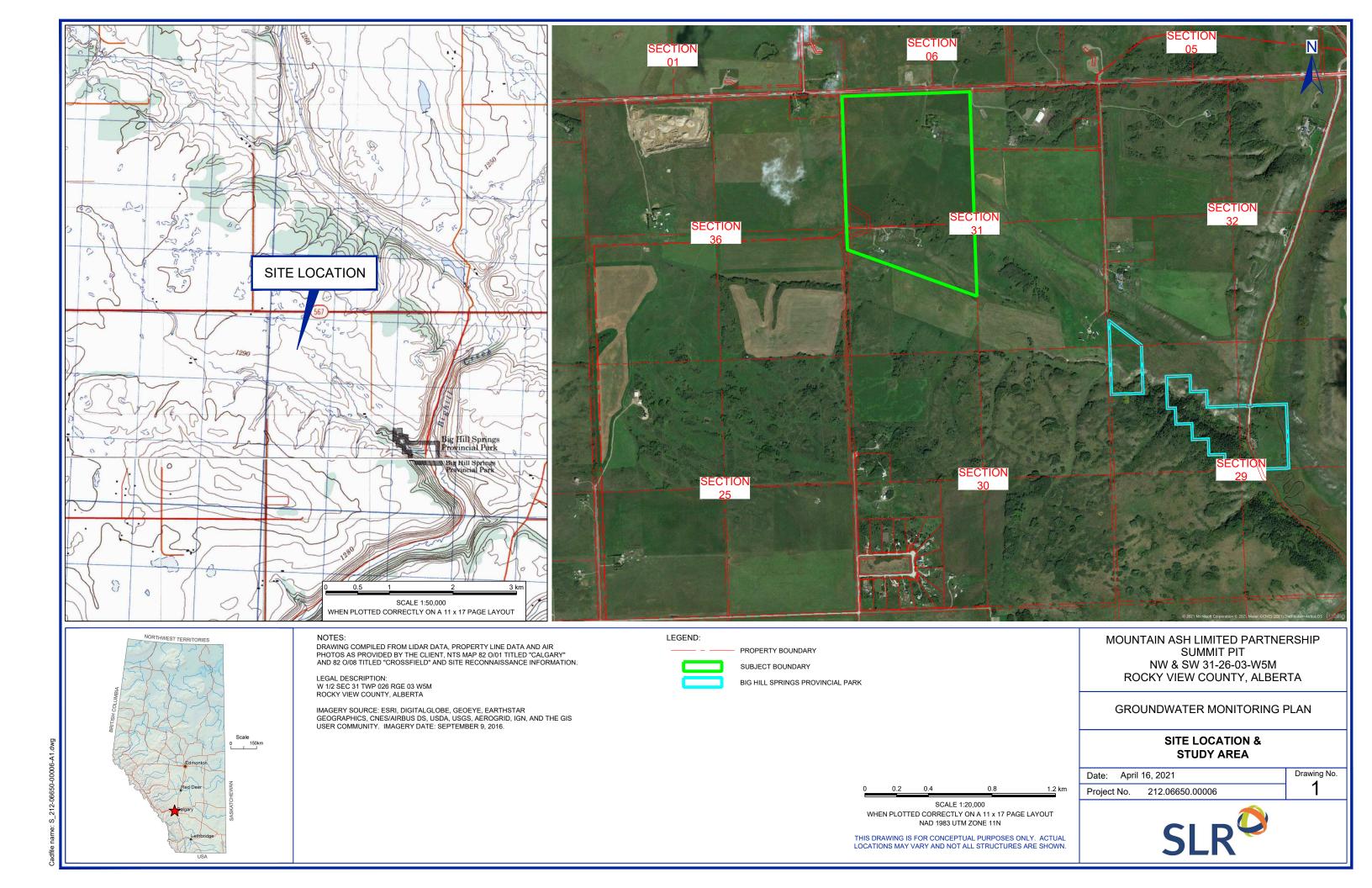
# **Groundwater Monitoring Plan**

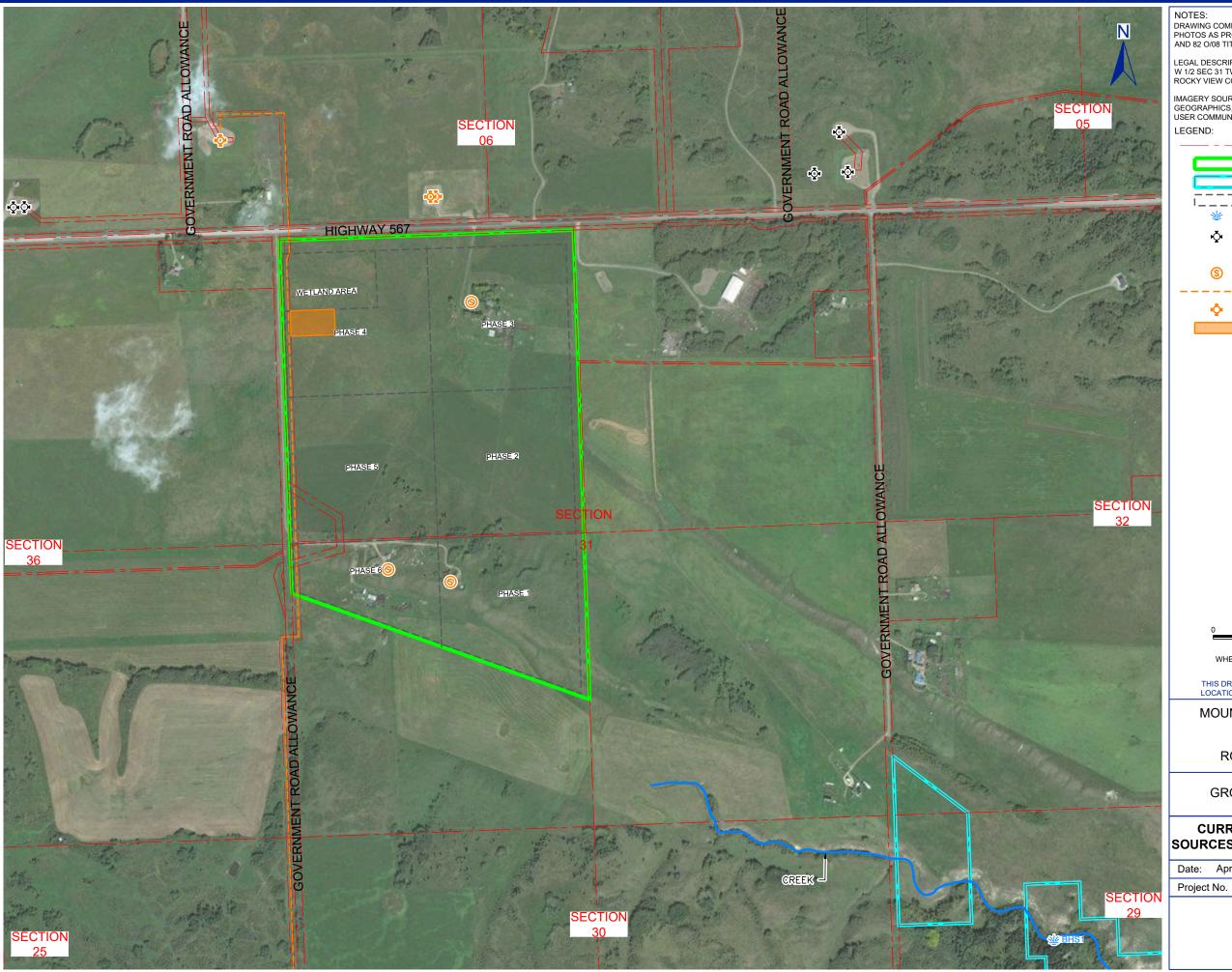
Mountain Ash Limited Partnership

Summit Pit

SLR Project No.: 212.06650.00006







DRAWING COMPILED FROM LIDAR DATA, PROPERTY LINE DATA AND AIR PHOTOS AS PROVIDED BY THE CLIENT, NTS MAP 82 O/01 TITLED "CALGARY" AND 82 O/08 TITLED "CROSSFIELD" AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION: W 1/2 SEC 31 TWP 026 RGE 03 W5M ROCKY VIEW COUNTY, ALBERTA

IMAGERY SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY. IMAGERY DATE: SEPTEMBER 9, 2016.

PROPERTY BOUNDARY SITE LOCATION

BIG HILL SPRINGS PROVINCIAL PARK BOUNDARY

EXTRACTION PHASE BOUNDARIES

SURFACE WATER MONITORING POINT

POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION EXISTING SEPTIC TANK

OIL PIPELINE

WELL CENTRE

PROPOSED REFUELLING, EQUIPMENT MAINTENANCE AND STORAGE LOCATION

WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT NAD 1983 UTM ZONE 11N

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

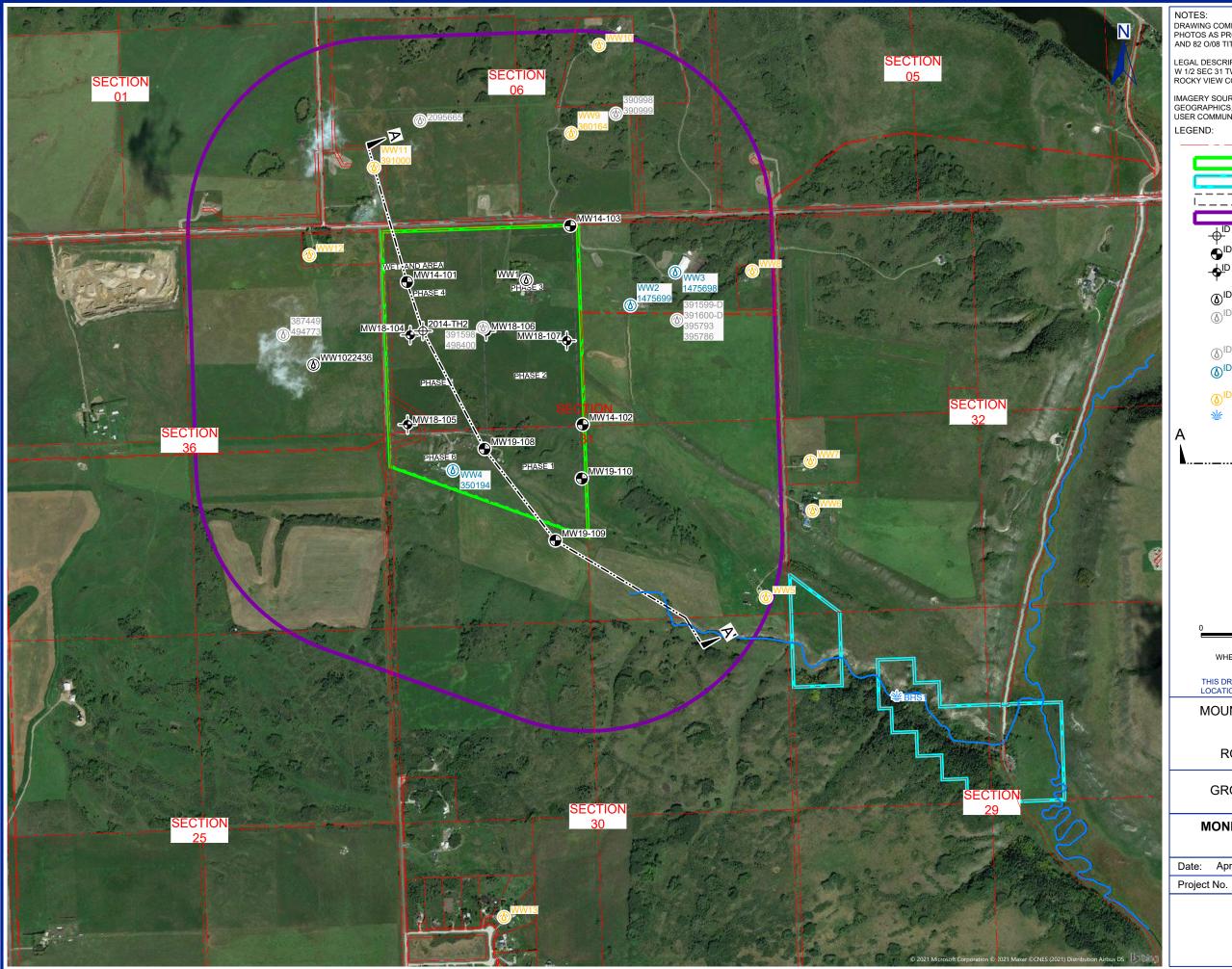
MOUNTAIN ASH LIMITED PARTNERSHIP SUMMIT PIT NW & SW 31-26-03-W5M ROCKY VIEW COUNTY, ALBERTA

GROUNDWATER MONITORING PLAN

**CURRENT AND HISTORICAL POTENTIAL** SOURCES OF GROUNDWATER CONTAMINATION

Date: April 16, 2021

212.06650.00006



DRAWING COMPILED FROM LIDAR DATA, PROPERTY LINE DATA AND AIR PHOTOS AS PROVIDED BY THE CLIENT, NTS MAP 82 O/01 TITLED "CALGARY" AND 82 O/08 TITLED "CROSSFIELD" AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION: W 1/2 SEC 31 TWP 026 RGE 03 W5M ROCKY VIEW COUNTY, ALBERTA

IMAGERY SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY. IMAGERY DATE: SEPTEMBER 9, 2016.

PROPERTY BOUNDARY

SITE LOCATION

BIG HILL SPRINGS PROVINCIAL PARK BOUNDARY

EXTRACTION PHASE BOUNDARIES

800 m RADIUS FROM SITE

BOREHOLE (OTHERS)

BOREHOLE COMPLETED AS A MONITORING WELL

BOREHOLE COMPLETED AS A MONITORING WELL (OTHERS)

WATER WELL (WELL PLOTTED AT QUATER SECTION CENTROID BASED ON DATABASE. EXACT LOCATION WITHIN QUARTER SECTION IS UNKNOWN)

WATER WELL (DECOMMISSIONED)

PREVIOUSLY SAMPLED WATER WELL TO BE INCLUDED IN MONITORING PROGRAM

WATER WELL TO BE ADDED TO MONITORING PROGRAM

SURFACE WATER MONITORING POINT

STRATIGRAPHIC CROSS SECTION LINE

STATION ID	NORTHING	EASTING
MW14-101	5682867.5	680067.9
MW14-102	5682278.7	680793.2
MW14-103	5683099.2	680740.6
MW18-104	5682648.9	680080.8
MW18-105	5682280.0	680070.2
MW18-106	5682664.2	680394.2
MW18-107	5682625.1	680726.1
MW19-108	5682179.2	680387.3
MW19-109	5681802.5	680679.1
MW19-110	5682057.8	680788.1
WW2/1475699	5682770.4	680988.2
WW4/350194	5682091.3	680256.7

SCALE 1:15,000

WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT NAD 1983 UTM ZONE 11N

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MOUNTAIN ASH LIMITED PARTNERSHIP SUMMIT PIT NW & SW 31-26-03-W5M ROCKY VIEW COUNTY, ALBERTA

GROUNDWATER MONITORING PLAN

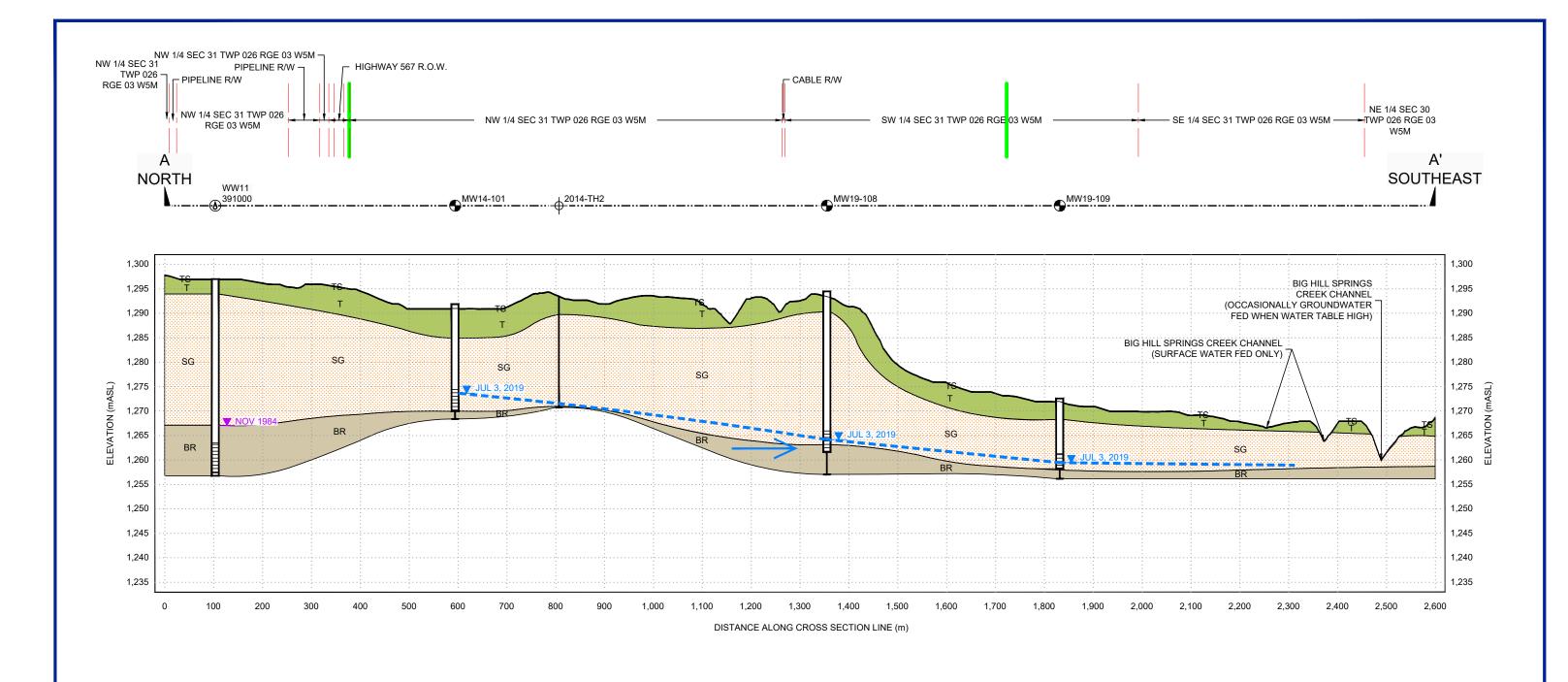
### **MONITORING WELL AND WATER WELL LOCATION PLAN**

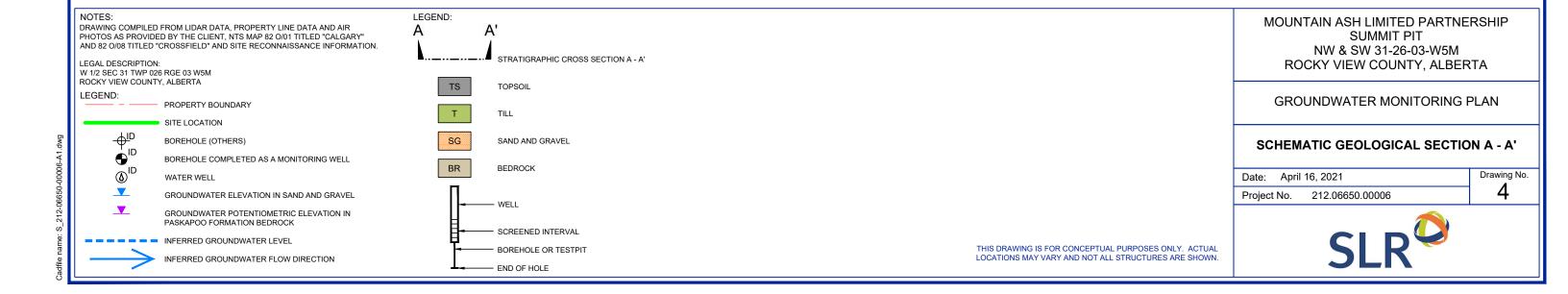
Date: April 16, 2021

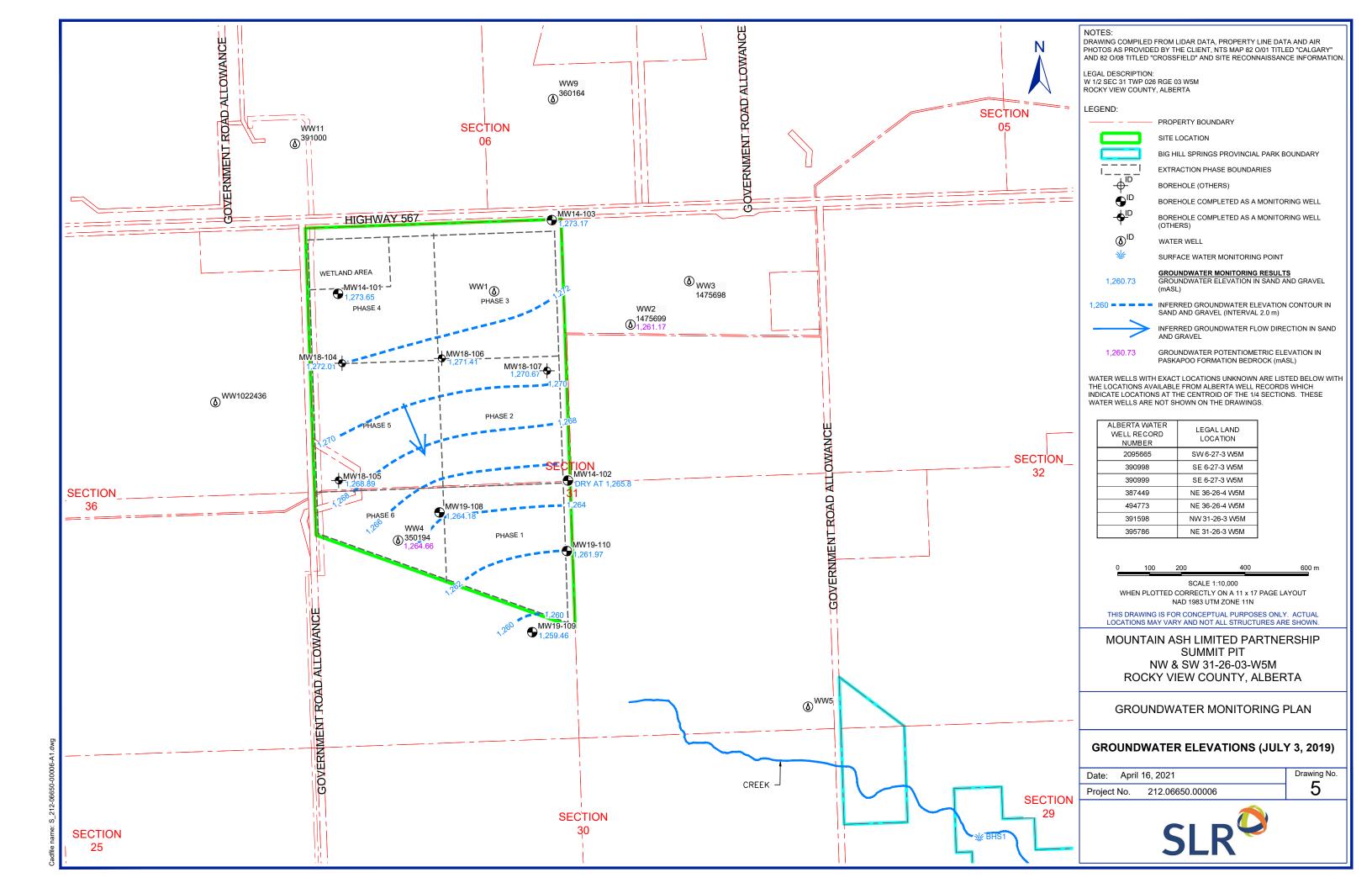
212.06650.00006

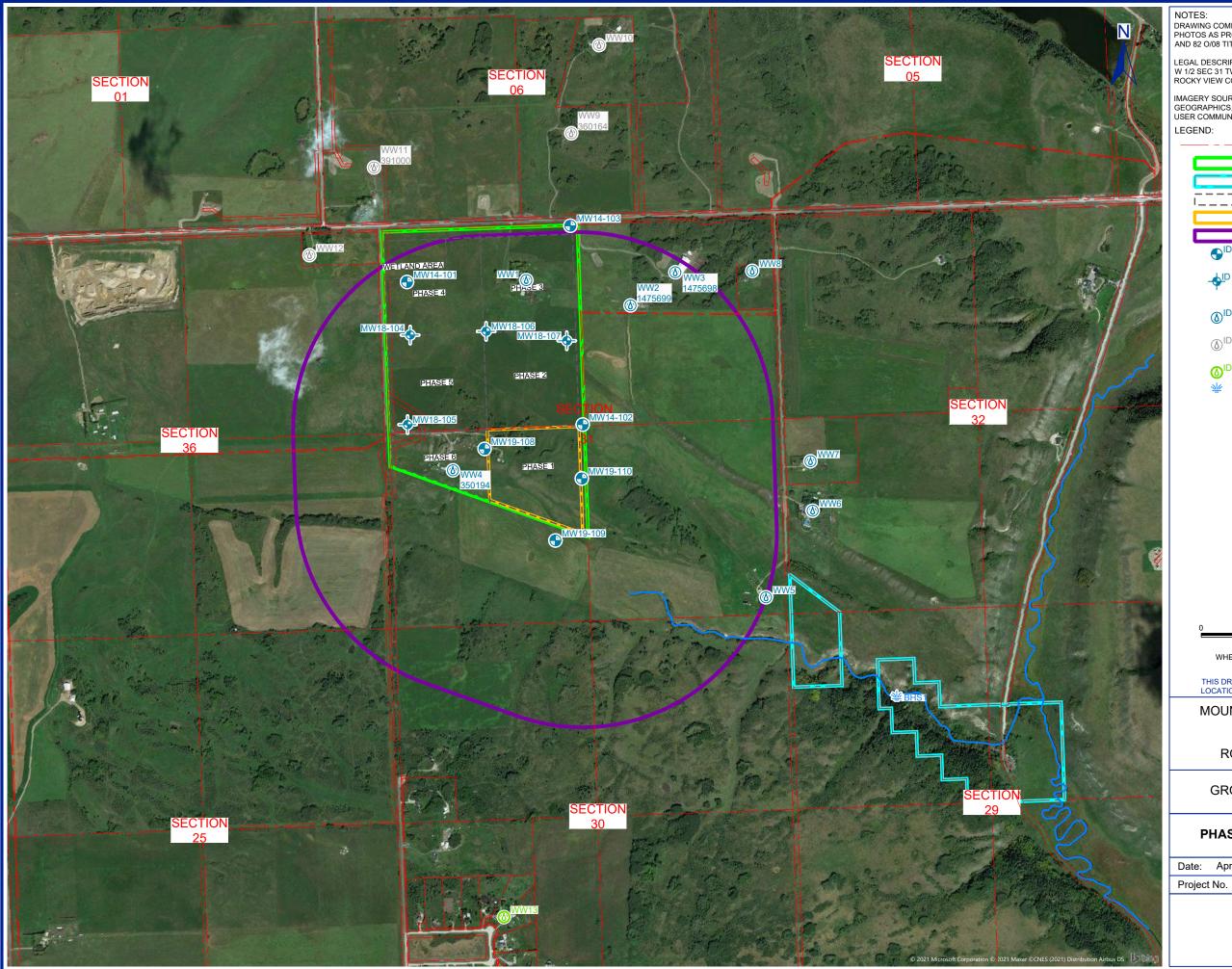
1.0 km











DRAWING COMPILED FROM LIDAR DATA, PROPERTY LINE DATA AND AIR PHOTOS AS PROVIDED BY THE CLIENT, NTS MAP 82 O/01 TITLED "CALGARY" AND 82 O/08 TITLED "CROSSFIELD" AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION: W 1/2 SEC 31 TWP 026 RGE 03 W5M ROCKY VIEW COUNTY, ALBERTA

IMAGERY SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY. IMAGERY DATE: SEPTEMBER 9, 2016.

PROPERTY BOUNDARY SITE LOCATION

BIG HILL SPRINGS PROVINCIAL PARK BOUNDARY

EXTRACTION PHASE BOUNDARIES

PHASE I EXTRACTION BOUNDARY

800 m RADIUS FROM PHASE I

BOREHOLE COMPLETED AS A MONITORING WELL TO BE INDLUDED IN PHASE I ROUTINE MONITORING

BOREHOLE COMPLETED AS A MONITORING WELL (OTHERS) TO BE INCLUDED IN PHASE I ROUTINE

RESIDENTIAL WATER WELL TO BE INCLUDED IN PHASE I ROUTINE MONITORING

> RESIDENTIAL WATER WELL NOT INCLUDED IN PHASE I ROUTINE MONITORING

ANNUAL REVIEW OF DATA COLLECTED BY OTHERS

SURFACE WATER MONITORING POINT

1.0 km

SCALE 1:15,000 WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT NAD 1983 UTM ZONE 11N

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

MOUNTAIN ASH LIMITED PARTNERSHIP SUMMIT PIT NW & SW 31-26-03-W5M ROCKY VIEW COUNTY, ALBERTA

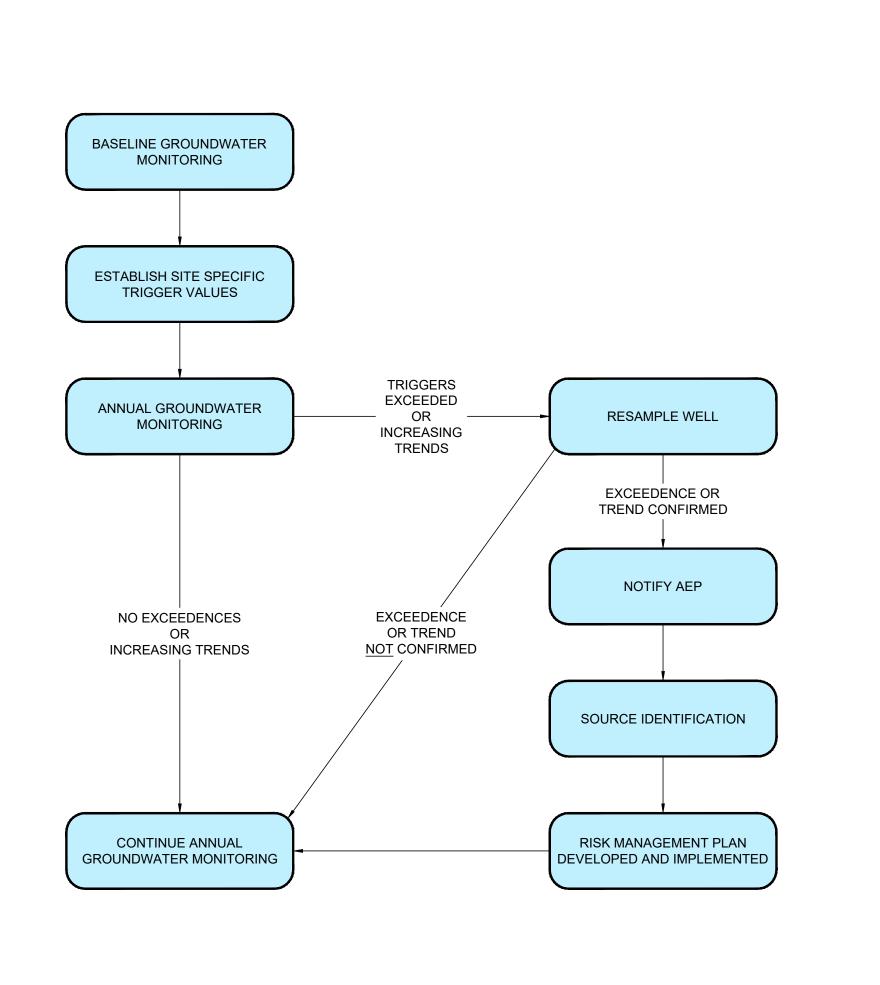
GROUNDWATER MONITORING PLAN

### PHASE I MONITORING LOCATION PLAN

Date: April 16, 2021

212.06650.00006





DRAWING COMPILED FROM LIDAR DATA, PROPERTY LINE DATA AND AIR PHOTOS AS PROVIDED BY THE CLIENT, NTS MAP 82 O/01 TITLED "CALGARY" AND 82 O/08 TITLED "CROSSFIELD" AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION: W 1/2 SEC 31 TWP 026 RGE 03 W5M ROCKY VIEW COUNTY, ALBERTA

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

MOUNTAIN ASH LIMITED PARTNERSHIP SUMMIT PIT NW & SW 31-26-03-W5M ROCKY VIEW COUNTY, ALBERTA

GROUNDWATER MONITORING PLAN

### **GROUNDWATER RESPONSE PLAN**

Drawing No.

Date: April 16, 2021

212.06650.00006 Project No.



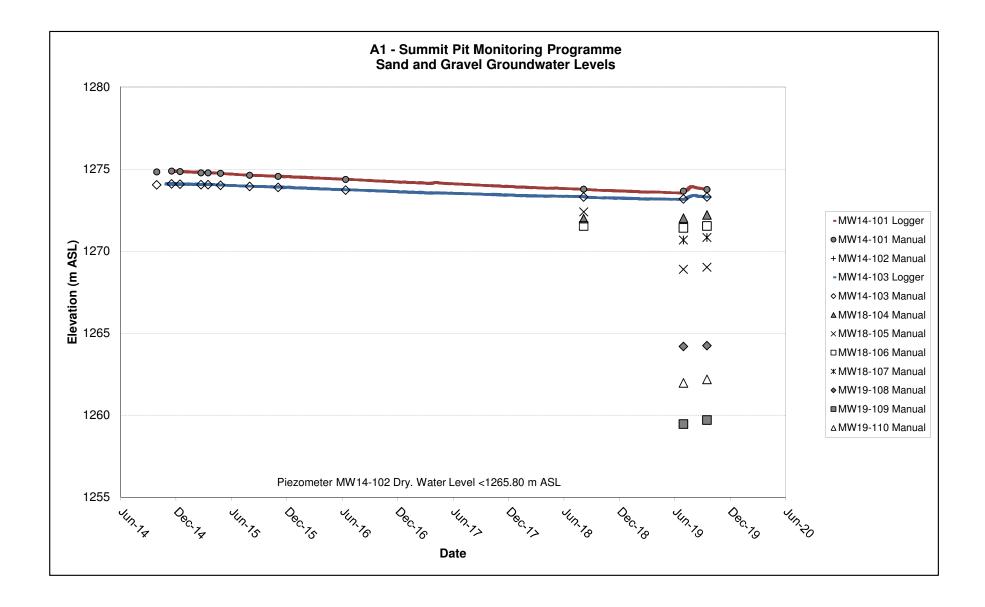
## **Groundwater Monitoring Plan**

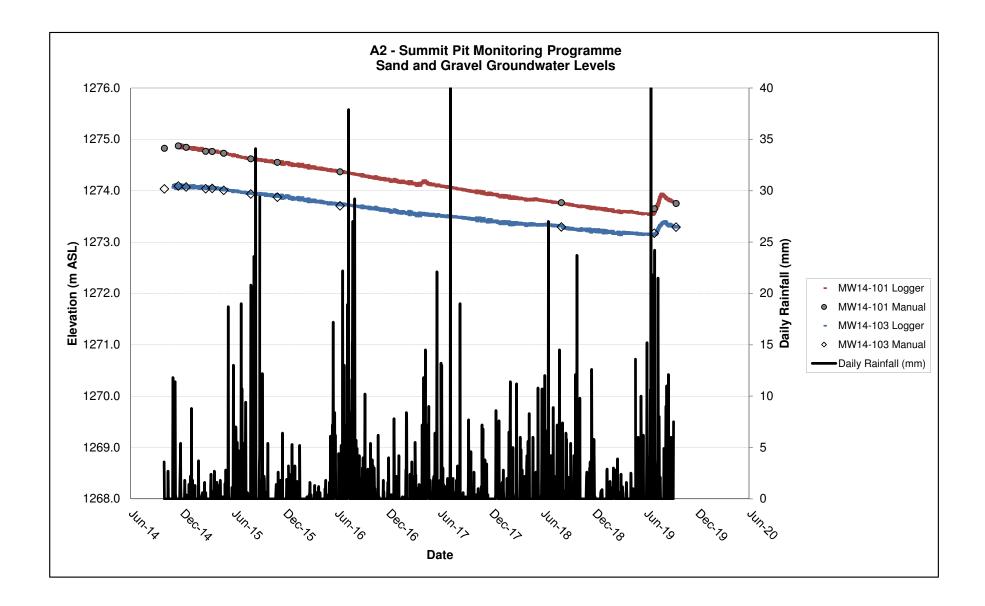
Mountain Ash Limited Partnership

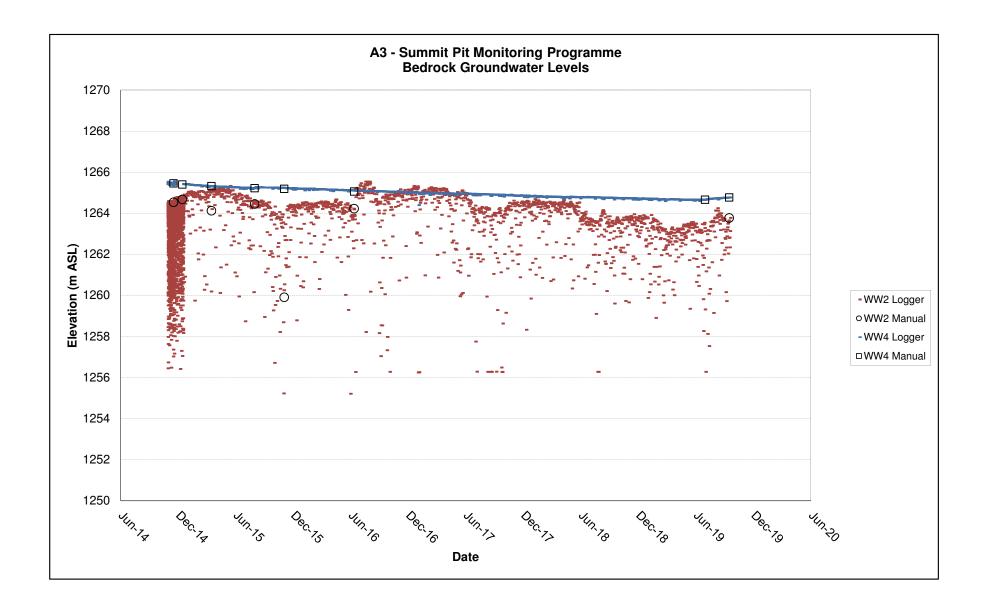
Summit Pit

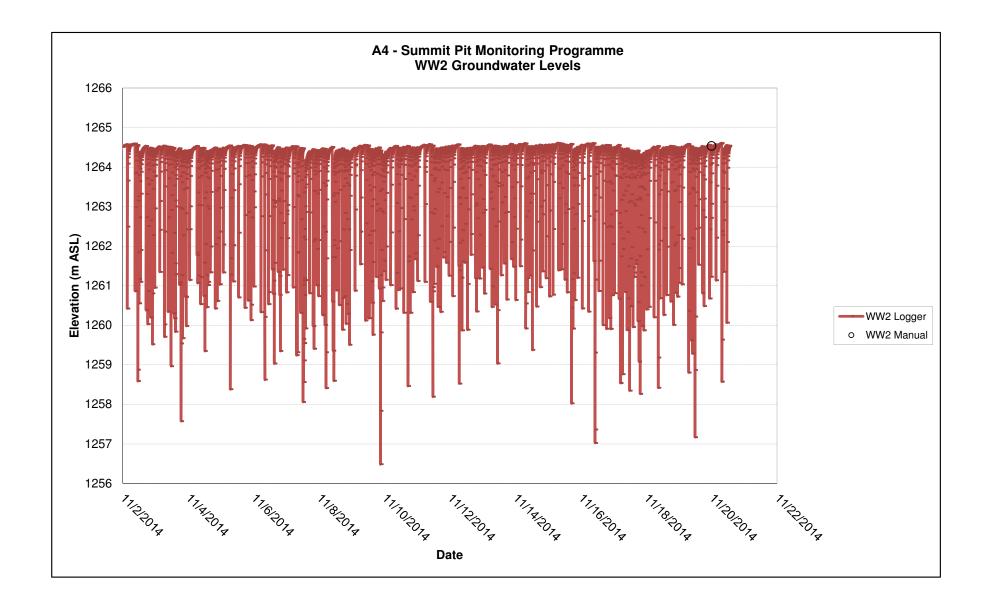
SLR Project No.: 212.06650.00006

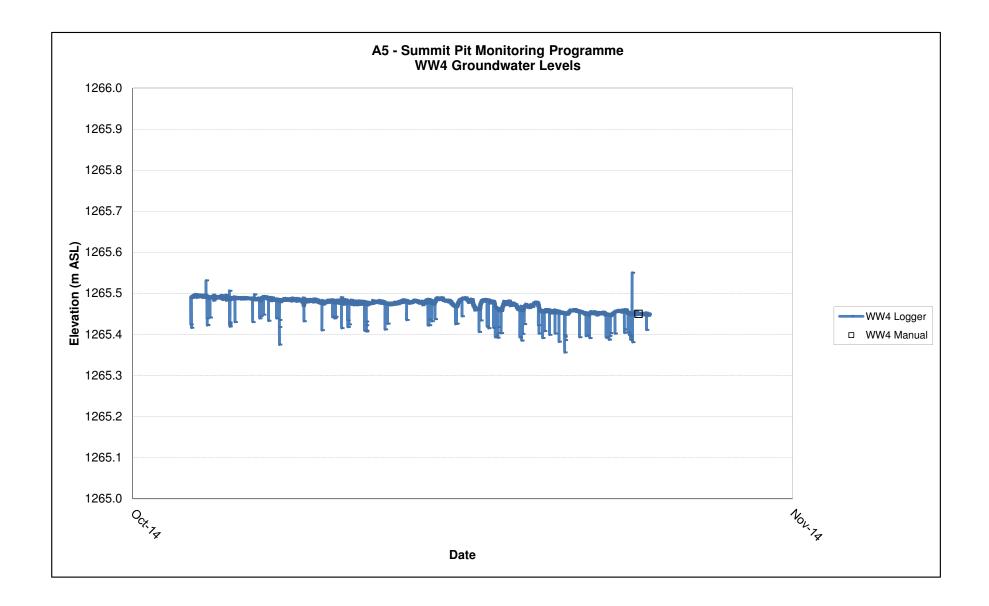














### **Groundwater Monitoring Plan**

Mountain Ash Limited Partnership

Summit Pit

SLR Project No.: 212.06650.00006





# **Reconnaissance Report**

View in Imperial

Export to Excel

## **Groundwater Wells**

Please click the water Well ID to generate the Water Well Drilling Report.

GIC Well	LSD	SEC	TWP	RGE	М	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	СНМ	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIA (cm)
350194	SW	31	26	3	5	LOU'S WATER WELL DRILLING	1990-03-09	35.05	New Well	Domestic		9		DAVIDSON, D.W.	15.24	54.55	14.12
<u>360164</u>	SE	6	27	3	5	AERO DRILLING & CONSULTING LTD.	1991-10-08	73.15	New Well	Domestic		10		BARGETZI, ERNIE	33.53	136.38	14.12
387449	NE	36	26	4	5	PARSONS DRLG	1962-08-10	33.83	New Well	Unknown		9		BRISTOW, C.R.	21.95	72.74	0.00
<u>390998</u>	SE	6	27	3	5	ALBERTA SOUTHERN EXPLORATION DRILLING LTD.	1987-02-11	65.53	New Well	Domestic & Stock		11		STRANGE, R.	45.72	36.37	16.84
390999	SE	6	27	3	5	ALBERTA SOUTHERN EXPLORATION DRILLING LTD.	1987-11-19	73.15	New Well	Stock		15		STRANGE, R.	39.62	45.46	16.84
<u>391000</u>	4	6	27	3	5	DIVERSIFIED DRILLING & EXPLORATION CO.	1984-11-07	40.23	New Well	Domestic & Stock	<u>1</u>	7		CIRCLE J RANCHES	28.96	68.19	13.97
<u>391598</u>	NW	31	26	3	5	PARSONS DRILLING		39.62	New Well	Domestic & Stock				MURRAY, R.J.			17.78
391599	NE	31	26	3	5	KRIEGER DRILLING LTD.		49.38	New Well- Decommissioned	Investigatio n		14		PARKER, G.L.	0.00		0.00
391600	NE	31	26	3	5	KRIEGER DRILLING LTD.	1981-10-14	27.43	New Well- Decommissioned	Domestic		9		PARKER, G.L.			0.00
<u>395786</u>	NE	31	26	3	5	PARSONS DRILLING	1981-11-19	62.48	New Well	Domestic & Stock		21		PARKER, G.L.	48.77	68.19	17.78
<u>395793</u>	NE	31	26	3	5	UNKNOWN DRILLER		62.48	Chemistry	Domestic				KIRK, S.			0.00
<u>494773</u>	NE	36	26	4	5	ALKEN BASIN DRILLING LTD.	1999-11-16	30.48	New Well	Stock		4	9	GOETJEN, MORRIE	22.25	63.65	13.97
498400	NW	31	26	3	5	MEDICINE VALLEY WATER WELLS	2001-05-14	74.68	New Well	Domestic		14	24	GIBBS, DAVE	10.82	9.09	13.97
1022436	9	36	26	4	5	AARON DRILLING INC.	2014-05-05	30.48	New Well	Investigatio n		6		LAFARGE CANADA INC			16.81
1475698	16	31	26	3	5	M&M DRILLING CO. LTD.	2003-01-14	39.62	New Well	Domestic		10	24	QUICK WAY FARMS LTD	32.00	45.46	14.13
1475699	15	31	26	3	5	M&M DRILLING CO. LTD.	2003-01-17	53.95	New Well	Domestic		10	24	QUICK WAY FARMS LTD	32.64	24.55	14.13
2095665	SW	6	27	3	5	UNKNOWNDRILLINGCOMP11		25.60	Well Inventory	Domestic & Stock		1		CIRCLE J RANCHES LTD			

Printed on 9/30/2019 3:15:18 PM Page: 1 / 1

# **Water Well Drilling Report**

**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No.

Drilling Company Well ID

JI AID	Gila =				ntained in this repo nis report will be ret			esponsibility fo	or its	Drilling Company We Date Report Receive	
Well Iden	tification and L	ocation									Measurement in Metri
Owner Na			Address P.O. BOX	970 COCH	IRANE	Town			Province	Country	Postal Code ToL 0W0
Location	1/4 or LSD SW	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Additio	nal Description	
Measured	from Boundary (	m from m from			Latitude	inates in Dec 51.259801 on Obtained	U	es (NAD 83) tude114.4		Elevation How Elevation Obtained	m_ ained
Drilling In	formation										
Method of Cable Too	•				Type of Wo	ork					
Proposed Domestic	Well Use										

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
6.10		Boulders	
10.67		Sand & Gravel	
12.19		Sand	
15.24		Gravel	
18.29		Gray Shale	
22.86		Light Green Shale	
28.96		Green Shale	
32.00		Green Shale	
35.05		Green Shale	

Yield Test Summary Measurement in Metric									
Recommended Pum	p Rate	0.00 L/min	<u> </u>						
Test Date W	ater Removal Rate	e (L/min)	St	atic Water Level (m)					
1990/03/09	54.55		15.24						
Well Completion				Measurement in Me	etric				
Total Depth Drilled	Finished Well Dep								
35.05 m		1990	/03/02	1990/03/09					
Borehole									
Diameter (cm)		om (m)		To (m)					
0.00  Surface Casing (if a Steel		0.00 Well Ca Steel	asing/Li	35.05 ner					
Size OD :	14.12 cm		Size O	D: 11.43 cm					
Wall Thickness :	0.478 cm	Wall 7	Thicknes	s: 0.318 cm					
Bottom at :	15.24 m		Тор а	at : 13.72 m					
		1	Bottom a	at: 35.05 m					
Perforations									
From (m) To (n	Diameter or Slot Width(cm)	Slo	ot h(cm)						
22.86 35.0	5 0.318	Lengt	ii(Ciii)	25.40					
Perforated by T	orch								
Annular Seal Drive		15.24	4 m						
Other Seals									
Тур	ре			At (m)					
Screen Type									
Size OD :	0.00 cm								
From (m)		o (m)		Slot Size (cm)					
Attachment									
			m Fitting	js					
Pack									
Туре		Grain	Size						
	.00	•		<u></u>					

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well  ${\tt UNKNOWN\ NA\ DRILLER}$ 

Company Name

LOU'S WATER WELL DRILLING

Certification No

# **Water Well Drilling Report**

View in Imperial Export to Excel

GIC Well ID GoA Well Tag No. 350194

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 1990/03/16

<b>,</b>		Date Report Rece	1990/03/16
Well Identification and Location			Measurement in Metric
Owner Name Address DAVIDSON, D.W. P.O. BOX 970 C	Town OCHRANE	Province Country	Postal Code T0L 0W0
Location         1/4 or LSD         SEC         TWP         RG           SW         31         026         03	E W of MER Lot Block 5	Plan Additional Description	
Measured from Boundary of m from m from	GPS Coordinates in Decimal Degra Latitude 51.259801 Long How Location Obtained Not Verified	1	
Additional Information			Measurement in Metric
Distance From Top of Casing to Ground Level Is Artesian Flow Rate L/min		ntrol Installed  Describe	
Recommended Pump Rate Recommended Pump Intake Depth (From TOC)		Depth  Make	m H.P Rating)
Did you Encounter Saline Water (>4000 ppm TDS) _ Gas _ Additional Comments on Well	Depthm	Geophysical Log Taken Submitted to ESRD	
Yield Test		Taken From Ground Level	Measurement in Metric
Test Date Start Time 1990/03/09 12:00 AM	Static Water Level 15.24 m Dra	wdown (m)  Depth to water level  Elapsed Time  Minutes:Sec	Recovery (m)
Method of Water Removal Type Bailer Removal Rate 54.55 L/min Depth Withdrawn From 0.00 m  If water removal period was < 2 hours, explain why  Water Diverted for Drilling			
Water Source	Amount Taken	Diversion Date & Time	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well  ${\tt UNKNOWN\ NA\ DRILLER}$ 

Company Name

LOU'S WATER WELL DRILLING

Certification No

# **Water Well Drilling Report**

**View in Imperial Export to Excel** 

Measurement in Metric

GIC Well ID GoA Well Tag No. 360164

Drilling Company Well ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Date Report Received 1991/10/24 Well Identification and Location Measurement in Metric Address Town Postal Code Owner Name Province Country BARGETZI, ERNIE 233 RATCLIFF PLACE SE, CALGARY SEC TWP W of MER Block 1/4 or LSD RGE Plan Additional Description Location Lot SE 06 027 03 9110979 GPS Coordinates in Decimal Degrees (NAD 83) Measured from Boundary of Elevation Latitude 51.274744 Longitude -114.405998 m m from How Location Obtained How Elevation Obtained m from Not Verified Not Obtained

**Drilling Information** Method of Drilling Type of Work New Well Rotary Proposed Well Use Domestic

Yield Test Summary

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
9.45		Till & Clay	
21.64		Gravel	
25.30		Brown Shale	
34.75		Gray Shale	
39.62		Gray Sandstone	
44.20		Gray Shale	
51.82		Gray Sandstone	
59.74		Gray Shale	
66.75		Gray Sandstone	
73.15		Gray Shale	

Recommended Pump Rate 136.38 L/min									
Test Date				ic Water Level (m)					
1991/10/08	136.38			33.53					
Well Completion	on		М	easurement in M	1etric				
Total Depth Drille	ed Finished Well D	,	Start Date End Date						
73.15 m		1991	/10/08	1991/10/08					
Borehole									
Diameter (		rom (m)		To (m)					
0.00				73.15					
Surface Casing Steel	(if applicable)	Well C Steel	asing/Line	r					
Size OD	: 14.12 cm			11.43 cm					
Wall Thickness	0.620 cm	Wall	Thickness :	0.396 cm					
Bottom at	24.99 m		Top at :	18.29 m					
			Bottom at :	73.15 m					
Perforations									
	Diameter of Slot		ot	Hole or Slot					
From (m) T	o (m) Width(cm			Interval(cm)					
36.58	57.06 0.157			15.24					
Perforated by	Torch								
Annular Seal									
Placed from	0.00 m to	24.9	9 m						
Amount _									
Other Seals									
	Type		Α	t (m)					
Screen Type									
Size OD	0.00 cm								
From (m	1)	To (m)		Slot Size (cm)					
Attachmen	t								
	<u> </u>		Bottom Fittings						
Pack									
Туре		Grain	Size						
Amount		_							

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

AERO DRILLING & CONSULTING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Printed on 10/24/2014 1:38:16 PM Page: 1 / 2

## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its

**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No. Drilling Company Well ID 360164

accuracy. The information on this report will be retained in a public database Date Report Received 1991/10/24 Well Identification and Location Measurement in Metric Address Owner Name Town Postal Code Province Country BARGETZI, ERNIE 233 RATCLIFF PLACE SE, CALGARY 1/4 or LSD SEC TWP W of MER RGE Block Plan Additional Description Location Lot SE 06 027 2 9110979 GPS Coordinates in Decimal Degrees (NAD 83) Measured from Boundary of Longitude -114.405998 Elevation \_ Latitude 51.274744 m m from How Elevation Obtained How Location Obtained m from Not Verified Not Obtained Additional Information Measurement in Metric Distance From Top of Casing to Ground Level Is Artesian Flow Is Flow Control Installed Rate Describe Recommended Pump Rate 136.38 L/min Pump Installed Depth m Recommended Pump Intake Depth (From TOC) 0.00 m H.P. Model (Output Rating) m Well Disinfected Upon Completion Did you Encounter Saline Water (>4000 ppm TDS) Depth m\_\_\_\_ Gas \_\_\_\_ Depth Geophysical Log Taken Submitted to ESRD Sample Collected for Potability Submitted to ESRD Additional Comments on Well Yield Test Taken From Ground Level Measurement in Metric Depth to water level Test Date Start Time Static Water Level Drawdown (m) Elapsed Time Recovery (m) 1991/10/08 12:00 AM 33.53 m Minutes:Sec Method of Water Removal Type Air 136.38 L/min Removal Rate Depth Withdrawn From 39.62 m If water removal period was < 2 hours, explain why Water Diverted for Drilling

Amount Taken

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

Water Source

AERO DRILLING & CONSULTING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Diversion Date & Time

# **Water Well Drilling Report**

View in Imperial Export to Excel

GIC Well ID GoA Well Tag No. Drilling Company Well ID Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Well Ident	ification and L	ocation									Measur	ement in Metric
Owner Nan BRISTOW,			Address COCHRAI	NE		Town			Province	Countr	у	Postal Code
Location	1/4 or LSD NE	SEC 36	<i>TWP</i> 026	RGE 04	W of MER 5	Lot	Block	Plan	Additio	onal Description		
Measured f	rom Boundary o					inates in Dec 51.267032	U	es (NAD 83 tude -114.	<i>'</i>	Elevation	1292.35 m	
		m from		l	Lalllude	31.207032	Longi	-114.	420119	Elevation	1292.33 111	
	'	m from			How Location	on Obtained				How Elevation C	Obtained	
					Мар				l	Estimated		

**Drilling Information** Method of Drilling Type of Work Cable Tool New Well Proposed Well Use Unknown Yield Test Summary Measurement in Metric 0.00 L/min

	Measurement in Metric
Water Bearing	Lithology Description
	Yellow Clay
	Gravel
	Fine Grained Sand
	Yellow Clay
	Blue Clay
	Hard Shale
	Sand
	Blue Shale & Sandstone Ledges
	Gray Shale

		Removal Rate (								
1962/08/10		72.74				21.95				
33.83 m		shed Well Depth	Start :	Date	Mea	End Date 1962/08/10	/letric			
Borehole Diamete	r (cm)	From	(m)	To (m)						
0.0		0.0	0.00 33.83							
Surface Casi	ng (if app	licable)	Well Ca	sing/Li	ner					
Size (	DD :	0.00 cm		Size O	D : _	0.00 cm				
Wall Thickne	Wall Thickness: 0.000 c			hicknes	0.00 cm ess: 0.000 cm					
Bottom	at:	0.00 m		Тор а	at :	21.95    Surrement in Metric     End Date     1962/08/10     To (m)     33.83     0.00 cm     0.00 cm     0.00 m     0.00 m     olle or Slot     nterval(cm)				
Perforations			Ε							
	To (m)	Diameter or Slot Width(cm)	Slo Length	-						
	70	.00 m to	0.00	) m_	At (	m)				
	OD : (m)	0.00 cm	(m)		Ş	Slot Size (cm)				
Attachm	ent									
				n Fitting	gs		_			
Pack						· · · · · ·	-			
Туре			Grain	Size						
Amount										

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name PARSONS DRLG Certification No

Copy of Well report provided to owner Date approval holder signed

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# **Water Well Drilling Report**

GIC Well ID GoA Well Tag No.

View in Imperial Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID Date Report Received

Well Identification and	d Location				•	Measurement in Metric
Owner Name BRISTOW, C.R.	Address COCHRAN	NE	Town	Provinc	e Country	/ Postal Code
Location 1/4 or LSE NE	SEC TWP 36 026	RGE W of MER 04 5	Lot Block		ional Description	
Measured from Boundar	ny of m from m from		ates in Decimal Degrees .267032 Longitu Obtained		Elevation How Elevation C Estimated	
Additional Information	1					Measurement in Metric
Is Artesian Flow	Casing to Ground LevelL/min		Is Flow Contro	ol Installed		
Recommended Pump I	Rate	0.00 L/min	Pump Installed		Depth	m
Recommended Pump I	ntake Depth (From TOC)	0.00 m	Туре	Make		Н.Р.
					Model (Output	Rating)
Did you Encounter Sa  Additional Comments		Gas Depth Depth	m m Sample Coll		og Taken to ESRD	
Yield Test					Ground Level	Measurement in Metric
Test Date 1962/08/10	Start Time 12:00 AM	Static Water Level 21.95 m	Drawd	own (m)	Elapsed Time Minutes:Sec	Recovery (m)
Removal Rate Depth Withdrawn Fron	Bailer 72.74 L/min		_			
Water Diverted for Dr	illing					
Water Source		Amount Taken		Divers	ion Date & Time	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name PARSONS DRLG Certification No

# **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** 

390998

GIC Well ID GoA Well Tag No.

Drilling Company Well ID 1987/03/05 Date Report Received

Well Identification	on and Lo	cation								Me	easurement in Metric
Owner Name STRANGE, R.		Addres P.O. Bo	s OX 981 COC	HRANE	Town	)		Province	Cour	ntry	Postal Code T0L 0W0
Location 1/4 SE	or LSD	SEC TWP 06 027	RGE 03	W of MER 5	Lot	Block	Plan	Addition	al Description		
Measured from B	m	n from n from		GPS Coordin  Latitude 5:  How Location  Not Verified	1.274744	Longit	es (NAD 83 ude <u>-114</u> .		Elevation How Elevation Not Obtained		m
Drilling Informati Method of Drillin Rotary Proposed Well U Domestic & Stock	ig /se			Type of Word New Well	k						
Formation Log			M	easurement in N	/letric	Yield Tes	t Summa	ry		Me	easurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Descrip	otion				nded Pum	p Rateater Removal	27.28 L/min	Statio	: Water Level (m)
7.62	, <u>J</u>	Till				1987/02		36.3			45.72
10.36		Gravel				Well Com				Me	easurement in Metric
11.58		Silty Clay						Finished Well	Depth Start L		End Date
17.68		Weathered Shall	e			65.53 m			1987/0	2/10	1987/02/11
27.43		Shale				Borehole					
39.62		Sandstone				Diam	neter (cm)		From (m)		To (m)
48.77		Shale					0.00		0.00		65.53
60.96		Sandstone				Surface C Steel	asing (if a	pplicable)	Well Cas Plastic	sing/Liner	•
62.48		Shale					ze OD :	16.84 cm		Size OD :	12.70 cm
							ckness :	0.478 cm	_	nickness :	
63.70		Sandstone					tom at :	18.29 m	_	Top at :	16.76 m
65.53		Shale					_		<b>-</b> В	ottom at :	65.53 m
							To (n 59.4)  No Seal Drive from ount	4 0.000 lachine en	Slot (m) Length	(cm)	Hole or Slot Interval(cm) 0.10
						Other Sea	ло Тур	ne		At	(m)
							/pe	0.00 cm			Slot Size (cm)
							hment		5 "	=	
						•	-ittings		Botton	n Fittings _	
						Pack					
						Туре			Grain S	Size	
					اا	Amount					

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

ALBERTA SOUTHERN EXPLORATION DRILLING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Printed on 10/24/2014 1:39:37 PM Page: 1 / 2

# **Water Well Drilling Report**

**View in Imperial Export to Excel** 390998

GIC Well ID GoA Well Tag No.

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 1987/03/05 Date Report Received

Well Identifi	ication and Lo	ocation		•	·				•	Measu	rement in Metric
Owner Name STRANGE, F		Address P.O. BOX	( 981 COCHRAN	E	Town			Province	Count	ry	Postal Code T0L 0W0
Location	1/4 or LSD SE	SEC         TWP           06         027	03 5		Lot	Block	Plan		al Description		
Measured fro		f m from m from	L	GPS Coordinate attitude 51.2    Jow Location Color Verified	274744	•			Elevation How Elevation Not Obtained		1
Additional I	nformation									Measu	rement in Metric
Is Artesian		ing to Ground Level L/min		cm	Is		trol Installed Describe				
Recommend	ded Pump Rate			27.28 L/min 62.48 m		Installed				m <i>H.P.</i>	_
	ncounter Saline	e Water (>4000 ppm n Well	TDS) Gas			m	Geo	physical Log Submitted to	Taken ESRD		GRD
Yield Test							Tak		round Level	Measu	rement in Metric
Test Date 1987/02/11		Start Time 12:00 AM	Static Wa	ter Level 45.72 m		Drav	down (m)	El	apsed Time linutes:Sec	Reco	very (m)
Re					_						
If water rem	noval period wa	s < 2 hours, explain v	why								
Water Dive	rted for Drillin	ng									
Water Source	ee		Amount	Taken L				Diversion	Date & Time		

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

ALBERTA SOUTHERN EXPLORATION DRILLING LTD.

Certification No

# **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** 

390999

GIC Well ID GoA Well Tag No.

Drilling Company Well ID Date Report Received

1987/12/02

Well Identification	n and Loc	cation								Measurement in Metric
Owner Name STRANGE, R.		Address P.O. BOX 98	1 COCHE	RANE	Town	1		Province	Country	Postal Code T0L 0W0
Location 1/4 or SE	r LSD	SEC TWP 06 027	RGE 03	W of MER 5	Lot	Block	Plan	Additional	Description	
Measured from Bou	m	from from		Latitude	51.274744 ion Obtained		<i>(NAD 83)</i> e <u>-114.40</u>		Elevation  How Elevation Ob.  Not Obtained	mtained
Drilling Information  Method of Drilling Rotary  Proposed Well Use Stock				Type of W New Well	ork (					
Formation Log			Mea	asurement ii	n Metric	Yield Test S	Summary	/		Measurement in Metric
	Vater Searing	Lithology Description				Recommend Test Date	ed Pump		31.82 L/min	Static Water Level (m)
5.79		Till				1987/11/19		45.46	(4,)	39.62
8.84		Gravel				Well Compl	etion			Measurement in Metric
9.75		Till				,	Drilled Fi	inished Well D	epth Start Date	End Date
16.76		Yellow Sandstone				73.15 m			1987/11/18	3 1987/11/19
20.12		Gray Sandstone				Borehole	er (cm)		rom (m)	To (m)
30.48		Shale					00		0.00	73.15
36.88		Sandstone				Surface Cas	ing (if ap	plicable)	Well Casing	/Liner
39.62 40.23		Shale Moist Candstone				Steel Size	OD:	16.84 cm	Plastic Size	OD: 12.70 cm
50.29		Moist Sandstone Shale				Wall Thickn		0.478 cm	Wall Thickn	
51.82		Sandstone				Bottor	n at :	11.89 m	To	p at : 9.14 m
58.22		Shale							Bottor	n at : 73.15 m
64.01		Shale				Perforations		Diameter of	or	
71.32	Yes	Water Bearing Sandst	one			_ ()	_ ,	Slot	Slot	Hole or Slot
73.15		Shale				From (m) 39.62	To (m) 73.15	Width(cm 0.157	i) Length(cm)	Interval(cm) 15.24
						Screen Type Size From Attachn Top Fitt	Type OD: n (m) ment	0.00 m to	To (m)  Bottom Fitt	At (m)  Slot Size (cm)
						Amount				

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

ALBERTA SOUTHERN EXPLORATION DRILLING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Printed on 10/24/2014 1:41:07 PM Page: 1 / 2

# **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

390999

View in Imperial Export to Excel

GIC Well ID GoA Well Tag No.

Drilling Company Well ID Date Report Received

1987/12/02

Well Ident	tification and L	ocation										Measure	ement in Metri
Owner Nar STRANGE			<i>ddress</i> .O. BOX 9	81 COCHI	RANE	Town			Province	Col	untry		Postal Code T0L 0W0
Location	1/4 or LSD SE	SEC 06	<i>TWP</i> 027	RGE 03	W of MER 5		Block			al Description	)		
Measured i		f m from m from			Latitude	inates in Dec 51.274744 on Obtained	•			Elevation How Elevation Not Obtained	on Obta		_
	Information											Measure	ement in Metri
Distance I Is Artesia	From Top of Casi an Flow Rate		/min		cm	Is		trol Installed Describe					
	ended Pump Rate	9	om TOC)		31.82 L/mi 60.96 m		Installed			Depth		m H.P.	
								Well Disinf					
Addition	Encounter Saline mal Comments or OCCURES AT 13	n Well	G	Gas	Dept	th	m	Geop	ohysical Log Submitted to				RD
Addition	nal Comments or OCCURES AT 13	n Well	G	Gas	Dept	th	m	Geop	physical Log Submitted to otability en From G	TakenESRD	Submi	itted to ESF	ement in Metri
Additior WATER O	nal Comments or OCCURES AT 13	n Well	G	234' @ 8-1	Dept	th	m Sample Co	Geop	ohysical Log Submitted to otability  en From G  Deptt	Taken	Submi	Measure	
Addition WATER O Yield Test Test Date 1987/11/1: Method o	nal Comments or OCCURES AT 13	Start Time 12:00 AM	6 L/min	234' @ 8-1 Statio	Dept  O GPM.  C Water Level	th	m Sample Co	Geop S Dllected for Po Tak	ohysical Log Submitted to otability  en From G  Deptt	round Level to water level lapsed Time	Submi	Measure	ement in Metri

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

ALBERTA SOUTHERN EXPLORATION DRILLING LTD.

Certification No

# **Water Well Drilling Report**

View in Imperial Export to Excel

GIC Well ID GoA Well Tag No. 391000

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 1984/12/05 Date Report Received

fication and L	ocation									Measurement in Metric
Owner Name     Address       BIRCLE J RANCHES     RR2, COCHRANE		HRANE	Town Provinc			Province	Country	Postal Code		
1/4 or LSD 04	SEC 06	<i>TWP</i> 027	RGE 03	W of MER 5	Lot	Block	Plan	Addition	nal Description	
om Boundary o	of			GPS Coordir	nates in Dec	imal Degre	es (NAD 83	3)		
•				Latitude 5	1.272936	Longi	tude -114.4	420414	Elevation	<u>m</u>
	m from			How Location	n Obtained				How Elevation Ob	tained
				Мар					Not Obtained	
	e ANCHES 1/4 or LSD 04 om Boundary o	ANCHES  1/4 or LSD SEC	e Address ANCHES RR2, COC  1/4 or LSD SEC TWP 04 06 027  om Boundary of m from	e         Address           ANCHES         RR2, COCHRANE           1/4 or LSD         SEC         TWP         RGE           04         06         027         03           om Boundary of m from         Triangle of m from         Triangle of m from	e         Address           ANCHES         RR2, COCHRANE           1/4 or LSD         SEC         TWP         RGE         W of MER           04         06         027         03         5           om Boundary of         GPS Coordin	Address   Town	e         Address         Town           ANCHES         RR2, COCHRANE           1/4 or LSD         SEC         TWP         RGE         W of MER         Lot         Block           04         06         027         03         5           om Boundary of	e         Address         Town           ANCHES         RR2, COCHRANE           1/4 or LSD         SEC         TWP         RGE         W of MER         Lot         Block         Plan           04         06         027         03         5           om Boundary of m from m from         Latitude         51.272936         Longitude         -114.4           How Location Obtained         How Location Obtained         -114.4         -114.4         -114.4	e Anches         Address         Town         Province           ANCHES         RR2, COCHRANE         Frown         Province           1/4 or LSD         SEC         TWP         RGE         W of MER         Lot         Block         Plan         Addition           04         06         027         03         5         Section of the control of the	e         Address ANCHES         Town         Province         Country           ANCHES         RR2, COCHRANE         Town         Province         Country           1/4 or LSD         SEC         TWP         RGE         W of MER         Lot         Block         Plan         Additional Description           04         06         027         03         5           om Boundary of m from         Latitude         51.272936         Longitude -114.420414         Elevation           How Location Obtained         How Elevation Obtained         How Elevation Obtained

**Drilling Information** Method of Drilling Type of Work Cable Tool New Well Proposed Well Use Domestic & Stock Yield Test Summary Measurement in Metric

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description
3.05		Yellow Clay
7.32		Cemented Gravel
19.51		Gravel
20.12		Cemented Gravel
29.87		Gravel & Boulders
32.92		Brown Shale & Sandstone
40.23	Yes	Brown Water Bearing Sandstone

Recommende	d Pump R	ate0.0	0 L/min			
Test Date	Water	Removal Rate (	L/min)	Sta	atic Water Level (m)	
1984/11/07		68.19			28.96	
Well Comple					Measurement in Me	etric
Total Depth D	rilled Fini	shed Well Depth			End Date	
40.23 m			1984	/10/15	1984/11/07	
Borehole						
	r (cm)				To (m) 40.23	
Surface Casin Steel		0.0 licable)		asing/Lii		
Size (	DD:	13.97 cm		Size OE	): 11.43 cm	
Wall Thickne	ess :	0.620 cm	Wall 7	hickness	0.318 cm	
Bottom	at:	31.09 m		Тор а	t: 0.00 m	
			E	Bottom a	t: 40.23 m	
Perforations						
		Diameter or Slot	Slo	.	Hole or Slot	
From (m)	To (m)		Length	n(cm)	Interval(cm)	
33.53	39.62	0.396			25.40	
Perforated by	Torch	1				
Annular Seal	Driven					
		.00 m to	1.22	2 m		
Other Seals			_			
	Type				At (m)	
Screen Type						
Size (	DD :	0.00 cm				
From	(m)	То	(m)		Slot Size (cm)	
Attachm	ent					
				m Fitting	s	
Pack						
Type			Grain	Size		
Amount						
		•				

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

DIVERSIFIED DRILLING & EXPLORATION CO.

Certification No

Copy of Well report provided to owner Date approval holder signed

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# **Water Well Drilling Report**

**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No. 391000

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 1984/12/05 Date Report Received

Well Identif	fication and L	ocation						Measurement in Metric
Owner Nam CIRCLE J R	-	Address RR2, COCH	RANE	Town		Province	Country	Postal Code
Location	1/4 or LSD <b>04</b>	SEC TWP 06 027	RGE W of MER 5	Lot Bloo		Additional D	escription	
Measured fr		f m from m from			e <b>grees (NAD 83)</b> ongitude <u>-114.420</u>	Но	vation w Elevation Obi	
Additional I	Information							Measurement in Metric
Distance Fr Is Artesian	rom Top of Cas n Flow Rate	ing to Ground Level L/min	cm	Is Flow	Control Installed _ Describe _			
	nded Pump Rate	9	0.00 L/min 0.00 m	Pump Install	ed	Dep Make	oth	
	Encounter Salin	G	S) Depth as Depth	m	Geopl	hysical Log Tak ubmitted to ESF	enRD	
Yield Test					Take	n From Grour		Measurement in Metric
Test Date 1984/11/07	,	Start Time 12:00 AM	Static Water Level 28.96 m		Prawdown (m)	Elapse	ed Time es:Sec	Recovery (m)
R Depth With	hdrawn From		,	_				
Water Dive	erted for Drillir	ng						
Water Source	ce		Amount Taken			Diversion Da	te & Time	

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

DIVERSIFIED DRILLING & EXPLORATION CO.

Certification No

# **Water Well Drilling Report**

GIC Well ID

**View in Imperial Export to Excel** 

GoA Well Tag No.
Drilling Company V

391598

JI AIDGI LA	The driller supplies accuracy. The infor	the data conta mation on this	ined in this repor report will be reta	t. The Provincained in a pub	ce disclaims re lic database.	sponsibility fo	or its	Drilling Company Date Report Rece	Well ID
Well Identification an	d Location								Measurement in Metric
Owner Name MURRAY, R.J.	Address 511 19ST I	NW, CALGA	RY	Town			Province	Country	y Postal Code
Location 1/4 or LSI NW	SEC TWP 31 026	RGE 03	W of MER 5	Lot	Block	Plan	Additio	nal Description	
Measured from Bounda	ry of		GPS Coordin		_				
	m from		_	1.267033	Longii	ude <u>-114.4</u>	14280	Elevation	1290.83 m
	m from		How Location	n Obtained				How Elevation C	)btained
		ı	Мар				ı	Estimated	
Drilling Information									
Method of Drilling Cable Tool			Type of Wor New Well	rk					
Proposed Well Use Domestic & Stock									
Formation Log		Mea	surement in	Metric	Yield Tes	t Summar	У		Measurement in Metric
Depth from Wate		n			Recomme	nded Pump	Rate	L/min_	
ground level (m) Beari	ng				Test D	ate Wa	ter Removal	Rate (L/min)	Static Water Level (m)
					Well Con				Measurement in Metric
						th Drilled F	Finished Well	Depth Start Da	te End Date
					39.62 m				
					Borehole	. , ,			T ( )
					Dian	neter (cm) 0.00		From (m) 0.00	To (m) 39.62
					Surface C	asing (if a	oplicable)	Well Casir	
					Steel			Steel	
						ize OD :	17.78 cr	_	ze OD : 12.70 cm
					Wall Thi		0.000 cr	_	
					В0	ttom at :	26.82 m	_	Top at : 0.00 m
					Perforation	ons		БОШ	om at : 39.62 m
							Diamete	er or	
					_ ,		Slot		Hole or Slot
					From (m 31.09	) To (m) 38.10			m) Interval(cm) 0.00
					Perforated				
					Annular S Placed	Seal Drive		0.00 ~	
						nount	0.00 m	to 0.00 m	<u>1</u>
					Other Sea				
					Other Sec	Type	2		At (m)
						,,,	-		
					Screen T	/pe			
					S	ize OD :	0.00 cr	n	
						om (m)		— То (m)	Slot Size (cm)
						chment			
					Тор	Fittings		Bottom F	-ittings
					Pack				
								Grain Siz	re
				L	Amount	!			

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name PARSONS DRILLING Certification No

Copy of Well report provided to owner Date approval holder signed

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# **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** 

Drilling Company Well ID Date Report Received

GIC Well ID GoA Well Tag No.

Well Identification and Lo	cation					Measurement in Metric
Owner Name MURRAY, R.J.	Address 511 19ST NW, CA	ALGARY	Town	Provin	ce Country	y Postal Code
Location 1/4 or LSD NW	SEC         TWP         RGB           31         026         03	5	Lot Block		itional Description	
	n from n from			es (NAD 83) tude <u>-114.414280</u>	Elevation How Elevation C	
Additional Information						Measurement in Metric
Distance From Top of Casin Is Artesian Flow Rate	ng to Ground Level L/min		Is Flow Con	trol Installed		
Recommended Pump Rate		L/min	_		Depth	m
Recommended Pump Intake	Depth (From TOC)	m	Туре	Make	Model (Output	H.PRating)
Did you Encounter Saline	Water (>4000 ppm TDS) Gas		m	Geophysical	Log Taken d to ESRD	
Additional Comments on	Well		oumplo oc	nicoted for Foldomy		onnited to Lone
Yield Test				Taken Fror	n Ground Level	Measurement in Metric
Test Date S	Start Time S	Static Water Level m				
			-			
Removal Rate Depth Withdrawn From						
If water removal period was						
Water Diverted for Drilling	]					
Water Source		Amount Taken L		Dive	rsion Date & Time	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well  ${\tt UNKNOWN\ NA\ DRILLER}$ 

PARSONS DRILLING

Company Name

Certification No

# **Water Well Drilling Report**

GIC Well ID

**View in Imperial Export to Excel** 

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GoA Well Tag No. Drilling Company Well ID Date Report Received

Depth from ground level (m) Bearing Lithology Description  0.30 Topsoil  Recommended Pump Rate 0.00 L/min Test Date Water Removal Rate (L/min) Static Water Level (m) 1981/10/10 0.00	Well Identification and Location				Measurement in Metric
New Year			n Pro	vince Country	
Inform   Inform   Inform   Inform   Inform   Inform   Inform   Inform   Inform   Information   Inf		03 5		dditional Description	
Type of Work   New Well-Abandoned   New Yeld   New Well-Abandoned   New Yeld   New Well-Abandoned   New Yeld   New	m from	Latitude 51.267033 How Location Obtained	Longitude -114.402748	How Elevation Obt	
Depth from ground level (m)   Bearing	Method of Drilling Rotary Proposed Well Use				
Test Date	Formation Log	Measurement in Metric	Yield Test Summary		Measurement in Metric
1981/10/10   0.00		otion			Static Water Level (m)
4.27   Brown Clay   6.71   Brown Sandy Clay   11.89   Sandy Gravel   17.07   Medium Grained Gravel   19.20   Sandstone   24.69   Fine Grained Gravel   23.29   Fine Grained Gravel   24.38   Medium Grained Gravel   24.69   Fine Grained Gravel   24.69   Fine Grained Gravel   24.69   Fine Grained Gravel   24.69   Fine Grained Gravel   25.20   Fine Grained Gravel   26.27   Shale   26.27   Shale   26.27   Shale   26.28   Fine Grained Gravel   26.29   Fine				,	
1.27	1.22 Gray Clay				Measurement in Metric
11.89	4.27 Brown Clay		•	d Well Depth Start Date	
17.07   Medium Grained Gravel   18.90   Fine Grained Gravel   19.20   Sandstone   24.69   Fine Grained Gravel   Size OD :	6.71 Brown Sandy Cla	ıy			
18.90	11.89 Sandy Gravel				
18.90   Fine Grained Gravel   19.20   Sandstone   24.69   Fine Grained Gravel   Size OD :	17.07 Medium Grained	l Gravel			
Size OD :	18.90 Fine Grained Gr	avel			
Signary   Sign	19.20 Sandstone		0' 00	00	0.00
36.27   Shale	24.69 Fine Grained Sa	nd			
Shale   Bottom at :   0.00 m	32.92 Fine Grained Gr	avel			
A3.59			Bottom at .		
49.38   Unknown   From (m)   To (m)   Slot   Length(cm)   Interval(cm)			Perforations		
Perforated by  Annular Seal Driven Placed from 0.00 m to 0.00 m  Amount Other Seals  Type At (m)  Screen Type Size OD: 0.00 cm From (m) To (m) Slot Size (cm)  Attachment Top Fittings Bottom Fittings Pack Type Grain Size	·			Slot Slot	
			Perforated by  Annular Seal Driven Placed from 0.00 Amount Other Seals  Type  Screen Type Size OD: 0. From (m)  Attachment Top Fittings  Pack Type	00 cm To (m)	At (m)  Slot Size (cm)

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

KRIÉGER DRILLING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Printed on 10/24/2014 1:43:45 PM Page: 1 / 2

# **Water Well Drilling Report**

GIC Well ID GoA Well Tag No.

**View in Imperial Export to Excel** 

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID Date Report Received

Owner Nan		ocation							Measure	THORIC III WIGHT
PARKER, (		Address P.O. BOX	123 COCHRANE	Town			Province	Country	/	Postal Code T0L 0W0
Location	1/4 or LSD NE	SEC         TWP           31         026	RGE W of ME 03 5		Block		Addition	al Description		
Measured i		m from m from	Latitude	51.267033 ation Obtained	_		2748	Elevation How Elevation C		_
	Information								Measure	ement in Metric
Distance F Is Artesia	From Top of Cas an Flow Rate	ing to Ground Level L/min				trol Installed _ Describe				
	ended Pump Rate		0.00 L		Installed _				m <i>H.P.</i>	
Addition	nal Comments or		Gas D  SPECS FOR SURFACE	epth	m	Geop	hysical Log ubmitted to		bmitted to ESF	
		TIMED WITTER, NO								
Yield Test	t	TIMES WITER, NO				Take		round Level	Measure	ment in Metri
Yield Test Test Date 1981/10/10		Start Time 12:00 AM	Static Water Leve 0.00 n		Draw	Take	Depth El	round Level to water level apsed Time linutes:Sec		ement in Metri
Test Date 1981/10/10  Method o	0  If Water Remove Type A Removal Rate thdrawn From	Start Time 12:00 AM	0.00 n		Draw		Depth El	to water level apsed Time		
Test Date 1981/10/10  Method o  F  Depth Wii  If water re.	of Water Remova Type A Removal Rate tithdrawn From moval period wa	Start Time 12:00 AM  al  L/mir  0.00 m	0.00 n		Draw		Depth EI	to water level apsed Time		ement in Metric

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

KRIÉGER DRILLING LTD.

Certification No

# **Water Well Drilling Report**

GIC Well ID

**View in Imperial Export to Excel** 391600

GoA Well Tag No.

Drilling Company Well ID Date Report Received

oi Aiberta	The driller supplies the data of accuracy. The information on	lity for its	Drilling Company Well ID Date Report Received 1981/11/2			
Well Identification and	Location					Measurement in Metri
Owner Name PARKER, G.L.	Address P.O. BOX 123 CO	Town CHRANE	n	Province	Country	Postal Code T0L 0W0
Location 1/4 or LSD NE	SEC TWP RGE 31 026 03	W of MER Lot 5	Block Plan	Additio	nal Description	
Measured from Boundar	v of m from m from	GPS Coordinates in De Latitude 51.267033 How Location Obtained Map	Longitude -1	* * * * * * * * * * * * * * * * * * *	Elevation 12 How Elevation Obtain Estimated	295.40 m ned
Drilling Information  Method of Drilling Rotary  Proposed Well Use Domestic		Type of Work New Well-Abandoned		_	1981/10/14 Jnknown	
Formation Log	<u> </u>	Measurement in Metric	Yield Test Sumi	mary		Measurement in Metri
Depth from ground level (m) Water Bearin	Lithology Description		Recommended P	-	L/min Rate (L/min) Si	tatic Water Level (m)
10.06 17.68	Sandy Till Clay & Shale		,		Depth Start Date	Measurement in Metric
20.12 21.03	Clay & Gravel Shale		27.43 m Borehole		1981/10/11	1981/10/14
22.86 24.08	Clay & Silt Gray Clay		Diameter (c) 0.00 Surface Casing (		From (m) 0.00 Well Casing/Li	To (m) 27.43
26.82	Clay & Gravel		Surface Casing (	п аррпсаыс)	Well Cashig/Li	nei
27.43	Lost Circulation		Perforated by  Annular Seal  Placed from  Amount  Other Seals	0.000 cm	Mall Thickness Top a Bottom a  Per or Slot Length(cm)	os: 0.000 cm at: 0.00 m
			Screen Type Size OD: From (m)  Attachment Top Fittings  Pack Type Amount		To (m)	Slot Size (cm)

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

KRIÉGER DRILLING LTD.

Certification No

## **Water Well Drilling Report**

**View in Imperial Export to Excel** 391600

GIC Well ID GoA Well Tag No.

Drilling Company Well ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database. Date Report Received 1981/11/25 Well Identification and Location Measurement in Metric Address Postal Code Owner Name Town Province Country T0L 0W0 PARKER, G.L. P.O. BOX 123 COCHRANE 1/4 or LSD SEC TWP W of MER RGE Lot Block Plan Additional Description Location NE 31 026 GPS Coordinates in Decimal Degrees (NAD 83) Measured from Boundary of Elevation \_ Latitude 51.267033 Longitude -114.402748 1295.40 m m from How Location Obtained How Elevation Obtained m from Estimated Additional Information Measurement in Metric Distance From Top of Casing to Ground Level Is Artesian Flow Is Flow Control Installed Rate Describe Recommended Pump Rate L/min Pump Installed Depth m Recommended Pump Intake Depth (From TOC) m H.P. Model (Output Rating) m Well Disinfected Upon Completion Did you Encounter Saline Water (>4000 ppm TDS) Depth m\_\_\_ Depth Geophysical Log Taken Gas Submitted to ESRD Sample Collected for Potability Submitted to ESRD Additional Comments on Well Yield Test Taken From Ground Level Test Date Start Time Static Water Level Method of Water Removal Type L/min Removal Rate Depth Withdrawn From m If water removal period was < 2 hours, explain why Water Diverted for Drilling

Amount Taken

Contractor Certification

Water Source

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name KRIEGER DRILLING LTD. Certification No

Copy of Well report provided to owner Date approval holder signed

Diversion Date & Time

# **Water Well Drilling Report**

GIC Well ID

**View in Imperial Export to Excel** 

Measurement in Metric

GoA Well Tag No.

395786

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 1982/02/02

	*	•		Date	Report Received	1902/02/02
Well Identification and Location					N	leasurement in Metric
Owner Name PARKER, G.L.	Address P.O. BOX 123 COO	Town	Province	Country	Postal Code	
Location 1/4 or LSD SEC NE 31	TWP RGE 026 03	W of MER Lot 5	Block Plan	Additional De	scription	
Measured from Boundary of m from m from	<u> </u>	GPS Coordinates in Dec. Latitude 51.267033 How Location Obtained Map	imal Degrees (NAD 83) Longitude <u>-114.4</u>	02748 Eleve	ation Elevation Obtaine Obtained	m d

**Drilling Information** Method of Drilling Type of Work Cable Tool New Well Proposed Well Use Domestic & Stock

Yield Test Summary

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
1.83		Brown Clay & Boulders	
3.35		Gray Clay & Boulders	
3.96		Boulders	
10.97		Brown Clay & Gravel	
13.72		Gravel	
15.54		Brown Shale	
21.64		Gray Hard Shale	
23.16		Gray Hard Sandstone	
25.30		Gray Shale	
26.82		Gray Sandstone	
27.74		Gray Shale	
28.65		Gray Sandstone	
29.26		Gray Soft Sandstone	
30.78		Gray Hard Sandstone	
34.75		Gray Firm Shale	
36.88		Gray Hard Sandstone	
43.89		Gray Firm Shale	
45.11		Gray Hard Sandstone	
54.86		Gray Shale	
56.39	Yes	Gray Water Bearing Sands	stone
62.48		Gray Shale	

Recommended F	ump Rate	0.00	0 L/min	_			
Test Date	Water Rem	oval Rate (L	/min)	Stati	c Water Level (m)		
1981/11/19		68.19			48.77		
Well Completio					easurement in M	1etric	
,	d Finished	Well Depth		Date End Date			
62.48 m			1981/	11/05	1981/11/19		
Borehole							
Diameter (c		From			To (m)		
	(:f!: -	0.0			62.48		
Surface Casing Steel	(іт арріісарі	*	Well Ca Steel	ising/Line	r		
Size OD	: 17.78	3 cm		Size OD:	12.70 cm		
Wall Thickness	: 0.58	7 cm	Wall T	hickness :	0.556 cm		
Bottom at	: 13.72	2 m		Top at:	0.00 m		
			E	Bottom at :	62.48 m		
Perforations							
		meter or	CI.				
From (m) To		Slot		ot o(cm)	Hole or Slot		
48.16 6	1.87	0.953	Lengu	i(CIII)	40.64		
Perforated by  Annular Seal D							
Placed from	0.00 n	n to	13.72	2 m			
Amount			_				
Other Seals							
	Type			A	t (m)		
Screen Type							
• • • • • • • • • • • • • • • • • • • •	: 0.00	0 cm					
From (m)	)	To (	m)		Slot Size (cm)		
Attachment							
				n Fittings		_	
Pack							
Туре			Grain	Size			
Amount							

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name PARSONS DRILLING Certification No

Copy of Well report provided to owner Date approval holder signed

Printed on 10/24/2014 1:45:00 PM Page: 1 / 2

# **Water Well Drilling Report**

View in Imperial Export to Excel 395786

GIC Well ID GoA Well Tag No. Drilling Company Well ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database. 1982/02/02 Date Report Received Well Identification and Location Measurement in Metric Address Postal Code Owner Name Town Province Country P.O. BOX 123 COCHRANE PARKER, G.L.

Location	1/4 or LSD NE	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Additional L	Description	
Measured		of m from m from			GPS Coordinat Latitude 51. How Location (	267033	0		Н	evation  ow Elevation  ot Obtained	m Obtained
Additional	Information										Measurement in Metric
	From Top of Cas an Flow Rate				cm	Is	: Flow Con	trol Installed Describe			
Recomme	ended Pump Rat	te			0.00 L/min	Pump	Installed		De	pth	m
Recomme	ended Pump Inta	ake Depth (I	From TOC)		60.96 m	Туре			Make	Nodel (Outp	H.Put Rating)
Additior	Encounter Salin	n Well		Gas	Depth		m	Geoph	nysical Log Tai ubmitted to ES	ken RD	
Yield Test	t							Taker	n From Grou		Measurement in Metric
Test Date 1981/11/1		Start Time 12:00 AM		Stat	ic Water Level 48.77 m		Draw	vdown (m)	Elaps	ed Time tes:Sec	Recovery (m)
Depth Wi	of Water Remov Type E Removal Rate tithdrawn From moval period wa	Bailer 6	8.77 m			-					

Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name PARSONS DRILLING Certification No

Copy of Well report provided to owner

Date approval holder signed

UNKNOWN DRILLER

# **Water Well Drilling Report**

**View in Imperial Export to Excel** 

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GoA Well Tag No. Drilling Company Well ID Date Report Received

GIC Well ID 395793

Well Ident	tification and Lo	ocation									Measurement in Metric
Owner Nam KIRK, S.	ле 		Address P.O. BOX 1	1295 CO	CHRANE	Town	1		Province	Countr	ry Postal Code TOL 0W0
Location	1/4 or LSD NE	SEC 31	<i>TWP</i> 026	RGE 03	5			Plan	Additiona	al Description	
Measured f		m from m from			Latitude	51.267033 cation Obtained		(NAD 83) le <u>-114.40</u> 2		Elevation  How Elevation (  Not Obtained	m Obtained
Drilling Info	formation										
Method of Unknown	Drilling				Type of Chemistr						
Proposed I Domestic					<u> </u>						
Formation	Log			N	Measurement	t in Metric	Yield Test S				Measurement in Metric
Depth from ground leve	Water Bearing	Litholo	ogy Description	1			Recommend Test Date		Rate er Removal R	L/min ate (L/min)	Static Water Level (m)
	·						Well Compl Total Depth L 62.48 m Borehole		nished Well L	Depth Start Da	Measurement in Metric  ate End Date
							Diamet	ter (cm)		From (m)	To (m)
							0.0 Surface Cas	.00 sing (if an	nlicable)	0.00 Well Casii	62.48
							Size Wall Thickn	OD:	0.00 cm	Wall Thio	ize OD : 0.00 cm ckness : 0.000 cm
							Bottor		0.000 cm		Top at : 0.000 m
										•	ttom at : 0.00 m
							Perforations	; 	Diameter	or	
							From (m)	To (m)	Slot Width(cr	Slot	Hole or Slot m) Interval(cm)
							Perforated by			'	
l							Annular Sea Placed from Amoun	om	0.00 m to	0.00 n	<u>n</u>
							Other Seals				
								Type			At (m)
							Screen Type		0.00 cm		
								n (m)		To (m)	Slot Size (cm)
							Attachn	nent			
										Bottom F	Fittings
							<b>Pack</b> Type			_ Grain Siz	ze
							Amount				
Name of Jo	r Certification ourneyman respo N NA DRILLER	onsible fo	r drilling/const	truction c	of well		Се 1	ertification	No		
Company N	lomo						0	ony of Mol	Il roport provi	dad to awnor	Date approval holder signed

Printed on 10/24/2014 1:45:55 PM Page: 1 / 2

# **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its

**View in Imperial Export to Excel** 

395793

GIC Well ID GoA Well Tag No. Drilling Company Well ID

	accuracy. The information on this report will be retained in a public database.  Date Report										ed
Well Ident	ification and L	ocation									Measurement in Metric
Owner Name Address KIRK, S. P.O. BOX 1295 CO					Town CHRANE				Province	Country	Postal Code T0L 0W0
Location	1/4 or LSD NE	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Additional	Description	
Measured from Boundary of m from					GPS Coordinates in Decimal Degrees (NAD 83)  Latitude 51.267033 Longitude -114.402748					Elevation	m
		m from			How Locat	ion Obtained		l l	How Elevation Obtained		

NE	(	31 026	03	5				
Measured from E	m	from from				es (NAD 83) itude -114.402748	Elevation How Elevation Not Obtained	m Obtained
Additional Infor	mation							Measurement in Metric
Is Artesian Flor				cm	Is Flow Con	trol Installed		
Recommended		<u> </u>		L/min	Pump Installed			
Recommended	Pump Intake	Depth (From TOC)		m	Туре	Make	Depth  Model (Outpu	H.Put Rating)
Did you Encol	unter Saline V	Vater (>4000 ppm T	DS) Gas			Geophysica	lpon Completion I Log Taken ed to ESRD	
Additional Co	mments on W	Vell			Sample Co	ollected for Potability	<u> </u>	Submitted to ESRD
Yield Test						Taken Fro	m Ground Level	Measurement in Metric
Test Date	Si	tart Time	Sta	tic Water Level m				
Method of Water								
Remo	ı ype val Rate	L/min						
Depth Withdray								
If water removal	l period was <	: 2 hours, explain wi	hy		_			
Water Diverted	I fan Drillin e							

Water Diverted for Drilling		
Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name UNKNOWN DRILLER

Certification No

Copy of Well report provided to owner

Date approval holder signed

Method of Drilling

Proposed Well Use

30.48

Rotary

# **Water Well Drilling Report**

Type of Work New Well

The driller supplies the data contained in this report. The Province disclaims responsibility for its

**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No.

Drilling Company Well ID

accuracy. The information on	nis report will be retained in a public database.	Date Report Received 1999/11/25		
Well Identification and Location		Measurement in Metric		
Owner Name Address GOETJEN, MORRIE RR1, AIRDRIE	Town Pro	vince Country Postal Code CANADA T4B 2A3		
Location         1/4 or LSD         SEC         TWP         RGE           NE         36         26         4	W of MER Lot Block Plan A 5	dditional Description		
Measured from Boundary of m from m from	GPS Coordinates in Decimal Degrees (NAD 83)  Latitude 51.267032 Longitude -114.426119  How Location Obtained  Not Verified	Elevation m  How Elevation Obtained  Not Obtained		
Drilling Information				

Stock Formation Log Measurement in Metric Water Lithology Description Depth from ground level (m) Bearing 3.05 Brown Clay 23.16 Coarse Grained Gravel 29.26 Yes Water Bearing Gravel

Brown Shale

Yield Test Sum	mary				Me	asurement ir	n Metric
Recommended F	Pump Rat	te 36.3	7 L/min				
Test Date	L/min)	Static Water Level (m)					
1999/11/16 63.65				22.25			
Well Completio					Me	asurement ir	n Metric
Total Depth Drille	hed Well Depth						
30.48 m			1999	/11/15		1999/11/16	6
Borehole							
Diameter (c	m)	From 0.0	-	To (m) 30.48			
Surface Casing Steel		cable)	Well Ca				
	:1	3.97 cm				0.00 cr	
Wall Thickness	:		Wall 7	all Thickness :			
Bottom at	:2	28.04 m				0.00 m	
Perforations			L	Bottom a	at : _	0.00 m	_
From (m) To		Diameter or Slot Width(cm)	Slo Lengtl			Hole or Slot Interval(cm)	
Other Seals	0.0		28.04	4 m_	At :	(m)	
Screen Type Size OD	:	0.00 cm					
From (m	То	o (m)			Slot Size (cm)		
Attachment							_
				m Fitting	gs_		
Pack							
Туре				Grain Size			
Amount							

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

ALKÉN BASIN DRILLING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

Page: 1 / 2 Printed on 10/24/2014 1:46:32 PM

## Water Well Drilling Report

The driller supplies the data contained in this report. The Province disclaims responsibility for its

GIC Well ID

**View in Imperial Export to Excel** 

GoA Well Tag No.

**Drilling Company Well ID** 

1999/11/25

accuracy. The information on this report will be retained in a public database Date Report Received Well Identification and Location Measurement in Metric Address Postal Code Town Owner Name Province Country RR1, AIRDRIE GOETJEN, MORRIE CANADA T4B 2A3 SEC TWP W of MER Additional Description 1/4 or LSD RGE Block Plan Location Lot NE 36 26 GPS Coordinates in Decimal Degrees (NAD 83) Measured from Boundary of Elevation \_\_\_ Latitude 51.267032 Longitude -114.426119 m m from How Elevation Obtained How Location Obtained m from Not Verified Not Obtained Additional Information Measurement in Metric Distance From Top of Casing to Ground Level Is Artesian Flow Is Flow Control Installed Rate Describe Recommended Pump Rate 36.37 L/min Pump Installed Depth m Recommended Pump Intake Depth (From TOC) 27.43 m H.P. Model (Output Rating) m Well Disinfected Upon Completion Did you Encounter Saline Water (>4000 ppm TDS) Depth m \_\_\_\_ Gas Yes Depth Geophysical Log Taken Submitted to ESRD Sample Collected for Potability Submitted to ESRD Additional Comments on Well DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 2'. Yield Test Taken From Ground Level Measurement in Metric Depth to water level Test Date Start Time Static Water Level Drawdown (m) Elapsed Time Recovery (m) 1999/11/16 12:00 AM 22 25 m Minutes:Sec 1:00 26.82 Method of Water Removal 2:00 24.38 3:00 23.16 Type Air 4:00 22.71 63.65 L/min Removal Rate 5:00 22.56 Depth Withdrawn From 30.48 m 6:00 22.40 7:00 22.25 If water removal period was < 2 hours, explain why 8:00 22.25 10:00 22.25

Water Diverted for Drilling		
Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

ALKÉN BASIN DRILLING LTD.

Certification No

Copy of Well report provided to owner Date approval holder signed

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## **Water Well Drilling Report**

**View in Imperial Export to Excel** 

Measurement in Metric

GIC Well ID GoA Well Tag No. Drilling Company Well ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Date Report Received 2001/06/22 Well Identification and Location Measurement in Metric Address Postal Code Town Owner Name Province Country P.O. BOX 1773 SPRUCE VIEW GIBBS, DAVE T0M 1V0 1/4 or LSD SEC TWP W of MER Block RGE Lot Plan Additional Description Location NW 31 026 03 GPS Coordinates in Decimal Degrees (NAD 83) Measured from Boundary of Elevation \_ Latitude 51.267033 Longitude -114.414280 m m from How Elevation Obtained How Location Obtained m from Not Verified Not Obtained

**Drilling Information** Method of Drilling Type of Work New Well Cable Tool Proposed Well Use Domestic

Yield Test Summary

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
4.57		Brown Clay & Rocks	
8.23		Gray Sandstone	
13.72		Gray Shale	
19.51		Gray Sandy Shale	
22.86		Gray Shale	
24.08		Gray Sandstone	
29.87		Gray Shale	
30.78		Blue Shale	
34.14		Gray Silty Shale	
54.56		Gray Shale	
57.30		Gray Sandstone	
67.67		Gray Shale	
71.63		Gray Sandy Shale	
74.68		Gray Shale	

L	Recommende	ed Pump R	ate 9.0	09 L/mir	1			
	Test Date	Water	Removal Rate	(L/min)	St	tatic W	ater Level (m)	)
	2001/05/14	1	9.09				10.82	
	Well Comple	etion				Meas	urement in I	Metric
	Total Depth D	Drilled Fini	shed Well Depti	h Start	Date		End Date	
	74.68 m			2001	/05/07		2001/05/14	
	Borehole							
		er (cm)		n (m)			To (m)	
	0.0			.00			74.68	
	Surface Case Steel	ing (if appl	icable)	Well Ca Plastic	asing/Li	iner		
			13.97 cm				11.43 cm	
	Wall Thickn	0.620 cm	Wall 7	Thicknes	ss :	0.602 cm		
	Bottom at : 24.69 m				Тор а	at :	19.81 m	
				1	Bottom a	at:	74.68 m	_
١,	Perforations							
			Diameter or Slot	CIA	<b>^</b> +	<b>⊔</b> ^	le or Slot	
П	From (m)	To (m)	Width(cm)	Slot ) Length(cm)			Interval(cm)	
	24.69	74.68	0.635		,		20.32	
	Perforated by	Saw						
	Annular Sea	/ Driven						
	Placed froi	m 0	.00 m to	24.69	9 m			
	Other Seals			_				
		Type				At (m	)	
	Screen Type	•						
	Size	OD :	0.00 cm					
	From	(m)	То	(m)		Slo	Slot Size (cm)	
	Attachn	nent						
	Top Fitti	ings		Botto	m Fitting	gs		_
	Pack							
	Туре			Grain	Size			
l	Amount						_	

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

MEDICINE VALLEY WATER WELLS

Certification No

Copy of Well report provided to owner Date approval holder signed

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## **Water Well Drilling Report**

G

View in ImperialExport to ExcelGIC Well ID498400

GIC Well ID GoA Well Tag No.

490400

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID
Date Report Received 2001/06/22

Owner Name GIBBS, DAVE  .ocation 1/4 or LSD NW  Measured from Boundary	SEC 31 y of m from	Address P.O. BOX TWP 026	1773 SPRI RGE 03	UCE VIEW  W of MER 5	Town Lot	Block	Plan	Province Addition	Country nal Description	Postal Co TOM 1V0
NW Measured from Boundary	31 y of m from			5	Lot	Block	Plan	Addition	nal Description	
	m from									
dditional Information						•	es (NAD 83)			
dditional Information	m from			Latitude 5	1.267033	Long	itude <u>-114.41</u>	4280	Elevation	<u>m</u>
dditional Information	m from			How Location	n Obtained				How Elevation Ob	tained
dditional Information				Not Verified				l	Not Obtained	
										Measurement in M
Distance From Top of C		d Level		cm						
Is Artesian Flow		I /min			Is	s Flow Con	ntrol Installed			
Recommended Pump R	Poto	<u> </u>		9.09 L/mir	Dumn	Inotallad	Describe		Depth	
Recommended Pump Ir		rom TOC)	-			installed _		Make		<u>м</u> Н.Р.
rtocommonaca r amp n	nano Dopar (r r	0111 1 0 0)		71.00 111	. ,,,,,,			Mano	Model (Output R	ating)
Did you Encounter Sa	line Water (>40	7 maa 000	DS)	Depth	)	m	Well Disinfe	ected Upon		
,				Depth						
								Submitted to		
						01- 0				-:
Additional Comments	on Woll					Sample C	ollected for Po	таршту	Subri	nitted to ESRD
		M TOD OF	- 0.4.0.11.0	TO OBOUND LE	-\/=1 . 41					
DRILLER REPORTS DI	STANCE FRO	IN TOP OF	CASING	TO GROUND LE	VEL. I.					
ield Test							Take		Ground Level In to water level	Measurement in M
Test Date 2001/05/14	Start Time 12:00 AM		Stati	ic Water Level 10.82 m		Drav	vdown (m)	E	lapsed Time	Recovery (m)
									Minutes:Sec 1:00	54.32
Method of Water Remo	oval								2:00	53.77
Type	Bailer								3:00	53.28
Removal Rate	9	.09 L/min							4:00	52.88
Depth Withdrawn From		.00 m							5:00	52.40
Deput Williarawii i Toili		.00 111							6:00	52.09
If water removal period	was - 2 hours	ovnlain w	hv						7:00 8:00	51.82 51.58
i water removar period	was < 2 Hours,	explail w	iiy						9:00	51.19
									10:00	50.81
									12:00	50.38
									14:00	50.05
									16:00	49.50
									20:00	48.05
									25:00	46.09
									30:00	44.84
									35:00	43.08
									40:00	41.53
									50:00	39.01
									60:00	36.32
									75:00	33.19
									90:00	30.57
									105:00	28.79
									120:00	26.93
Matain Discontinuit (a.e. Dis	W									
Vater Diverted for Dri	iiing									
Vater Source			Am	ount Taken				Diversio	n Date & Time	

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name

MEDICINE VALLEY WATER WELLS

Certification No

1

Copy of Well report provided to owner Date approval holder signed

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## **Water Well Drilling Report**

View in Imperial Export to Excel

Measurement in Metric

GIC Well ID GoA Well Tag No. 1022436

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 2014/09/24 Date Report Received

Well Ident	tification and L	ocation									Measurement in Metric
Owner Nar LAFARGE	<mark>ne</mark> CANADA INC		Address 115 QUAF	RY PARK	BLVD	Town CALG			Province ALBERT		Postal Code T2C 5G9
Location	1/4 or LSD 9	SEC 36	<i>TWP</i> 26	RGE 4	W of MER 5	Lot	Block	Plan	Additio	onal Description	
Measured	Measured from Boundary of m from			_	1.265686	U	es (NAD 83 tude114.	·	Elevation	m	
m from				How Location Obtained Hand held autonomous GPS 20-30m			How Elevation Ob Hand held autono	tained mous GPS 20-30m			

**Drilling Information** Method of Drilling Type of Work New Well Rotary - Air Proposed Well Use Investigation

Yield Test Summary

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
0.30		Topsoil	
4.27		Brown Moist Clay	
25.30		Gravel	
28.35		Moist Gravel	
29.26		Sandstone	
30.48		Shale	

	mp Rate	L/min_			
Test Date \	Date Water Removal Rate (L/min) Static Water Level (m)				
Well Completion			Measur	ement in M	
	Finished Well Dep			nd Date	
30.48 m	28.35 m	2014/05/01	1 20	014/05/05	
Borehole					
Diameter (cm			Т		
20.02		0.00 5.60		25.60 80.48	
	f applicable)			00.40	
Steel	аррисаые)	Well Casing	Linei		
Size OD:	16.81 cm	Size	OD :	cm	
Wall Thickness:	0.478 cm	Size Wall Thickn	ness :	cm	
Bottom at :	25.60 m	To	p at :	m	
			m at :		
Perforations					
	Diameter or			- Cl-t	
From (m) To (	(m) Slot Width(cm)	Slot Length(cm)		or Slot val(cm)	
Perforated by		<u>'</u>			
Annular Seal Ce Placed from Amount	ment/Grout 0.00 m to _ 150.00 Gallo		-		
Annular Seal Ce Placed from Amount Other Seals	0.00 m to				
Annular Seal Ce Placed from Amount Other Seals	0.00 m to		At (m)		
Annular Seal Ce Placed from Amount Other Seals Tr	0.00 m to 150.00 Gallo				
Annular Seal Ce Placed from Amount Other Seals  Tr Dr  Screen Type Sta	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel		At (m)		
Annular Seal Ce Placed from Amount Other Seals  Tr Dr  Screen Type Sta Size OD:	0.00 m to 150.00 Gallo ype iven inless Steel 14.12 cm	ns_	At (m) 25.60		
Annular Seal Ce Placed from Amount Other Seals  Tr Dr  Screen Type Sta Size OD: From (m)	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel 14.12 cm	o (m)	At (m) 25.60		
Annular Seal Ce Placed from Amount Other Seals  Tr Dr  Screen Type Sta Size OD: From (m) 26.21	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel 14.12 cm	o (m) 7.43	At (m) 25.60	Size (cm) 0.025	
Annular Seal Ce Placed from Amount Other Seals  To Dr  Screen Type Sta Size OD: From (m) 26.21  Attachment	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel 14.12 cm  To 2	o (m) 7.43	At (m) 25.60 Slot :	0.025	
Annular Seal Ce Placed from Amount Other Seals  To Screen Type Sta Size OD: From (m) 26.21 Attachment Top Fittings F	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel 14.12 cm	o (m) 7.43	At (m) 25.60 Slot :	0.025	
Annular Seal Ce Placed from Amount Other Seals  To Screen Type Sta Size OD: From (m) 26.21 Attachment Top Fittings F	0.00 m to 150.00 Gallo  ype iven inless Steel 14.12 cm Ti 2 Telescoped	o (m) 7.43 Bottom Fitt	At (m) 25.60  Slot 9	pe	
Annular Seal Ce Placed from Amount Other Seals  To Screen Type Sta Size OD: From (m) 26.21 Attachment Top Fittings F	0.00 m to 150.00 Gallo  150.00 Gallo  ype iven inless Steel 14.12 cm  To 2	o (m) 7.43 Bottom Fitt	At (m) 25.60  Slot 9	pe	

#### Contractor Certification

Name of Journeyman responsible for drilling/construction of well  ${\sf CHRIS}\,$   ${\sf QUINLAN}\,$ 

Company Name AARON DRILLING INC. Certification No

48135A

Copy of Well report provided to owner Yes

Date approval holder signed

2014/09/24

## **Water Well Drilling Report**

**View in Imperial Export to Excel** 

1022436

GIC Well ID GoA Well Tag No.

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 2014/09/24 Date Report Received

Well Identification and Location	on					Measurement in Metric
Owner Name LAFARGE CANADA INC	Address 115 QUARRY PARI	K BLVD	Town CALGARY	Province ALBERT	,	Postal Code T2C 5G9
Location 1/4 or LSD SE		5	Lot Block		onal Description	
Measured from Boundary of m from m from		Latitude <u>51.2</u> How Location O		ude <u>-114.424418</u>	Elevation  How Elevation Ob  Hand held autono	
Additional Information						Measurement in Metric
Distance From Top of Casing to Is Artesian Flow Rate				rol Installed		
Recommended Pump Rate		L/min	Pump Installed		Depth	
Recommended Pump Intake De	oth (From TOC)	m	Туре	Make	Model (Output R	H.P
Did you Encounter Saline Wat			m m		ng Taken	
Additional Comments on Well PUMP TEST PERFORMED BY	WATERLINE RESOURCE	ES	Sample Co			mitted to ESRD
Yield Test				Taken From	Ground Level	Measurement in Metric
Test Date Start	Time Sta	atic Water Level m				
Method of Water Removal						
Type Removal Rate			•			
Depth Withdrawn From						
If water removal period was < 2	hours, explain why		_			
Water Diverted for Drilling						
Water Source CITY OF CALGARY		mount Taken 092.18 L			ion Date & Time 4/29 8:00 AM	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well  ${\sf CHRIS}\,$   ${\sf QUINLAN}\,$ 

Company Name AARON DRILLING INC. Certification No

48135A

Copy of Well report provided to owner Yes

Date approval holder signed

2014/09/24

Printed on 12/24/2014 10:48:54 AM Page: 2 / 2

## **Water Well Drilling Report**

GIC Well ID GoA Well Tag No.

View in Imperial Export to Excel 1475698

The driller supplies the data contained in this report. The Province disclaims responsibility for its

Drilling Company Well ID

accuracy. The information on this report will be retained in a public database.									I	Date Report Receive	ed
Well Ident	ification and L	ocation									Measurement in Metric
Owner Name Address QUICK WAY FARMS LTD P.O. BOX 1719			Town BROOKS			Province AB	Country CA	Postal Code T1R 1C5			
Location	1/4 or LSD 16	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Addition	al Description	
Measured from Boundary of m from			GPS Coordinates in Decimal Degrees (NAD 83)  Latitude 51.267444 Longitude -114.400			· I	Elevation	m			
		m from			How Location		GPS 20-30r	n		How Elevation Obt	ainea

**Drilling Information** Method of Drilling Type of Work New Well Rotary Proposed Well Use Domestic

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
2.13		Clay	
21.03		Clay & Gravel	
23.16		Clay	
26.82		Gray Shale	
28.65		Gray Sandy Shale	
31.39		Gray Shale	
31.70		Sandstone	
33.53		Shale	
35.97		Sandstone	
39.62		Shale	

rieid Test S	ummary				ivieasurement in ivie	IIIC
Recommende	ed Pump Rat	e 36.3	37 L/min	_		
		Removal Rate (			atic Water Level (m)	
2003/01/15		45.46			32.00	
Well Comple	etion				Measurement in Me	tric
Total Depth D	rilled Finisl	ned Well Depth	n Start	Date End Date		
39.62 m			2003/	01/10	2003/01/14	
Borehole						
	er (cm) 23		n (m)		To (m) 39.62	
Surface Casi			00 Well Ca	scina/Li		
Steel	ng (n appno	able)	Unknow	_	nei	
Size	OD :1	4.13 cm		Size OL	): <u>cm</u>	
Wall Thickne	ess: C	.478 cm	Wall 7	hicknes	s: cm	
Botton	n at:				nt :m	
			L	Bottom a	nt :m	
Perforations		D:				
		Diameter or Slot	Slo	ot	Hole or Slot	
From (m)	To (m)	Width(cm)	Length	-	Interval(cm)	
32.00	35.97	0.318			25.40	
Perforated by	Torch					
Annular Seal	Driven & E	Bentonite				
		0 m to	31.39	m		
Other Seals						
	Type				At (m)	
Screen Type						
Size	OD :	cm				
From			(m)	-	Slot Size (cm)	
Attachm	ent					
	ngs		Botto	m Fitting	rs	
Pack						
Type Unkr	nown		Grain	Size		
Amount	ι	Jnknown				

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

WILLIAM PENROD

Company Name

M&M DRILLING CO. LTD.

Certification No

A000187

Copy of Well report provided to owner Date approval holder signed

Page: 1 / 2

## **Water Well Drilling Report**

GIC Well ID

View in Imperial Export to Excel 1475698

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GoA Well Tag No. Drilling Company Well ID Date Report Received

Additional Information	Well Identification and	Location							Measurement in Me
Measured from Boundary of   In from   Information   Info									Postal Code T1R 1C5
Latitude   St. 1267444   Longitude   114.400639   How Elevation   Most E					Block	Plan	Additional De	escription	
How Location Obtained   Hand held autonomous GPS 20-30m	Measured from Boundary	of			•	· /			
Hand held autonomous GPS 20-30m   Not Obtained		m from		· · · · · · · · · · · · · · · · · · ·		le <u>-114.4006</u>		· · · · · · · · · · · · · · · · · · ·	
Distance From Top of Casing to Ground Level   60.96 cm   1s Flow Control Installed   Describe		m from							tained
Distance From Top of Casing to Ground Level   60.96 cm   Is Flow Control Installed   Describe				Hand held autonom	ous GPS 20-30m		l Not	Obtained	
Second   Installed	Additional Information								Measurement in Me
Recommended Pump Rate   36.37 L/min   Pump Installed   Depth   Make   Depth   Make   Depth   Recommended Pump Intake Depth (From TOC)   35.05 m   Type   Make   Model (Output Rating)   Depth   Depth   Model (Output Rating)   Depth   Dept	Distance From Top of Ca	sing to Ground Leve	el	60.96 cm					
Recommended Pump Rate   Sa.37 Limin   Pump Installied   Depth   Make   Depth   Pamp   Pump Installied   Make   Depth   Pamp   Make   Depth   Pamp   Make   Depth   Pamp   Pump	Is Artesian Flow				Is Flow Control	I Installed			
Recommended Pump Rate   36.37 Limin   Pump Installed   Depth   Make   Depth   Make   H.P.	Rate	L/min	_			Describe			
Did you Encounter Saline Water (>4000 ppm TDS)				36.37 L/min					
Did you Encounter Saline Water (>4000 ppm TDS)	Recommended Pump Int	ake Depth (From TO	)C)	35.05 m	Type	N			H.P.
Did you Encounter Saline Water (\$\( \text{s4000 ppm TDS} \)	,	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					M	lodel (Output R	ating)
Company   Comp	Did you Encounter Sali	ne Water (>4000 pp	m TDS)	Depth	m V	Vell Disinfect			
Sample Collected for Potability   Submitted to ESRD   Additional Comments on Well	•								
Sample Collected for Potability   Submitted to ESRD								_	
Additional Comments on Well  FIELD TEST HARD WATER TDS 250, GPS # 51.2671333, N-51-16.0-2.8, W-114-24-2.3, -114.40038333, BOREHOLE DIAMETER 8.75" TO 103" & 6.25" TO 130"  Yield Test  Test Date Start Time Static Water Level 2003/01/15 12:00 AM 32.00 m  Method of Water Removal 71/19 Pump 32.59 1:00 32.69 32.59 1:00 32.69 32.69 32.69 32.69 32.69 32.60 32.69 32.65 32.85 6:00 32.55 1.00 32.61 32.85 6:00 32.55 1.00 32.61 32.85 6:00 32.55 1.00 32.60 32.60 32.85 6:00 32.55 1.00 32.60 32.60 32.89 7:00 32.51 32.89 7:00 32.51 32.89 7:00 32.40 32.99 12.00 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32.90 32.40 32.90 32					0 1 0 "				
Drawdown (m)   Elapsed Time   Minutes: Sec   Recovery (m)	FIELD TEST HARD WAT		# 51.267133	3, N-51-16.0-2.8, W-11	4-24-2.3, -114.400		From Grour	nd Level	0 103' & 6.25" TO 130'  Measurement in Me
Method of Water Removal   32.39   1:00   32.81	Test Date	Start Time	Sta	atic Water Level					
Substituting   Subs	2003/01/15	12:00 AM		32.00 m	Drawdo	wn (m)			Recovery (m)
Type Pump 32.69 3:00 32.65  Removal Rate 45.46 L/min 32.83 5:00 32.60  Depth Withdrawn From 35.05 m 32.85 6:00 32.85  If water removal period was < 2 hours, explain why 32.90 8:00 32.47 32.92 9:00 32.47 32.99 12:00 32.40 33.02 14:00 32.37 33.02 14:00 32.37 33.05 16:00 32.34 33.08 20:00 32.34 33.08 20:00 32.32 33.13 25:00 32.28 33.13 25:00 32.28 33.14 40:00 32.21 33.27 50:00 32.21 33.28 60:00 32.16 33.31 75:00 32.21 33.29 33.20 32.20 33.31 75:00 32.21 33.32 90:00 32.21 33.34 105:00 32.10 33.34 105:00 32.09							1:	00	
Removal Rate									
Section   Sect									
See									
If water removal period was < 2 hours, explain why  32.90 32.92 9:00 32.47 32.94 10:00 32.40 33.09 11:00 32.40 33.02 14:00 32.37 33.05 16:00 32.34 33.08 20:00 32.28 33.13 25:00 32.28 33.06 30:00 32.28 33.19 35:00 32.28 33.24 40:00 32.21 33.27 50:00 32.20 33.24 40:00 32.21 33.27 50:00 32.20 33.28 60:00 32.10 33.31 75:00 32.10 33.32 90:00 32.10 33.34 105:00 32.09 33.35 120:00 32.06	Depth Withdrawn From	35.05 m	_						
32.92 9:00 32.47 32.94 10:00 32.45 32.99 12:00 32.40 33.02 14:00 32.37 33.05 16:00 32.34 33.08 20:00 32.32 33.13 25:00 32.28 33.06 30:00 32.26 33.19 35:00 32.23 33.24 40:00 32.21 33.27 50:00 32.21 33.28 60:00 32.16 33.31 75:00 32.12 33.32 90:00 32.10 33.33 90:00 32.10 33.34 105:00 32.10					32.	89	7:	:00	32.51
32.94 10:00 32.45 32.99 12:00 32.40 33.02 14:00 32.37 33.05 16:00 32.34 33.08 20:00 32.32 33.13 25:00 32.28 33.06 30:00 32.26 33.19 35:00 32.23 33.24 40:00 32.21 33.27 50:00 32.20 33.28 60:00 32.10 33.28 60:00 32.16 33.31 75:00 32.10 33.32 90:00 32.10 33.34 105:00 32.09 33.35 120:00 32.06	If water removal period w	as < 2 hours, explai	n why						
32.99 12:00 32.40 33.02 14:00 32.37 33.05 16:00 32.34 33.08 20:00 32.32 33.13 25:00 32.28 33.06 30:00 32.26 33.19 35:00 32.23 33.24 40:00 32.21 33.27 50:00 32.20 33.28 60:00 32.10 33.28 60:00 32.16 33.31 75:00 32.12 33.32 90:00 32.10 33.34 105:00 32.09 33.35 120:00 32.06									
33.02									
33.05   16:00   32.34									
33.08   20:00   32.32									
33.13   25:00   32.28									
33.19   35:00   32.23									
33.24   40:00   32.21									
33.24   40:00   32.21					33.	19	35	:00	32.23
33.28   60:00   32.16   33.31   75:00   32.12   33.32   90:00   32.10   33.34   105:00   32.09   33.35   120:00   32.06							40	:00	32.21
33.31     75:00     32.12       33.32     90:00     32.10       33.34     105:00     32.09       33.35     120:00     32.06   Water Diverted for Drilling									
33.32     90:00     32.10       33.34     105:00     32.09       33.35     120:00     32.06   Water Diverted for Drilling									
33.34     105:00     32.09       33.35     120:00     32.06   Water Diverted for Drilling									
Water Diverted for Drilling									
Water Diverted for Drilling									
· ·					33.	35	120	0:00	32.06
·	Water Diverted for Drill	ling							
water Source Amount taken Diversion date & time		5	Λ.	mount Taken			Diversion Da	to & Timo	
L Expression Face Control of the Con	vvaler Source		A				וועersion Dai	ie & Time	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

WILLIAM PENROD

Company Name M&M DRILLING CO. LTD. Certification No

A000187

Copy of Well report provided to owner Date approval holder signed

# **Water Well Drilling Report**

GIC Well ID

**View in Imperial Export to Excel** 1475699

Measurement in Metric

GoA Well Tag No. Drilling Company Well ID Date Report Received

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

									•	die report receive	ou
Well Ident	ification and L	ocation									Measurement in Metric
Owner Name Address QUICK WAY FARMS LTD P.O. BOX 1719				1719	Town Provi BROOKS AB				Province AB	Country CA	Postal Code T1R 1C5
Location	1/4 or LSD 15	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Additiona STOCK	al Description WELL	
Measured f		m from			GPS Coordin	1.267556	U	es (NAD 83 tude114.4	<b>′</b>	Elevation How Elevation Obt	m
	-	m from			Hand held au		GPS 20-30r	n		Not Obtained	ameu

Drilling Information	
Method of Drilling Rotary	Type of Work New Well
Proposed Well Use Domestic	

Yield Test Summary

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description
2.44		Clay & Rocks
27.43		Lost Circulation Gravel
28.96		Shattered Shale
32.92		Brown Sandstone
34.75		Gray Sandstone
45.72		Shale & Sandstone Ledges
47.24	Yes	Water Bearing Sandstone
50.29	Yes	Water Bearing Shale
50.90	Yes	Water Bearing Sandstone
53.95		Shale

Recommende	ed Pump Ra	te27.2	28 L/min	<u>1</u>				
Test Date	Water	Removal Rate (	(L/min)	St	tatic Water Level (m)			
2003/01/20	)	24.55			32.64			
Well Comple	etion				Measurement in Metr	ic		
Total Depth D	Drilled Finis	hed Well Depti	h Start	Date	End Date			
53.95 m			2003	2003/01/17				
Borehole								
	er (cm)		n (m)		To (m)			
Surface Casi			00 Well Ca	asing/Li	53.95 iner			
Steel	OD:	1/13 cm	Plastic	Siza O	D:11.43 cm_			
			Wall 7	Thicknes	ss: 0.544 cm			
	n at :		rran i		at: 23.47 m			
			1		at: 53.95 m			
Perforations								
From (m) 43.28	To (m)	Diameter or Slot Width(cm) 0.635	Slo Lengtl		Hole or Slot Interval(cm) 25.40			
		0.000			251.10			
Perforated by								
Annular Sea			20.40	n				
		00 m to		<u>s m</u>				
Other Seals			_					
Other Seals	Type				At (m)			
	.,,,,				, te ()			
Screen Type								
Size	OD :	cm						
From	(m)	То	(m)		Slot Size (cm)			
Attachm	nent							
Top Fitti	ings		Botto	m Fitting	gs			
Pack								
Type Unk	nown		Grain Size					
Amount		Unknown						

Contractor	Certification

Name of Journeyman responsible for drilling/construction of well

WILLIAM PENROD

Company Name

M&M DRILLING CO. LTD.

Certification No

A000187

Copy of Well report provided to owner Date approval holder signed

Rate

Recommended Pump Rate

Recommended Pump Intake Depth (From TOC)

Did you Encounter Saline Water (>4000 ppm TDS)

## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

27.28 L/min

Depth

42.67 m

Gas \_\_\_\_

Amount Taken

**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No. Drilling Company Well ID Date Report Received

Depth

Model (Output Rating)

1475699

m

H.P.

										Date Hopert Hoodin		
Well Identit	fication and Lo	ocation									Measurement in N	∕letric
Owner Nam QUICK WAY	ne Y FARMS LTD		Address P.O. BOX	Address P.O. BOX 1719		Town BROOKS			Province AB	Country CA	Postal Co T1R 1C5	
Location	1/4 or LSD 15	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan		nal Description KWELL		
Measured fr		m from m from			GPS Coordin  Latitude 5  How Location  Hand held au	51.267556 n Obtained	Longi	tude <u>-114.4</u>	<i>'</i>	Elevation  How Elevation Obt  Not Obtained	mtained	
Additional I	Information										Measurement in M	/letric
Distance Fr Is Artesian	rom Top of Casi n Flow	ing to Gro	ound Level _		60.96 cm	I	ls Flow Con	trol Installed	d			

Depth m

Pump Installed

Describe

m Well Disinfected Upon Completion

Geophysical Log Taken

			Subi	milled to ESRD	
			Sample Collected for Potal	pility Sui	bmitted to ESRD
Additional Comment	ts on Well				<del></del>
	MOD HARD BAILED @ (LOSS CIRCULATION),		4-24-20.4, -114.4034, BOREHOL	E DIAMETER 8.75" TO 99	9' & 5.125" 177', 90' - 95'
Yield Test			Taken	From Ground Level	Measurement in Metric
T4 D-4-	Ota at Time	04-4-14/-411		Depth to water level	
Test Date 2003/01/20	Start Time 12:00 AM	Static Water Level 32.64 m	Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
			35.07	1:00	36.99
Method of Water Rem	noval		35.73	2:00	36.20
Type	e Pump		35.83	3:00	36.12
Removal Rate	e 24.55 L/m	in	36.01	4:00	36.02
	-	-	36.22	5:00	35.91
Depth Withdrawn Fron	n 53.34 m	_	36.37	6:00	35.79
			<del>-</del> 36.49	7:00	35.72
If water removal period	l was < 2 hours, explain	why	36.62	8:00	35.61
			31.24	9:00	35.45
			36.86	10:00	35.41
			36.96	12:00	35.29
			37.11	14:00	35.16
			36.91	16:00	35.05
			37.40	20:00	34.88
			37.58	25:00	34.75
			37.76	30:00	34.59
			37.90	35:00	34.50
			38.01	40:00	34.40
			38.28	50:00	34.27
			38.43	60:00	34.14
			38.71	75:00	34.03
			38.91	90:00	33.91
			20.00	105.00	22 02

#### Contractor Certification

Water Diverted for Drilling

Name of Journeyman responsible for drilling/construction of well

WILLIAM PENROD

Company Name

Water Source

M&M DRILLING CO. LTD.

Certification No A000187

39.24

Copy of Well report provided to owner Date approval holder signed

120:00

Diversion Date & Time

33.74

## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** 

GIC Well ID

1556533

GoA Well Tag No.
Drilling Company Well ID
Date Report Received

2014/06/04

Well Iden	tification and L	ocation									Measu	rement in Metric
	Owner NameAddressSOUTH ROCK LTDP.O. BOX 460								Province ALBERT			Postal Code T1A 7G2
Location	1/4 or LSD 4	SEC 32	<i>TWP</i> 26	RGE 3	W of MER 5	Lot	Block	Plan		onal Description RVATION HOLE #5	5	
Measured	-	m from m from			GPS Coordir Latitude 5 How Location Differential co	1.258118 n Obtained	Longi	itude <u>-114.</u>	,	Elevation How Elevation C Differential corre		

Drilling Information

Method of Drilling
Rotary - Mud

Proposed Well Use
Monitoring

Type of Work
Other

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
0.30		Black Topsoil	
6.40		Brown Clay	
11.89		Gray Gravel	
13.72		Gray Shale	



	ary	Measurement in Me							
Recommended Puri	p Rate	L/min_							
			Static Water Level (m)						
Well Completion			Measurement in Me						
Total Depth Drilled	Finished Well Dept	h Start Date	End Date						
13.72 m	13.72 m	2014/05/08	2014/05/08						
Borehole									
Diameter (cm)	Fron	m (m)	To (m)						
14.29		.00	13.72						
Surface Casing (if	applicable)	Well Casing/I	Liner						
Size OD :	cm		OD: 6.35 cm						
Wall Thickness :			ess : 0.516 cm						
Bottom at :			o at : -0.91 m						
Dottom at .			nat: 13.72 m						
Perforations		Bottom	10.72 111						
	Diameter or								
	Slot	Slot							
From (m) To (r	n) Width(cm)	Length(cm)	Interval(cm)						
Perforated by									
Annular Seal Placed from Amount	tonite Chips/Tablets 0.91 m to 300.00 Pound	9.75 m							
Annular Seal Placed from Amount Other Seals	0.91 m to	9.75 m							
Annular Seal Placed from Amount	0.91 m to	9.75 m	At (m)						
Annular Seal Placed from Amount Other Seals  Typ  Screen Type Slott	0.91 m to 300.00 Pound	9.75 m	At (m)						
Annular Seal Placed from Amount Other Seals  Screen Type Size OD: From (m)	0.91 m to 300.00 Pound  seed PVC 6.35 cm	9.75 m	Slot Size (cm)						
Annular Seal Placed from Amount Other Seals  Typ  Screen Type Slott Size OD: From (m) 10.67	0.91 m to 300.00 Pound  sed PVC 6.35 cm To 13	9.75 m	· ·						
Annular Seal Placed from Amount Other Seals  Typ  Screen Type Slott Size OD: From (m) 10.67  Attachment At	0.91 m to 300.00 Pound  sed PVC 6.35 cm To 13 tached To Casing	9.75 m	Slot Size (cm) 0.254						
Annular Seal Placed from Amount Other Seals  Typ  Screen Type Slott Size OD: From (m) 10.67  Attachment At	0.91 m to 300.00 Pound  seed PVC 6.35 cm To 13  tached To Casing	9.75 m	Slot Size (cm) 0.254						
Annular Seal Placed from Amount Other Seals  Typ  Screen Type Slott Size OD: From (m) 10.67  Attachment At	0.91 m to 300.00 Pound  seed PVC 6.35 cm To 13 tached To Casing	9.75 m	Slot Size (cm) 0.254						
Annular Seal Placed from Amount Other Seals  Screen Type Slott Size OD: From (m) 10.67  Attachment Top Fittings Ri	0.91 m to 300.00 Pound  seed PVC 6.35 cm To 13 tached To Casing	9.75 m	Slot Size (cm) 0.254 ngs Plug						

#### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name NIEMANS DRILLING (1980) LTD. Certification No

46340A

Copy of Well report provided to owner

Date approval holder signed 2014/06/04

Printed on 1/13/2015 2:18:43 PM Page: 1 / 2

## **Water Well Drilling Report**

GIC Well ID

View in Imperial Export to Excel

1556533

GoA Well Tag No.

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Drilling Company Well ID Date Report Received 2014/06/04

Well Identification	on and Lo	ocation											Measure	nent in Metric
Owner Name SOUTH ROCK LT	D.		Address P.O. BOX	160			Town MEDIC	OINE HAT		Province ALBERTA		Country CANADA		Postal Code T1A 7G2
Location 1/4 o	or LSD	SEC 32	<i>TWP</i> 26	RGE 3	W of ME 5		Lot			OBSEF	nal Description			
Measured from Bo		f m from m from	_		Latitude How Loc	51.2 cation C	258118 Obtained	•	ees (NAD 83) gitude114. S 5-10m	*	Elevation How Eleva Differential	ation Obtain	ned	 GPS 5-10m
Additional Inform	nation												Measurer	ment in Metric
Distance From To Is Artesian Flow Rate					91.44 cm	1	Is			d				_
Recommended P						L/min	Pump	Installed			Depth		m	
Recommended P	Pump Intal	ke Depth (	(From TOC)		r	<u>m</u>	Туре			Make	Model (C	H Output Ratii	I.P. ng)	
Did you Encour Additional Com				DS) Gas			т	<u>m</u>	Ge	infected Upon eophysical Log Submitted to Potability	Taken ESRD	÷		)
LOCKABLE PRO	TECTOR	PIPE INS	STALLED AN	D CONC	RETED INTO	THE	ROUND.			$\neg$				
Yield Test									Та	aken From C	Ground Leve	el	Measurer	nent in Metric
Test Date		Start Tim	ne	Sta	tic Water Lev r	<i>rel</i> m								
Method of Water							_							
	al Rate _		<u>L/mi</u> n											
Depth Withdrawr	n From		m											
lf water removal p	period wa	s < 2 houi	rs, explain wl	ny										
Water Diverted f	for Drillin	ng												
Water Source	OKS				mount Taken						n Date & Tin			

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name

NIEMANS DRILLING (1980) LTD.

Certification No

46340A

Copy of Well report provided to owner Yes

Date approval holder signed 2014/06/04

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## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

View in Imperial Export to Excel

GIC Well ID 15 GoA Well Tag No.

1556534

Drilling Company Well ID
Date Report Received

2014/06/04

Well Ident	Well Identification and Location Measurement in Metric											
Owner Name Address SOUTH ROCK LTD P.O. BOX 460		460	Town Province MEDICINE HAT ALBER				,	Postal Code T1A 7G2				
Location	1/4 or LSD 4	SEC 32	<i>TWP</i> 26	RGE 3	W of MER 5	Lot	Block	Plan		onal Description RVATION WELL:	#6	
Measured f	rom Boundary o	of			GPS Coordir	nates in Dec	imal Degree	es (NAD 83	)			
		m from			Latitude 5	1.257155	Longi	tude <u>-114.3</u>	394328	Elevation	1277.00	m
m from					How Location Obtained			How Elevation Obtained				
Differential corrected handheld GPS 5-10m						Differential cor	rected handh	neld GPS 5-10m				

Drilling Information

Method of Drilling
Rotary - Mud

Proposed Well Use
Monitoring

Type of Work
Other

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description
5.79		Brown Sandy Clay & Rocks
8.84		Gray Gravel
10.97		Gray Shale

	<b>\  </b>

rieid Test Sun	imary			IN	vieasurement in i	vietric		
Recommended I	Pump R	ate	L/min	<u>.</u>				
		Removal Rate (			tic Water Level (m)			
Well Completion	on				Measurement in N	/letric		
Total Depth Drill		shed Well Depth	Start					
10.97 m	10.9	97 m	2014/05/12 2014/05/12					
Borehole								
Diameter (	cm)		(m)		To (m)			
14.29		0.			10.97			
Surface Casing	(if appl	licable)	Well Ca Plastic	asing/Lin	er			
Size OD	//\	cm		Size OD	: 6.35 cm			
Wall Thickness		cm			: 0.518 cm			
Bottom at	:	m		Top at	: -0.91 m			
			E	Bottom at	: 10.97 m			
Perforations								
		Diameter or	61					
From (m) T	(m)	Slot Width(cm)	Slot		Hole or Slot Interval(cm)			
TTOIII (III)	0 (111)	widai(ciii)	Lengu	i(Citi)	Interval(CIII)			
Perforated by								
Annular Seal	3entonit	e Chips/Tablets						
		.91 m to	7.01	1 m				
		200.00 Pounds						
Other Seals			_					
	Type		At (m)					
Screen Type	Slotted F	PVC						
Size OD	:	6.35 cm						
From (m	1)	То	(m)		Slot Size (cm)			
Attachmen	t Attach	ed To Casing						
	_	Pipe	Botto	m Fittings	Plug			
Pack				3 -		_		
Type Sand			Grain	Size 10-	20			
Amount	200.00	Pounds	0.011		<del></del>			

### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name

NIEMANS DRILLING (1980) LTD.

Certification No

46340A

Copy of Well report provided to owner Yes

Date approval holder signed 2014/06/04

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## **Water Well Drilling Report**

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View in Imperial Export to Excel GIC Well ID

1556534

GoA Well Tag No.

Drilling Company Well ID Date Report Received

2014/06/04

well identification a	and Location									weasurement in weth
Owner Name SOUTH ROCK LTD		Address P.O. BOX	460		Town MEDIC	INE HAT		Province ALBERTA	Country CANADA	Postal Code T1A 7G2
Location 1/4 or L	SD SEC 32	TWP 26	RGE 3	W of MER 5	Lot	Block	Plan	Additional L	Description	-
Measured from Bound	dary of m from m from			Latitude <u>!</u> How Locatio	inates in Deci 51.257155 on Obtained corrected han	Longit	ude <u>-114.39</u>	4328 EI Ho	evation 1  ow Elevation Obta  fferential corrected	
Additional Informati	ion									Measurement in Metri
Distance From Top of Is Artesian FlowRate				91.44 cm	Is	Flow Cont				
Recommended Pum	,			L/mi	_			De	pth	<u>m</u>
Recommended Pum	p Intake Depth	(From TOC)		m	Туре					H.Pting)
Did you Encounter  Additional Comme  INSTALLED LOCKA	ents on Well	١١	Gas	Depti		m Sample Co	Geop. S	ected Upon Cor hysical Log Ta ubmitted to ES otability	RD	itted to ESRD
Yield Test							Take	en From Grou	nd Level	Measurement in Metri
Test Date	Start Tin	me	Stat	ic Water Level m						
	уре									
Removal R Depth Withdrawn Fr	Pate rom									
If water removal perio			hy							
Water Diverted for	Drilling									
Water Source TOWN OF OKOTOKS	-			nount Taken 27.66 L	L			Diversion Da 2014/05/12		

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name

NIEMANS DRILLING (1980) LTD.

Certification No

46340A

Copy of Well report provided to owner Yes

Date approval holder signed

2014/06/04

Printed on 1/13/2015 2:20:48 PM Page: 2 / 2

## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** GIC Well ID

1556535

GoA Well Tag No. Drilling Company Well ID Date Report Received

2014/06/04

										Bato Roport Root	2011/00/01
Well Iden	tification and L	ocation									Measurement in Metri
Owner Name SOUTH ROCK LTD			Address P.O. BOX 460		Town MEDICINE HAT		Province ALBERT		,		
Location	1/4 or LSD 4	SEC 32	<i>TWP</i> 26	RGE 3	W of MER 5	Lot	Block	Plan		onal Description RVATION WELL #7	7
Measured	Measured from Boundary of m from m from				GPS Coordinates in Decimal Degrees (NAD 83)  Latitude 51.255906 Longitude -114.392635  How Location Obtained			*	Elevation How Elevation C	1273.00 m Obtained	
					Differential corrected handheld GPS 5-10m				Differential corrected handheld GPS 5-10m		

**Drilling Information** Method of Drilling Type of Work Rotary - Mud Other Proposed Well Use Monitoring

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description
3.66		Brown Clay & Rocks
11.28		Gray Gravel
12.19		Gray Shale



New   Completion	rieid Test Sur	nmary			IVI	easurement in i	/ietric	
Well Completion         Measurement in Metric           Total Depth Drilled         Finished Well Depth         Start Date         End Date           12.19 m         12.19 m         2014/05/13         2014/05/13           Borehole           Diameter (cm)         From (m)         To (m)           Surface Casing (if applicable)           Wall Thickness:         cm         Wall Thickness:         0.518 cm           Bottom at:         m         Top at:         -0.91 m           Bottom at:         12.19 m           Perforations           From (m)         To (m)         Slot         Hole or Slot           Interval(cm)           Perforated by           Annular Seal         Bentonite Chips/Tablets           Placed from         0.91 m         to         8.23 m           Amount         250.00 Pounds           Other Seals           Type         At (m)           Screen Type           Placed from (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment         Attachment         Attachment </th <th>Recommended</th> <th>Pump Ra</th> <th>ate</th> <th>L/min</th> <th></th> <th></th> <th></th>	Recommended	Pump Ra	ate	L/min				
Total Depth Drilled   Finished Well Depth   Start Date   2014/05/13   2014/05/13   2014/05/13	Test Date	Water	Removal Rate (I	_/min)	Stat	ic Water Level (m)		
Total Depth Drilled   Finished Well Depth   Start Date   2014/05/13   2014/05/13   2014/05/13								
12.19 m	Well Completion	on			М	easurement in N	/letric	
Diameter (cm)   From (m)   To (m)	Total Depth Drill	ed Finis	shed Well Depth	Start	Date	End Date		
Diameter (cm)   From (m)   To (m)	12.19 m	12.1	9 m	2014/05/13 2014/05/13				
Surface Casing (if applicable)   Well Casing/Liner   Plastic   Size OD :   6.35 cm   Wall Thickness :   cm   Wall Thickness :   0.518 cm   Top at :   -0.91 m   Bottom at :   12.19 m	Borehole							
Size OD :	Diameter (	cm)	From	(m)		To (m)		
Size OD :								
Size OD :         cm         Size OD :         6.35 cm           Wall Thickness :         cm         Wall Thickness :         0.518 cm           Bottom at :         12.19 m           Perforations           From (m)         To (m)         Diameter or Slot Slot Uniterval(cm)         Hole or Slot Interval(cm)           Perforated by         Annular Seal Placed from 0.91 m to 8.23 m         8.23 m           Amount 250.00 Pounds         Other Seals           Type         At (m)           Screen Type Plastic Size OD : 6.35 cm         From (m) Slot Size (cm) 9.14 12.19 0.000           Attachment Attached To Casing Top Fittings Riser Pipe         Bottom Fittings Plug           Pack Type Sand         Grain Size 10-20	Surface Casing	(if appl			sing/Line	er		
Wall Thickness :	Size OL	);			Size OD :	6.35 cm		
Perforations   Diameter or Slot Slot Length(cm)   Interval(cm)								
Perforations    Diameter or Slot Slot Length(cm) Interval(cm)						_		
Perforations           From (m)         To (m)         Diameter or Slot Width(cm)         Slot Length(cm)         Hole or Slot Interval(cm)           Perforated by           Annular Seal         Bentonite Chips/Tablets           Placed from				Ε				
From (m) To (m) Slot Length(cm) Interval(cm)  Perforated by  Annular Seal Bentonite Chips/Tablets  Placed from 0.91 m to 8.23 m  Amount 250.00 Pounds  Other Seals  Type At (m)  Screen Type Plastic  Size OD: 6.35 cm  From (m) To (m) Slot Size (cm)  9.14 12.19 0.000  Attachment Attached To Casing  Top Fittings Riser Pipe Bottom Fittings Plug  Pack  Type Sand Grain Size 10-20	Perforations							
From (m)   To (m)   Width(cm)   Length(cm)   Interval(cm)				CI.				
Perforated by           Annular Seal         Bentonite Chips/Tablets           Placed from         0.91 m         to         8.23 m           Amount         250.00 Pounds           Other Seals         Type         At (m)           Screen Type Plastic           Size OD :         6.35 cm           From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment         Attached To Casing           Top Fittings         Riser Pipe         Bottom Fittings         Plug           Pack           Type         Sand         Grain Size         10-20	From (m)	-o (m)						
Annular Seal         Bentonite Chips/Tablets           Placed from	110111 (111)	O (III)	Widelicity	Lengun(CIII)		Interval(em)		
Annular Seal         Bentonite Chips/Tablets           Placed from	Perforated by							
Placed from Amount 0.91 m to 8.23 m           Amount 250.00 Pounds           Other Seals           Type         At (m)           Screen Type Plastic           Size OD: 6.35 cm           From (m) To (m) Slot Size (cm)           9.14 12.19 0.000           Attachment Attached To Casing           Top Fittings Riser Pipe Bottom Fittings Plug           Pack           Type Sand         Grain Size 10-20	,	Pontonit	China/Tablata					
Amount				8 23	R m			
Other Seals           Type         At (m)           Screen Type Plastic           Size OD:         6.35 cm           From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment Attached To Casing         Top Fittings Riser Pipe         Bottom Fittings Plug           Pack         Type Sand         Grain Size 10-20								
Type	_			-				
Size OD:         6.35 cm           From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment To Casing           Top Fittings         Riser Pipe         Bottom Fittings         Plug           Pack           Type         Sand         Grain Size         10-20		Type		At (m)				
Size OD:         6.35 cm           From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment To Casing           Top Fittings         Riser Pipe         Bottom Fittings         Plug           Pack           Type         Sand         Grain Size         10-20								
Size OD:         6.35 cm           From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment To Casing           Top Fittings         Riser Pipe         Bottom Fittings         Plug           Pack           Type         Sand         Grain Size         10-20	Screen Type	Plastic						
From (m)         To (m)         Slot Size (cm)           9.14         12.19         0.000           Attachment Top Fittings         Attachment Riser Pipe         Bottom Fittings         Plug           Pack           Type         Sand         Grain Size         10-20	• • • • • • • • • • • • • • • • • • • •		6.35 cm					
9.14         12.19         0.000           Attachment Attached To Casing         Top Fittings Riser Pipe         Bottom Fittings Plug           Pack         Type Sand         Grain Size 10-20				m)		Slot Size (cm)		
Top Fittings         Riser Pipe         Bottom Fittings         Plug           Pack         Type         Sand         Grain Size         10-20								
Pack Type Sand Grain Size 10-20	Attachmen	Attach	ed To Casing					
Type Sand Grain Size 10-20	Top Fitting	s Riser F	Pipe	Bottor	m Fittings	Plug	_	
	Pack							
	Type Sand			Grain	Size 10-2	20		
	Amount	200.00	Pounds					

#### Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name

NIEMANS DRILLING (1980) LTD.

Certification No

46340A

Copy of Well report provided to owner Yes

Date approval holder signed 2014/06/04

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## **Water Well Drilling Report**

View in Imperial Export to Excel GIC Well ID

1556535

GoA Well Tag No.

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID 2014/06/04 Date Report Received

Well Identification and Location	า					Measurement in Metric
Owner Name SOUTH ROCK LTD	Address P.O. BOX 460		Town MEDICINE HAT	Province ALBERTA	Country CANADA	Postal Code T1A 7G2
Location 1/4 or LSD SEC 4 32	<i>TWP RGE</i> 26 3	W of MER 5	Lot Block Plan		l Description ATION WELL #7	
Measured from Boundary of m from m from		Latitude <u>51.2</u> How Location O	es in Decimal Degrees (NAD 8: 55906 Longitude -114: btained ceted handheld GPS 5-10m	.392635	Elevation 12 How Elevation Obtain Differential corrected	
Additional Information						Measurement in Metric
Distance From Top of Casing to G Is Artesian Flow Rate		91.44 cm	Is Flow Control Installe Describ	ed		
Recommended Pump Rate		L/min	Pump Installed		Depth	
Recommended Pump Intake Dept	th (From TOC)	m	<i>Type</i>	Make		ng)
Did you Encounter Saline Water  Additional Comments on Well  INSTALLED LOCKABLE PROTE(	Gas	Depth	Sample Collected for	eophysical Log T Submitted to E	Faken	red to ESRD
Yield Test			T	aken From Gro	ound Level	Measurement in Metric
Test Date Start 1	Fime Sta	atic Water Level m		aken i fom On	Junu Level	ivieasurement in ivietile
Method of Water Removal Type						
Removal Rate	<u>L/mi</u> n		•			
Depth Withdrawn From	<u>m</u>					
If water removal period was < 2 ho	ours, explain why					
Water Diverted for Drilling			_			
Water Source TOWN OF OKOTOKS		mount Taken 318.44 L		Diversion 2014/05/1	Date & Time 2 7:00 AM	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well

CHAD NIEMANS

Company Name

NIEMANS DRILLING (1980) LTD.

Certification No

46340A

Copy of Well report provided to owner Yes

Date approval holder signed 2014/06/04

Printed on 1/13/2015 4:52:27 PM Page: 2 / 2

Company Name

UNKNOWNDRILLINGCOMP11

## **Water Well Drilling Report**

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**View in Imperial Export to Excel** 

GIC Well ID GoA Well Tag No.

Copy of Well report provided to owner Date approval holder signed

2095665

Drilling Company Well ID
Date Report Received 20

2014/12/04

Well Identification and Location			Measurement in Metric
Owner Name Address CIRCLE J RANCHES LTD RR 2	Town COCHRANE	Province ALBERTA	Country Postal Code CANADA TOL 0W0
Location         1/4 or LSD         SEC         TWP         RG           SW         6         27         3	E W of MER Lot Block	Plan Additional De M. GILES	escription
Measured from Boundary of m from m from	GPS Coordinates in Decimal Degree Latitude 51.274608 Long How Location Obtained Not Verified	ees (NAD 83) gitude114.417737	vation m w Elevation Obtained Obtained
Drilling Information  Method of Drilling Unknown	Type of Work Well Inventory		
Proposed Well Use Domestic & Stock			
Formation Log	Measurement in Metric Yield Te	est Summary	Measurement in Metric
Depth from ground level (m) Water Earing Lithology Description	Recomm Test I	Date Water Removal Rate	L/min Static Water Level (m)
25.60 Old Well	Total De 25.60 m	pmpletion pth Drilled Finished Well Dept	Measurement in Metric th Start Date End Date 1934/06/30
	Borehol		m (m) To (m)
		ameter (cm) From	m (m) To (m)
	Surface	Casing (if applicable)	Well Casing/Liner
		Size OD : cm_	Size OD:cm_
		nickness: cm	Wall Thickness : cm
	В	ottom at :m	Top at:m
	Perforat	ions	Bottom at :m
	From (I	Diameter or Slot m) To (m) Width(cm)	Slot Hole or Slot Length(cm) Interval(cm)
	Perforate	ed by	
		Seal d from to mount	m_
	Other Se		At (m)
	Screen	Type Size OD :cm_	
			o (m) Slot Size (cm)
		achment	Bottom Fittings
	Pack		Grain Size
	Amou		
Contractor Certification		Operition than he	
Name of Journeyman responsible for drilling/constructio UNKNOWN DRILLER11	n or well	Certification No 11	

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## **Water Well Drilling Report**

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

**View in Imperial Export to Excel** 2095665

GIC Well ID GoA Well Tag No.

Drilling Company Well ID Date Report Received

2014/12/04

vveii iden	tification and L	ocation									Measurement in Me
Owner Nar CIRCLE J	<mark>me</mark> RANCHES LTD		Address RR 2			Town COCH	RANE		Province ALBERTA	Country CANADA	Postal Code TOL 0W0
Location	1/4 or LSD SW	SEC 6	<i>TWP</i> <b>27</b>	RGE 3	W of MER 5	Lot	Block	Plan	Addition M. GILE	al Description S	
Measured		m from m from			GPS Coordin Latitude 5 How Location Not Verified	51.274608	0	ees (NAD 83) itude <u>-114.41</u>	I .	Elevation  How Elevation Ob  Not Obtained	
Additional	I Information										Measurement in Me
Distance I Is Artesia	From Top of Cas an Flow	ing to Gro	_			Is	s Flow Cor	ntrol Installed			
	Rate		L/min					Describe			
	ended Pump Rati ended Pump Inta				L/mir m	Pump	Installed		Make	Depth	м Н.Р.
Necomme	эпава г атр та	ке Берит	(1101111100)			_ <i>Type</i>			wake	Model (Output R	Pating)
Addition ORIGINAI APPLICA WERE GE	nal Comments of L WELL REPOR TION RECEIVED	n Well T NOT IN D ON DEC CONSIST	GIC. THE FO CEMBER 04, ENTLY. OWN	Gas OLLOWING 1984. OWI NER REPC	Depth  G INFORMATION NER REPORTS	N WAS TAKI	m Sample C EN FROM WAS BAI	Geop ollected for Po DROUGHT E LED OUT TO	Submitted to otability  EMERGENC 4 FEET OF	Subr Y GROUNDWATER WATER, TOOK 1 I	
Yield Test	t							Tak	en From G	round Level	Measurement in Me
Test Date		Start Tin	ne	Stati	c Water Level m						
Depth Wi	of Water Remove Type _ Removal Rate _ iithdrawn From _ emoval period wa		L/min m	ny		_					
Water Div	verted for Drillin	ng									
Water Sou	ırce			Am	ount Taken L	-			Diversion	Date & Time	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN DRILLER11

Company Name

UNKNOWNDRILLINGCOMP11

Certification No

Copy of Well report provided to owner Date approval holder signed



# Appendix C

# Residential Well Assessment Questionnaires

### **Groundwater Monitoring Plan**

Mountain Ash Limited Partnership

Summit Pit

SLR Project No.: 212.06650.00006





### Water Well Reconnaissance Survey



	SITE RECON	NAISSANCE CHECKLIST		
Project Name:	WATERMAN AGGA	LEGATE RESOURCE		
Project Number:	203-50065.0000	SLR Staff: R. Tru		
Street Address:	3 - MW31-2	6-3 WSM - 35181	BIG HILL SPRINGS	FOAD
Property Type:	Private Residence	Commerical/Industrial Other	er	
Person/Resident Interviewed:	JULIE THORESON,	BRUCE WATERMAN		·
Date of Visit:	29 OCT 2014	Time: 10:15		fi
1. Well Owner Information				
Name:	BRUCE WATGEMA	~		71
Street Address:		1	**	
Contact Number:	Home:	Business:	Cell:	-
Email Address:	0	*		
2. Well User/Occupant of th	ne Residence Using the Wel			
	Same as Well Owner			11 2
If different from well owner ple	ase fill out details below:		8	
Name:	JULIE THORESO	100		
Street Address:	Will			
Contact Number:	Home:	Business:	Cell: *	-
Email Address:			<	M
3. Well Details	S			
Well Location	Lot: NW31-26-3 WSM	Concession:	Township:	
3A. Well Use				
Water Use: No Drinking,	Domestic:	No. of people using water from	the well:	
uses bottled water	Livestock:	No. of livestock using water from	m the well: 7 horse	5 4 SHEEP 4 GOVA
	Lawn Watering:	Acres/area covered:	Approximate Amount:	
	Irrigation:	Acres/area covered:	Approximate Amount:	



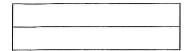
3A. Well Use Continued							
Additional Equipment:	Pool:	Jacuzzi/Hot	Tub:		Landscape water feat	ure/fountain:	
	Other:			*		7.0	
		<del>-</del> , -	<i>B</i> 4 34	-25			
Private waste and water dispos							
System description:	1006 GAL				* 0		
Distance to Well	75=ft		-	=	, S, E, or W)		
Well is	Uphill		Downhill _		Same Grade	as the waste water system	
3B. Well Construction Deta	ils						
Construction/Installation Date:	LNKNOWA	· PRE-196	မ Cd	ontractor:			
Type of Installation:	Drilled 🗾	Dug 🗌		Other:	·		
Diameter:	6/8 INCH	-	Well D	epth (m):	8 ~ 400 A		
Screen? wiknown	YES	NO 🗌			MOE Reco	ord Number:	
	Screen length (m)	63			w/ r/		
2	Depth to top of sc	reen (m)					
Is the well accesible for sampli	ng?	YES	NC		Confirmed	I Inferred	
If no provide details:	WELL HEAD	APPROXIMA	7 624 E	在 2~	BELOW EROWD L	HEZ IN A PIT	
Location of measurement (top	of pipe (TOP), grou	nd surface):			<u> </u>		
SLR staff member collecting th	e measurement:	process as a second	_				
Date of <u>original</u> measurement:			Original/ini	tial water	level depth (m)		
Subsequent water level measu	rements					1	
	Date						
8	Depth (m) Staff						
3C. Pumping Equipment				300	a.		
Pump Type:	Suction-lift	=	¥!		Pumping Capacity		
	Positive-submerge	once 🗍			Age	e e	
How is the pump lubricated?					Age		
Depth of intake setting:	Original (m)		Present	t (m)	100+ H Pumping F	Pate (I /s)	
Storage Tank:		CISTE		· (111 <i>)</i>			
Additional Features:	Type: Chlorinator		Water softer		Capacity: 1000  Water filter	<u>,                                     </u>	
Additional Features.		REATM			vvater litter	Filter type:	



4. Well History			- Company		THE WATER CO. THE CO. I SHALL
How long have you owned, opera	ated or lived on th	is property?	7 YEA	r5	
Have you ever experienced any <u>p</u>	<u>orevious</u> problems	s with your well?	_500	b m wer	
If so, when?	3-				
What was the cause of the previo	ous problem:	Drought		Pump Failure	
		Plugging		Increased usage	
		Interference	ij	Contamination	
If the problem was contamination	n, what water qua	lity changes were a	apparent? (Note	any differences in tast	e, odour, colour or clarity)
SAND IN CISTE	en, PIPES	ETC	100000000000000000000000000000000000000		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
What action was taken to overco	me this problem?	husum	C- 7 + CH	LORD ATED	
What were the effects of this acti	ion?	CLEARED	Problem	but Problem	came Back
Did you ever have your well?		deepend, YES		NO 🔽	
		cleaned, YES	9	NO SHOCK	ED
*		or a new well YES		NO 🔽	
If	f so why?		940-8411-9411-94		
Outline briefly any previous repai	irs or changes in p	pumping equipmen	t, and dates		
5. Sample Details - TAUG	n from Kit	CHEN TAP -	(NO TREATM	ent on site)	4
Date:	29/10/14	Sam	ple Collected?	YES NO	
Sample Name/Number:	wwi	. Nun	ber of Bottles:	2	
Field Analysis	Harness		lron		Conductivity
	рН	<del>-</del>	Temperature		Other
6. Contact Details					
Permission for future monitoring	?	YES NO			
Well Aware Booklet:					2
Perferred contact time/method:		call/contact ahead		site visit 🗌	
Contact by:		email phon	e 🗸	perferred contact num	ber:
р	referred contact (	time (evening, weel	kday, morning, e	tc.): <u>Aw'r</u> -	TIME DERING DAY



7. Well Location Sketch Notes: shown location of water well(s), septic tanks and beds, laneways/roads, fences, site buildings, north arrow, and any distinguishing site features. Include Legend. 10 MENWAY **LEGEND** → North Building o Well R Septic Tank and Bed Roadways and Lanes Note: R= Residental B=Barn C=Commercial I=Irrigation A=Agricultural (Not a Barn) Not to Scale Well GPS 8. Site Photograph Log Number of Photos Taken: Photograph Number/Name Description



### Water Well Reconnaissance Survey



SITE RECONNAISSANCE CHECKLIST					
Project Name:	WATERMAN AGE	REGATE RESOURCE			
Project Number:	263.50065.00001	SLR Staff: R.T.L.	*		
Street Address:	SE 31-26-3 W	SM			
Property Type:	Private Residence	Commerical/Industrial Other_			
Person/Resident Interviewed:	MRS PARKER				
Date of Visit:	PHONE CALL 10 DEC 201	4 Time: 16:30			
1. Well Owner Information					
Name:	MRS PARKER				
Street Address:	Bax 123	SE 31 26 3 WSM			
Contact Number:	Home:	Business: C	Cell:		
Email Address:					
2. Well User/Occupant of the	ne Residence Using the W	'ell	4		
	Same as Well Owner				
If different from well owner ple	ase fill out details below:				
Name:		,			
Street Address:		THE THE THE SECOND SECO	h		
Contact Number:	Home:	Business: C	Cell:		
Email Address:					
3. Well Details		,	,		
Well Location	Lot: IN House	SE 31-26-3 WSM Concession: T	ownship:		
3A. Well Use	weres)				
Water Use:	Domestic:	No. of people using water from the	well: 2		
	Livestock:	No. of livestock using water from the	he well: 100 HEAD CATTLE		
	Lawn Watering:	Acres/area covered:A	pproximate Amount:		
	Irrigation:	Acres/area covered:A	pproximate Amount:		
	and the second s	gra			

3 ARTESIAN WELLS



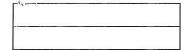
3A. Well Use Continued	:							
Additional Equipment:	Pool:	Jacuzzi/Hot	Tub:	]	Landscape	water feat	ure/fountain:	
	Other:	ξ <u>ι</u>	V - 1782					<del>2323</del>
Private waste and water dispo	sal:	Type (ex. S	pectic tank):	SEPT	ic TAN	ik		<u>-</u>
System description:	9							
Distance to Well	100 ft	-	Direction from v	well (N	, S, E, or W)	\$	DEPENDS	on werl
Well is	Uphill 📝		Downhill		Same Grad	е 🗌	as the waste	water system
3B. Well Construction Deta	ils							
Construction/Installation Date:	192015		Cont	ractor:	_0410	ER	11.	
Type of Installation:	Drilled	Dug 🗹		Other:				
Diameter:	6" on 8"	-	Well Dep	th (m):	20-25	feet		
Screen?	YES 🔽	NO 🗌				MOE Reco	ord Number:	
	Screen length (m)		_					
	Depth to top of sc	reen (m)						
Is the well accesible for sampli	ng?	YES	NO 🗸	1		Confirmed	l Infe	rred
If no provide details:	IN THE	hon	\$6					
Location of measurement (top	of pipe (TOP), grou	nd surface):				• 9	i¥	
SLR staff member collecting th	e measurement:	***				•)		
Date of <u>original</u> measurement:			_ Original/initia	l water	level depth	(m) -3	ARTESIA	N - 10/t Be
Subsequent water level measu	rements				ř		<del></del>	aurand
	Date							
	Depth (m) Staff							
	, Stall							
3C. Pumping Equipment		U. 180						
Pump Type:	Suction-lift	SUBMER	SIBLE		Pumping Ca	apacity		-
ä	Positive-submerge	ence 🗌			Age		4	
How is the pump lubricated?				- 32 to - 32 -				
Depth of intake setting:	Original (m)	<del> </del>	Present (n	n)	<del></del>	Pumping F	Rate (L/s)	
Storage Tank: $\lambda Q$	Туре:	ş			Capacity:		-	
Additional Features: NO	Chlorinator		Water softener		Water filter		Filter type:	<u>-</u> 1
TREAT	MENT							



4. Well History			
How long have you owned, operated or li	ived on this property?	1955	
Have you ever experienced any previous	problems with your well?	NO	
If so, when?			
What was the cause of the previous prob	lem: Drought	Pump Fa	
		Contami	- Company of the Comp
If the pushion was contamination what w	Interference		)
If the problem was contamination, what v	vater quality changes were a	pparent? (Note any differe	ences in taste, odour, colour or clarity)
What action was taken to overcome this p	problem?		
What were the effects of this action?			
Did you ever have your well?	deepend, YES	□ NO ☑	6
	cleaned, YES or a new	□ NO ☑	
	well YES	NO NO	
If so why	?		
V			
Outline briefly any previous repairs or cha	anges in pumping equipment	, and dates 1966/6	7 funds
5. Sample Details			
Date:		ple Collected? YES	NO
Sample Name/Number:		ber of Bottles:	<del>-</del>
Field Analysis	Harness	lron	Conductivity
	рН	Temperature	Other
6. Contact Details		/	A STATE OF THE STA
Permission for future monitoring?	YES NO [	J - NOT NO	TIL AFTER XMAS
Well Aware Booklet:		and the state of t	
Perferred contact time/method:	call/contact ahead	site visit	]
Contact by:	email phone	perferred o	ontact number:
preferred	contact time (evening, week	day, morning, etc.):	
· · · · · · · · · · · · · · · · · · ·			



7. Well Location Sketch			
Notes: shown location of water well Legend.	l(s), septic tanks and b	eds, laneways/roads, fences, site buildings, north arrow, and any disti	nguishing site features. Include
Legend.			LEGEND  North Building Well Septic Tank and Bed Roadways and Lanes Note: R= Residental B=Barn C=Commercial I=Irrigation
Not to Scale			A=Agricultural (Not a Barn)
Well GPS			
8. Site Photograph Log			
	Number of Photos	Taken:	
Photograph Number/Name	- ,	<u>Description</u>	
	_ ,		-
a .			
	n **		
	- · · · · · · · · · · · · · · · · · · ·		



### Water Well Reconnaissance Survey



	SITE RECONN	NAISSANCE CHECKL	.IST		
Project Name:	WATGEMAN &	AGGREGATE	Resource	* #	
Project Number:	203.50065.00001	SLR Staff:	R.Tiu		and the second s
Street Address:	NE 31-26-3 . h	15M			<u> </u>
Property Type:	Private Residence	Commerical/Industrial	Other		
Person/Resident Interviewed:	CALVIN &	RAWN.			
Date of Visit:	29 OCT 2014	Time: _	12:00	_	
1. Well Owner Information					
Name:	CALVIN RAWN				
Street Address:	As above		examination and the second		
Contact Number:	Home:	Business:	Cell: (	_	
Email Address:				31	
2. Well User/Occupant of t	he Residence Using the Well				
	Same as Well Owner				
If different from well owner ple	ease fill out details below:				
Name:					
Street Address:					
Contact Number:	Home:	Business:	Cell:	39ni	
Email Address:					<u></u>
3. Well Details	20				
Well Location	Lot: NE 31-26-3 WSM	Concession:	Township:		
3A. Well Use - 2	weres				
Water Use:	Domestic:	No. of people using wa	iter from the well:	<b>\$</b> 5	(ww2)
ar.	Livestock:	No. of livestock using v	water from the well:	40 norses	(Eww)
	Lawn Watering:	Acres/area covered: _	Approxima	ate Amount:	
*	Irrigation:	Acres/area covered: _	Approxima	ite Amount:	



3A. Well Use Continued							
Additional Equipment:	Pool:	Jacuzzi/Hot T	ub:	]	Landscape water fea	ture/fountain:	
	Other:	(t <del></del>			ha.		(4)
Private waste and water dispo	sal:	Type (ex. Spe	ectic tank):	Ser	ric TANK	100 Car	
System description:					¥r		
Distance to Well 2	-300 ft	_ D	irection from v	vell (N,	, S, E, or W) EA	157	
Well is	Uphill	į	Downhill 🗌		Same Grade	as the waste	e water system
3B. Well Construction Deta	ails						
Construction/Installation Date:			Contr	actor:			
Type of Installation:	Drilled V	Dug 🗌	(	Other:			
Diameter:	6 won	_	Well Dept	h (m):	177 + 135		
Screen?	YES	NO	8		MOE Rec	ord Number:	
,	Screen length (m)						
	Depth to top of sc	reen (m)					
Is the well accesible for sampli	ng?	YES (ww	2) NO 🗸	/(ww	3) Confirme	d Int	erred
If no provide details:	WW3 BLO	cked @	27.5mbTol	<u> </u>	999 marks and 6 m	12	
Location of measurement (top	of pipe (TOP), grou	nd surface): _	TOP				
SLR staff member collecting th	ne measurement:	ROBERT	TILL				.95
Date of <u>original</u> measurement:	29/OCT/201	4	Original/initial	water	level depth (m) 29	.65 m6 To1	(wwz)
Subsequent water level measu	rements - ωω 2	- LOGGER	WSTALLE	a		· · · · · · · · · · · · · · · · · · ·	7
	Date Depth (m)						-
	Staff						
3C. Pumping Equipment							
Pump Type:	Suction-lift	SUBME	asible		Pumping Capacity	and an area of	
<u>.</u>	Positive-submerge	ence			Age	io yrs -	- 5425
How is the pump lubricated?	X-0-0						
Depth of intake setting:	Original (m)		Present (m		ww2 ww3 1 <b>6e</b> ft +125€tPumping		Name and the second
Storage Tank:	Type:	CISTERN			Capacity: 400 6	L VAZ (Nowse) 4	"PSO GAL
Additional Features:	Chlorinator	v	Vater softener		Water filter 🗹	Filter type:	PARTICULATE
			House		1000 \$6		

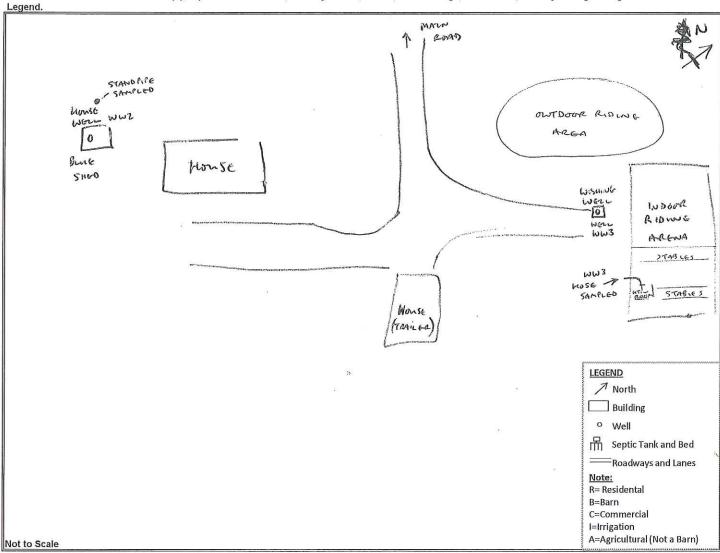


4. Well History	
How long have you owned, operated of	or lived on this property? 10 425
Have you ever experienced any previo	us problems with your well?
If so, when?	
What was the cause of the previous pr	roblem: Drought Pump Failure
	Plugging Increased usage
	Interference Contamination
NIZA	at water quality changes were apparent? (Note any differences in taste, odour, colour or clarity)
What action was taken to overcome th	is problem? N/A
What were the effects of this action?	N/A
Did you ever have your well?	deepend, YES NO
	cleaned, YES NO
	or a new well YES NO
If so w	rhy?
Outline briefly any previous repairs or	changes in pumping equipment, and dates REPLACED House Pump
5. Sample Details WW 2 - STAND	FIFE AT BACK OF PUMP HOUSE, WW3 - HOSE IN STABLES (NO TREATMENT)
Date: 29 00	Sample Collected? YES NO
Sample Name/Number: WW2	+ WW3 Number of Bottles: 2 EACH
Field Analysis	Harness Iron Conductivity 577 MS/cm
	pH 7.62 Temperature 6.4° C Other
6. Contact Details	
Permission for future monitoring?	YES NO
Well Aware Booklet:	
Perferred contact time/method:	call/contact ahead site visit
Contact by:	email phone perferred contact number:
preferr	ed contact time (evening, weekday, morning, etc.):    During Day - Any Reason AB   Non R



### 7. Well Location Sketch

Notes: shown location of water well(s), septic tanks and beds, laneways/roads, fences, site buildings, north arrow, and any distinguishing site features. Include Legend.



Well GPS	WWZ - 06809	192m, 5682772m	WW3 -, 0681169 m	, 568 2906 m
8. Site Photograph Log				
	Number of Photos	Taken:		
Photograph Number/Name		<u>Description</u>		
	_	<u> Partina anno anto anto anto anto anto anto an</u>		
	_		3-1	
	_			
	_	<u></u>		
	<u>-</u>			


### Water Well Reconnaissance Survey



	SITE RECON	NAISSANCE CHECKLIST	
Project Name:	WATERMAN AGE	REGATE RESOURCE	
Project Number:	203.50065.0000	SLR Staff: RTIL	
Street Address:	SW 31-26-03	SWSM	
Property Type:	Private Residence	Commerical/Industrial Other	
Person/Resident Interviewed:	JOHN NUGTER	2	
Date of Visit:	30 OCTOBER 2014		
1. Well Owner Information			
Name:	JOHN NUGTER		
Street Address:	AS Above	ę	
Contact Number:	Home:	Business: Cell:	
Email Address:	,		
2. Well User/Occupant of t	he Residence Using the Wel	I	
	Same as Well Owner		
If different from well owner ple	ease fill out details below:		
Name:		•	
Street Address:		*	
Contact Number:	Home:	Business: Cell:	
Email Address:			
3. Well Details			
Well Location	Lot: SW-31-26-03 WSM	Concession: Townshi	p:
3A. Well Use			
<u>Water Use:</u>	Domestic:	No. of people using water from the well:	3
	Livestock:	No. of livestock using water from the well:	25 CATTLE, 5 HORSES
	Lawn Watering:	Acres/area covered:Approxir	nate Amount:
Å.	Irrigation:	Acres/area covered:Approxim	nate Amount:



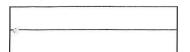
3A. Well Use Continued								
Additional Equipment:	Pool:	Jacuzzi/Hot	t Tub:		Landscape	water feat	ure/fountain:	
5	Other:	3			70 (6 Ex			
Private waste and water dispo	sal:	Type (ex. S	pectic tank):	Ser	IC TAND	es (2	( BANKT	
System description:	1 TANK		onse + 1					
Distance to Well		_	Direction from w	/ell (N	, S, E, or W)		40	
Well is	Uphill		Downhill		Same Grade	е 🗌	as the waste \	vater system
3B. Well Construction Deta	nils							
Construction/Installation Date:	1990		Contra	actor:	Louis	WATER	were DR	LLUN G
Type of Installation:	Drilled i	Dug 🗌	C	Other:			e e	
Diameter:		_	Well Depti	h 🗐:	115 ft			
Screen?	YES 🗸	NO				MOE Reco	ord Number:	
	Screen length (m)		<del></del>			350	194	
¥	Depth to top of sc	reen (m)	( <del>)</del>				•	
Is the well accesible for sampli	ng?	YES 🗹	NO _	]		Confirmed	Infe	red
If no provide details:	-							
Location of measurement (top	of pipe (TOP), grou	nd surface):	5 TOP		12/1			
SLR staff member collecting th	e measurement:	RoBERT	r Time					
Date of <u>original</u> measurement:	30 OCTOBER	2014	_ Original/initial	water	level depth	(m) 11.7	34 mb Toc	
Subsequent water level measur	rements	r <sup>ta</sup>	T .				1	
	Date Depth (m)							
	Staff							
3C. Pumping Equipment								
Pump Type:	Suction-lift		Subrasible		Pumping Capacity Age		30 GAZ/11	N
	Positive-submerge	2006					10	
How is the pump lubricated?	Secretaria de la companya del companya de la companya del companya de la companya		1.00					
Depth of intake setting:	Original (m)		Present (m)	) .	100ft?	Pumping R	Rate (L/s)	15-55088
Storage Tank:	Туре:	N/A			Capacity:			
Additional Features:	Chlorinator	Δ(A	Water softener		Water filter [		Filter type: _	



4. Well History							
How long have you owned, op	erated or lived on	this property?	17 76	-R5			
Have you ever experienced any <u>previous</u> problems with your well?							
If so, when?							
What was the cause of the pre	vious problem:	Drought	Drought Pump Failure				
		Plugging		Increased usage	ge		
		Interference	<u> </u>				
If the problem was contaminat	ion, what water qu	uality changes	were apparent? (Not	e any differences in tast	e, odour, colour or clarity)		
What action was taken to over	come this problem	1?					
What were the effects of this a	ction?	1					
Did you ever have your well?		deepend,	YES	NO 🗸			
	*	cleaned, or a new	YES	NO 🖸			
		well	YES .	NO 🕽			
	If so why?						
Outline briefly any previous rep	pairs or changes in	n pumping equ	ipment, and dates	CHANGED PL	Ml 2006		
5. Sample Details		are construction of					
Date:	30 OCT 2014	<u> </u>	Sample Collected?	YES NO			
Sample Name/Number:	WW4	=	Number of Bottles:	_2_			
Field Analysis	Harnes	s	_ Iron	1	Conductivity 606 ps/cm		
	pl	H 5.44?	Temperature	5.1°C	Other		
6. Contact Details							
Permission for future monitorin	ıg?	YES 🔽	NO				
Well Aware Booklet:	File Color Ad All Colors	· · · · · · · · · · · · · · · · · · ·					
Perferred contact time/method:		call/contact	ahead 🗸	site visit			
Contact by:		email	phone	perferred contact num	ber:		
	preferred contact time (evening, weekday, morning, etc.):						



## 7. Well Location Sketch Notes: shown location of water well(s), septic tanks and beds, laneways/roads, fences, site buildings, north arrow, and any distinguishing site features. Include Legend. from HIGHWAY 567 SWAMIT AGGREGATES SITE LEGEND → North Building o Well Septic Tank and Bed Roadways and Lanes Note: R= Residental B=Barn C=Commercial I=Irrigation A=Agricultural (Not a Barn) Not to Scale Well GPS 0680258 , 5682090 8. Site Photograph Log Number of Photos Taken: Photograph Number/Name Description



### Water Well Reconnaissance Survey



SITE RECONNAISSANCE CHECKLIST								
Project Name:	SUMMIT	AGGREGA	TES LESOURE	E				
Project Number:	203.50065		-10 A-1					
Street Address:	265201	RANGE PO	AD 35 , ROCKY W	NEW COUNTY	· · · · · · · · · · · · · · · · · · ·			
Property Type:	Private Residenc							
Person/Resident Interviewed:	MR + MR	s Hodges	ion					
Date of Visit:	1 HB 200	6	Time:	19:00	_			
1. Well Owner Information								
Name:	HARRY 1	100650n						
Street Address:	AS ABOVE							
Contact Number:	Home:		Business:	Cell:				
Email Address:	Vicinity and the second	4						
2. Well User/Occupant of th	ne Residence Us	ing the Well						
	Same as Well Ow	ner /						
If different from well owner ple	ase fill out details	below:						
Name:								
Street Address:	,							
Contact Number:	Home:		Business:	Cell:				
Email Address:		···						
3. Well Details								
Well Location	Lot:		Concession:	Township:	-			
3A. Well Use	=							
Water Use:	Domestic:		No. of people using wa	ater from the well:	2			
	Livestock:		No. of livestock using	water from the well:	2 MORSES			
	Lawn Watering:		Acres/area covered: _	Approxima	te Amount:			
	Irrigation:		Acres/area covered: _	Approxima	ite Amount:			



3A. Well Use Continued									
Additional Equipment:	Pool:	Jacuzzi/Hot Tub:				Landscape water feature/fountain:			
	Other:								
Private waste and water dispos	ectic tank):	YES	- SEPT	IC GEZ	D				
System description:	TANK L								
Distance to Well	Direction from well (N, S, E, or W)								
Well is	Uphill Downhill Same Grade as the waste water system							water system	
3B. Well Construction Deta	nils								
Construction/Installation Date:	NOVEMBER I	981	_ Co	ontractor:	PARSO	ws DRI	LLING		
Type of Installation:	Drilled	Dug 🔲		Other:					
Diameter:	5 IN	_	Well D	epth (m):	Table Control				
Screen?	YES 🔽	NO 🗌				MOE Reco	ord Number:		
	Screen length (m)	13.7	<b>-</b>			395	786		
	Depth to top of sc	reen (m)	48.15						
Is the well accesible for sampli	ng?	YES	NC			Confirmed	l Infe	rred	
If no provide details:	WELL IN	A Becon	u Grown.	D PIT	- conf	ines ser	ACE ENTRY		
Location of measurement (top of pipe (TOP), ground surface): 160ft To WATER - From CHENT/LOG									
SLR staff member collecting th	ne measurement:	<u> </u>				<del>-</del>			
Date of <u>original</u> measurement: $5/Nov/1981$ Original/initial water level depth (m) 48.77 (Decea)									
Subsequent water level measurements									
	Date								
	Depth (m) Staff								
	Juli								
3C. Pumping Equipment									
Pump Type:	Suction-lift				Pumping C	apacity			
	Positive-submerge	ence 🗌			Age		LIYR		
How is the pump lubricated?	Y								
Depth of intake setting:	Original (m)	170 F	Presen	t (m)		_Pumping I	Rate (L/s)	_	
Storage Tank:	Туре:				Capacity:	V4			
Additional Features:	Chlorinator		Water softe	ner	Water filter	r 🗌	Filter type:		
Kan	TREATME	57							



4. Well History									
How long have you owned, ope	erated or lived on th	nis property?		11 4 CA	RS				
Have you ever experienced any	/ <u>previous</u> problems	s with your w	ell?	NO					
If so, when?	***************************************								
What was the cause of the prev	vious problem:	Drought			_ Pur	mp Failure	-		
26		Plugging			_ Inci	reased usage	·		
		Interference			_ Cor	ntamination	-		
If the problem was contaminati	on, what water qua	lity changes	were ap	parent? (Note	any d	lifferences ir	taste, od	lour, colour or	clarity)
What action was taken to over	come this problem?	•							
What were the effects of this a	ction?		1.						
Did you ever have your well?		deepend,	YES		NO				
		cleaned, or a new	YES		NO				
		well	YES		NO				
	If so why?	Part of the second							
Outline briefly any previous rep  5. Sample Details	oairs or changes in	pumping equi	ipment,	and dates	-				
Date:			Samp	ole Collected?	YES	NO			
Sample Name/Number:		_	Numl	er of Bottles:	1				
Field Analysis	Harness		<b>-</b> 9.	Iron	1		Co	nductivity	<u> </u>
	рН		<del>z</del> n	Temperature	·			Other	
6. Contact Details									
Permission for future monitoring	ng?	YES 🔽	ио [						`
Well Aware Booklet:									
Perferred contact time/method:		call/contact	ahead			/isit 🗌		403-818-97	
Contact by:		email	phone		perfe	erred contact	number:	403-932-5	664 (nm)
	preferred contact	time (evening	, week	day, morning, e	etc.):	-			



7. Well Location Sketch			
Notes: shown location of water well Legend.	(s), septic tanks and b	eds, laneways/roads, fences, site buildings, north arrow, and any disti	nguishing site features. Include
			LEGEND  North Building Well Reptic Tank and Bed Roadways and Lanes Note: R= Residental B=Barn C=Commercial I=Irrigation A=Agricultural (Not a Barn)
Not to Scale  Well GPS		, i	
8. Site Photograph Log			
	Number of Photos	Taken:	
Photograph Number/Name		<u>Description</u>	
	-	· · · · · · · · · · · · · · · · · · ·	
	<b>:</b> 5	· · · · · · · · · · · · · · · · · · ·	
<del></del>	. :		
<del></del>	. 1		



# **Water Well Drilling Report**

View in Metric Export to Excel

GIC Well ID GoA Well Tag No. Drilling Company Well ID

395786

GOWN ID

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Date Report Received

1982/02/02

vveii identii	ication and L	.ocalion									Measure	ment in impena
Owner Name PARKER, G.			Address P.O. BOX	123 COCHE	RANE	Town			Province	Countr	y	Postal Code
Location	1/4 or LSD NE	SEC 31	<i>TWP</i> 026	RGE 03	W of MER 5	Lot	Block	Plan	Additio	onal Description		
Measured fro	m Boundary o	of ft from ft from			Latitude	inates in Dec 51.267033 on Obtained	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.	and the same	83) 4.402748	Elevation How Elevation C Not Obtained	ft Obtained	
Drilling Info Method of D Cable Tool					Type of Wo	ork					av de de	
Proposed W Domestic & S												
Formation I	_og			Meas	urement in Ir	mperial	Yield Tes	t Sumn	mary		Measurer	ment in Imperial
Depth from ground level	(ft) Water Bearing	Lithology	Description	n			Recomme Test D		<i>ımp Rate</i> Water Remova	0.00 igpm Il Rate (igpm)	Static Water	er Level (ft)
6.00		Brown C	av & Boule	larc			1981/11	/19	15	nn	160	0.00

Formation Log		Measurement in Imperial
Depth from ground level (ft)	Water Bearing	Lithology Description
6.00		Brown Clay & Boulders
11.00		Gray Clay & Boulders
13.00		Boulders
36.00		Brown Clay & Gravel
45.00		Gravel
51.00		Brown Shale
71.00		Gray Hard Shale
76.00		Gray Hard Sandstone
83.00		Gray Shale
88.00		Gray Sandstone
91.00		Gray Shale
94.00		Gray Sandstone
96.00		Gray Soft Sandstone
101.00		Gray Hard Sandstone
114.00		Gray Firm Shale
121.00		Gray Hard Sandstone
144.00		Gray Firm Shale
148.00		Gray Hard Sandstone
180.00		Gray Shale
185.00	Yes	Gray Water Bearing Sandstone
205.00		Gray Shale

Yield Test Sun	nmary			Mea	asurement in Im	perial
Recommended I	Pump Ra	te0.0	00 igpm			
		Removal Rate			ic Water Level (ft)	)
1981/11/19		15.00			160.00	
Well Completion					asurement in Im	perial
Total Depth Drille 205.00 ft	ed Finis	hed Well Depth	Start I 1981/		End Date 1981/11/19	
Borehole						
Diameter (	(in)	Fron 0.	n (ft) 00	Transport of Assessment	To (ft) 205.00	
Surface Casing Steel			Well Cas Steel	sing/Line	r	
Size OD	نا	7.00 in		Size OD :	5.00 in	
Wall Thickness	:(	0.231 in	Wall TI	ickness :	0.219 in	
Bottom at	:	15.00 ft		Top at :	0.00 ft	
			В		205.00 ft	
Perforations						
From (ft) T	o (ft)	Diameter or Slot Width(in)	Slot Le (in)	ngth		
158.00 2	03.00	0.375			16.00	ļ
	Orive Sho	00 ft to		<u>ft</u>		
Other Seals			=()			
Other deals	Туре			Α	t (ft)	
Screen Type Size OD	;	0.00 in				
From (ft			(ft)		Slot Size (in)	
Attachmen						
			Bottom	Fittings		·
Pack						
Туре			Grain S	Size		
Amount						

Con	ractor	Certi	ficat	ion

Name of Journeyman responsible for drilling/construction of well

UNKNOWN NA DRILLER

Company Name PARSONS DRILLING Certification No

Copy of Well report provided to owner

Date approval holder signed



# **Water Well Drilling Report**

View in Metric Export to Excel

GIC Well ID GoA Well Tag No.

395786

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

Drilling Company Well ID
Date Report Received

A CONTRACTOR OF THE PARTY OF TH											
Well Ident	tification and Lo	ocation									Measurement in Imperi
Owner Nan PARKER, C			ddress .O. BOX	123 COCHRA	ANE	Town			Province	Country	y Postal Code
Location	1/4 or LSD NE	SEC 31	<i>TWP</i> 026	RGE 03	5	Lot		Plan		nal Description	
Measured f		ft from ft from				inates in Decii 51,267033 on Obtained				Elevation How Elevation C	
Additional	Information								-1-1-1-1		Measurement in Imperia
Distance F Is Artesia	From Top of Casi on Flow Rate		Level _		<u>in</u>	Is	Flow Cont				
Recomme	nded Pump Rate				0.00 igpm	n <i>Pump</i>	Installed			Depth	ft
Recomme	nded Pump Intak	e Depth (Fro	m TOC)	2	200.00 ft	Туре	_		Make		H.P
										Model (Output	Rating)
Dia you l	Encounter Saime	vvater (>400	10 ppm 11	08)	Depii	·					
Addition	Encounter Saline nal Comments on REPORTS WATE	Well	(	Gas	Depti		ft	Geo	physical Log Submitted to		bmitted to ESRD
Addition	nal Comments on REPORTS WATE	Well	(	Gas	Depti		ft	Geo, llected for P	physical Log Submitted to Potability sen From G	a Taken	-
Addition	nal Comments on REPORTS WATE	Well	(	BID Static V	Depti  Depti  Water Level 160.00 ft		ft Sample Co	Geo, llected for P	physical Log Submitted to Potability  Ren From G Depti	n Taken o ESRD Sub	bmitted to ESRD
Addition DRILLER F Yield Test Test Date 1981/11/19 Method of F Depth With	nal Comments on REPORTS WATE	Well ER QUALITY Start Time 12:00 AM I ailer 15.0 160.0	AS TUR	BID Static V	Deptl		ft Sample Co	Geo,	physical Log Submitted to Potability  Ren From G Depti	Sround Level to water level clapsed Time	bmitted to ESRD
Addition DRILLER F Yield Test Test Date 1981/11/19 Method of F Depth With	nal Comments on REPORTS WATE  9  f Water Removal Type Ba Removal Rate	Well ER QUALITY  Start Time 12:00 AM  I ailer 15.0 160.0	AS TUR	BID Static V	Deptl		ft Sample Co	Geo,	physical Log Submitted to Potability  Ren From G Depti	Sround Level to water level clapsed Time	bmitted to ESRD

Contractor Certification

Name of Journeyman responsible for drilling/construction of well UNKNOWN NA DRILLER

Company Name

PARSONS DRILLING

Certification No

Copy of Well report provided to owner Date approval holder signed



# Monitoring Well Construction Logs

# **Groundwater Monitoring Plan**

Mountain Ash Limited Partnership

Summit Pit

SLR Project No.: 212.06650.00006





# **Monitoring Well Summary**

Monitoring Well Name	Drill Hole Name	Northing	Easting	Ground Elevation (masl)	Top of Screen (mbg)	Base of Screen (mbg)
MW14-101	MW14-101	5682868.6	680066.4	1291.08	16.5	21.0
MW14-102	MW14-102	5682279.8	680791.6	1280.92	10.4	14.9
MW14-103	MW14-103	5683100.4	680739.0	1297.44	22.6	27.1
MW18-104	MA-18-06	5682650.8	680079.8	1293.81	-	27.4
MW18-105	MA-18-11	5682281.0	680070.0	1294.21	-	27.4
MW18-106	MA-18-07	5682665.6	680392.4	1287.66	-	19.8
MW18-107	MA-18-08	5682628.0	680724.0	1292.03	-	27.4
MW19-108	MW19-108	5682182.0	680386.0	1293.64	29.0	32.0
MW19-109	MW19-109	5681803.0	680676.0	1271.68	10.7	13.7
MW19-110	MW19-110	5682059.0	680785.0	1291.14	27.7	32.3

mASL – metres above sea level

mbg – metres below ground

- Top of screen not recorded in 2018 wells

		CI			CLIENT: Summit Aggregates Resource PROJECT: Hydrogeological Assessment	BO	OREHOLE	LOG LOUTM COORDIN	ŢΑŢ
		<b>JL</b>	K		NW 31-026-3 W5M Alberta	BOREHOLE NO:	MW14-	101 COORDIN 56828	
		ONSULTIN	G (CA	NADA) I	TD. PROJECT No. <b>203.50065.00001</b>	SURFACE ELEVATION:	1293.53 m	680066	
	SAMPLE TYPE	0	_			TEST DATA	WELL COMPLETION WATER LEVEL		
	<u> </u>	SAMPLE ID	Recovery	SOIL TYPE	SOIL DESCRIPTION	■SPT Count	#   E	WELL	
:	MPI	MPI	Rec	<u> </u>	COLL DECOMM THOM		I MP	WELL COMPLETION NOTES	
	SA	SA	%	S		▼ /6 IVIOIStuTE	W COM	140120	
1-									ŀ
1								stickup, above ground steel	Ļ
+					Ground Surface			protector	ŀ
)				$\frac{z_{IN}}{z_{IN}}$	TOPSOIL				†
-					$\neg$ Clay, some silt, occasional gravel, rootlets, brown, moist, soft to firm	1			ļ
1					CLAY TILL			backfilled with drill cuttings	-
-					Sandy, gravelly (fine to coarse grained) clay, light brown, dry, very hard			Cuttings	ŀ
		WP1			very flatu				ŀ
-							)		-
2_				• •					-
-									ļ
-									ŀ
,									ļ
3-									-
+									ŀ
1									-
-				+		<u> </u>			ļ
7									-
1									
;-									ŀ
-									F
+									ŀ
3				•					-
Ì		•			SAND AND GRAVEL 6.1	1			ŀ
-		WP2			Fine to medium grained sand, fine to coarse grained gravel, well graded, light brown to orangey brown, dry, compact with				ŀ
.					occasional hard, calcified bands				ŀ
′-									ŀ
+									ļ
-									ŀ
3-									ŀ
]									ŀ
1								hydrated bentonite chips	•
9-									ŀ
									F
+									t
,						L			F
+									ŀ
1									F
+									t
1									-
+									-
1									-
2-						<u> </u>			t
1									-
1									ļ
	DRIL	LING MET	HOE	): ):	Becker Hammer Notes:■■ GRAB SAN	I MPLE			_
					TWOICS.				
		L DATE:	20	Conton	ber 2014 LOGGED BY: RT		1	eet 1 of 2	

		CI			CLIENT: Summit Aggregates Resource PROJECT: Hydrogeological Assessment	В	OKE	HO	LE	E LOG	JATE
		<b>2</b> L	.K		NW 31-026-3 W5M Alberta	BOREHOLE NO:	MN	N14	<b>4</b> -1	O T COORDIN 56828	
-		CONSULTIN	NG (CA	ANADA) L	тр. PROJECT No. <b>203.50065.00001</b>	SURFACE ELEVATION:	1293	3.53 m	_	680066	
DEPTH (m)	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA  ■SPT Count  ◆ % Moisture		WELL	WATER LEVEL	WELL COMPLETION NOTES	
3-	SA	SAI	%	SO		→ % Moisture		₩S	×	NOTES	_
4-								-			-
5-					GRAVEL 14.63 Medium to coarse grained, sandy, light brown, moist, compact with occasional hard bands Below 15.2 m: Occasional cobbles					50 mm solid PVC pipe	-
6-		WP3							<u> </u>	GW = 16.40 mbg (2Oct2014)	-
7-					Below 16.8 m: Wet						
3-										50 mm 010 slot PVC pipe	
0-		WP4		000	SAND Medium to coarse grained, grey brown, wet, very loose  19.5						
1-		WP5		• • • • • • • • • • • • • • • • • • • •	SANDSTONE 21.03 Fine grained, brown, grey, wet, weak						-
2- -		WP6			Below 21.6 m: Weathered, clayey, silty, soft			-		bentonite chips	-
					End of borehole at 22.3 m  Well Completion Details: Screened interval from 16.5 m to 21.0 m below surface Elevation at top of pipe (TOP) = 1294.240 m  Groundwater Information: Depth to groundwater from TOP = 17.11 m (2Oct2014)						
	DRIL	LING ME	THO	D: I	Becker Hammer Notes: GRAB SAM	  PLE					_
	DRIL	L DATE:	30	Septem	ber 2014 LOGGED BY: RT				She	et 2 of 2	

					CLIENT: Summit Aggregates Resource	<u> </u>	D	JIILI	IUI		LOG	1.5
		SL	R		PROJECT: Hydrogeological Assessmen NW 31-026-3 W5M Alberta	nt	BOREHOLE NO:	MW	<i>I</i> 14	1	02TM COORDIN 56822	1A7 280
_ 5	LR C	ONSULTING	G (CA	NADA) L		s	URFACE ELEVATION:	1283.			680791	
$\Box$							TEST DATA		ž	Ē		T
	SAMPLE TYPE		Recovery						WELL	WATER LEVEL		
Ē		LE	300	=	SOIL DESCRIPTION		■SPT Count		ᆲ	H	WELL COMPLETION	
DEPIH (m)	3AM	SAMPLE ID	% Re	SOIL TYPE			♦ % Moisture		NE ON	٧AT	NOTES	
1-	(0)	0)	0.	0)					> 0	>		+
+									П			-
1											stickup, above ground steel	ŀ
4					Ground Surface						protector	ļ
0+				71 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TOPSOIL				4	$\neg$		╬
1				шШ	Sandy, occasional gravel, dark brown, rootlets, mo	oist 0.3					silica sand	ŀ
-				• .	<b>CLAY TILL</b> Silty, sandy clay, some gravel, brown, moist, very h	hard						-
1-					Silty, Salidy Clay, Some graver, brown, moist, very r							ŀ
-												F
												ŀ
-												ŀ
2-		WP7				<u> </u>					Investment 10 1 1	-
1											hydrated bentonite chips	•
-												-
3-												+
~ ]				$  \phi  $								ŀ
-												-
1												ŀ
4-					SAND	3.96		<u>-</u>				F
1		WP8			Medium to coarse grained, well graded, grayelly (fi	ine to						ŀ
4				0	coarse, rounded), occasional cobble, brown, moist GRAVEL AND SAND	4.57		95				İ
_				[· 0°]	Well graded, fine to coarse gravel and well graded			9				ŀ
5- -					coarse sand, occasional cobble, rounded, moist	,						ŀ
4		WP9						g.				ŀ
1				800				95				ŀ
6-				60°				🛭				ļ
1				P. O. 4				9				-
4					SAND AND GRAVEL	6.4		9			backfilled with drill cuttings	t
_ 1					Fine grained, trace medium, trace coarse sand. Fin coarse, rounded gravel, red, moist	ne to		9			- Serian go	-
7- -		WP10			3 to 1 to 3 to 1 to 3 to 1 to 1 to 1 to							-
4								95				-
1					From 7.6 to 7.9 m: Rounded, medium to coarse gra	avel, sandy,		95				ŀ
8-					dry							
1								9				ŀ
-								Q.				ļ
9-												-
9								10	d Ko			t
+											hydrated bentonite chips	;
1											•	t
0-						<u> </u>					50 mm solid PVC pipe	F
1								:			PiPC	ŀ
+								:				
1					<b>GRAVEL</b> Poorly graded, medium, rounded, sandy, trace silt,	10.7		]:	$\exists$			-
[		WP11		60	coating on gravel, black and dark brown staining							ŀ
1				60 d	Below 11.3 m: Fine to coarse grained gravel, round	ded, sandy,			Ħ			-
1				500	fine, dark brown, moist			į.	$\mathbf{H}$			-
2-		WP12				<u> </u>			$  \exists    $			F
1				[0,0]				:	: <b>∃</b> :1			ŀ
-											50 mm 010 slot PVC pipe	ļ
_				ĎVď					. <b>=</b> , `.		r vo pipe	1
- 1	DRIL	LING MET	HOE	):	Becker Hammer Notes:	GRAB SAMPLE						

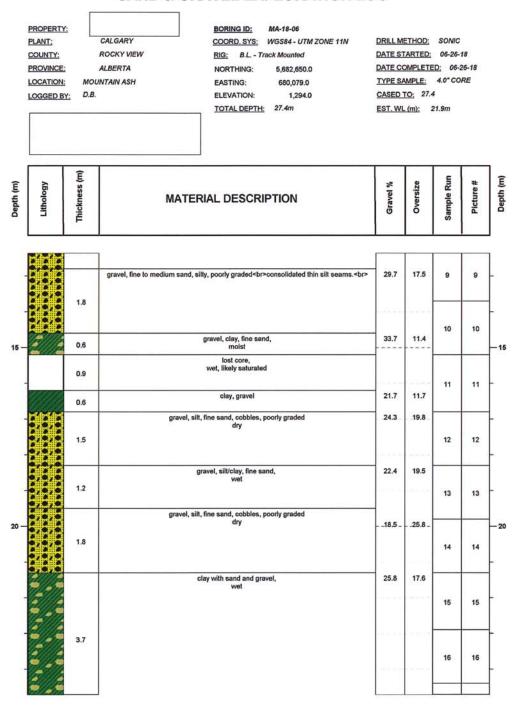
		SL	.R			PROJECT: Summit Aggregate Hydrogeological A NW 31-026-3 W5M	Assessment	BOREHOLE NO:	M۱	N14	4-1	LOG 02 <sup>TM COORDIN</sup> 56822	
	SAMPLE TYPE S	NITLU RIND SAMBLE ID	% Recovery		LTD.	PROJECT No. <b>203.50065.00001</b> SOIL DESCRIPTION	1	SURFACE ELEVATION:  TEST DATA  SPT Count	1283	WELL COMPLETION	WATER LEVEL	68079 <sup>-</sup> WELL	1.6
င္က DEPIH (m)		SAMP	% Re	SOIL TYPE	CD	AVEL AND SAND	10.0			WELL	WATE	COMPLETION NOTES	
		WP13			Fine med	e to medium, trace coarse, rounde dium, trace coarse sand, occasion ow 13.7 m: Increasing cobble	d gravel. Fine, trace nal cobble, dry						-
4-													- - -
5- 5- 1		WP14			We	NDSTONE eak, fine grained, silty, dry	14.93					silica sand	-
6- 6-		WP15			•	m 15.5 to 15.8 m: Higher clay and coming more competent below 15.				-		bentonite chips	-
+				*****	•	d of borehole at 16.5 m	16.5						╪
	DRILI	LING MET	ТНОІ	): D:	Becker	r Hammer	Notes: GRAB SAM	MPLE					
1	DRILI	L DATE:	1 (	October	2014	LOGGED BY: MH					She	et 2 of 2	

				CLIENT: Summit Aggregates Resource PROJECT: Hydrogeological Assessment	ВС	JRE	HO	)LE	E LOG	ראו
	5			NW 31-026-3 W5M Alberta	BOREHOLE NO:				103 COORDIN 56831	00 1A (
	CONSULT	ING (C	ANADA) I		SURFACE ELEVATION:	1299.	.81 r	n	6807	739
SAMPLE TYPE		>			TEST DATA		WELL COMPLETION	WATER LEVEL		
	SAMPLE ID	Recovery	SOIL TYPE	SOIL DESCRIPTION	■SPT Count		E	H H	WELL COMPLETION	
SAMPLE	MP	Rec			♦ % Moisture		Ŋ M M M M	ATE	COMPLETION NOTES	
S	\S	%	S				≶ઇ	Š		1
' <u> </u>										F
1									stickup, above ground steel	ŀ
-				Ground Surface					protector	ŀ
יַרָּי			$\frac{z_{I N}}{z_{I}}$ $\frac{z_{I}}{z_{I}}$	TOPSOIL						ļ
+			1/ 7/1/	Silty and clay, trace sand, rootlets, dark brown, moist				-	silica sand	ŀ
1				CLAY TILL 0.61						Ĺ
1-				Silty, sandy clay, trace rounded gravel, grey, moist, very hard, softer below 2.4 m						ŀ
]										F
1										ţ
2-										ŀ
1_										ļ
									hydrated bentonite chips	r
3-	WP16									ŀ
										+
1										-
-					L					ŀ
-										F
1										ŀ
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i-								2		ŀ
-								Š		ŀ
1						2		3		ļ
3-					<u> </u>			Ž		ŀ
]				Below 6.4 m: Brown		2		Ž		F
1				Delow 6.4 III. Blowii			רים וער	עצ		ŀ
7-				SAND AND GRAVEL 7.01	L	b		Ž		ŀ
1				Very fine, trace coarse sand. Medium to coarse grained,		<u> </u>		χί V		ŀ
+				rounded gravel. Some silt, red/brown, dry		Ŕ		A D		ŀ
3-								<u> </u>		-
1								Š		ŀ
-			ممر	GRAVEL AND SAND 8.53				3		ŀ
9-			000	Fine to medium, (trace coarse) gravel. Poorly graded, very fine sand, brown, moist		🖁				ļ
+			60C	inic sand, brown, moist		2				ŀ
1			600			Ž				ļ
			000			Ď		4		$\vdash$
- -			1000			5		X V		F
	WP17		000			P		Ž Ž		ŀ
			8000	Below 10.7 m: Increasing gravel		Ŕ		XI X		F
1			00					Ž		ļ
1			60%			0		Ž		-
1			000					Š		ļ
2-			600		<u> </u>	}	d E	Ž		}
1			000			0		<b>y</b>		ļ
1			600			2		Ž Ž		-
 DRI	LLING M	 ETHO	D:	Becker Hammer Notes: GRAB SAM	I IPLE		C) KC	<u> </u>	1	工
				NOTES.	·· = <b>=</b>					
DBI	ILL DATE	: 1	October	2014 LOGGED BY: MH				She	eet 1 of 3	

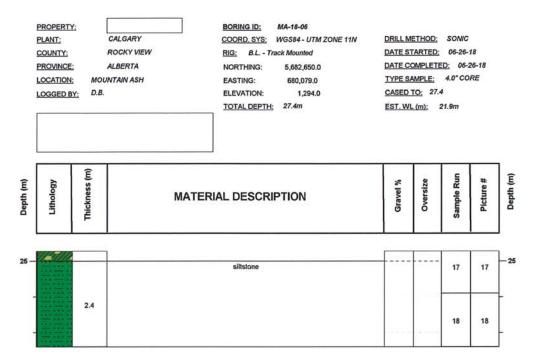
BOREH	TOLE I	LUG	<u> </u>
DLE NO: NATION: 1299.8		25 TM COORDIN 56831 6807	
Count oisture	WELL COMPLETION WATER LEVEL	WELL COMPLETION NOTES	
j			ŧ
	AKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAK	50 mm solid PVC pipe	-
	TORORORORORO		-
	TKOKOKOKOKO TKOKOKOKOKO		-
	KOKOKOKOK KOKOKOKOK		
	KONONONONONO		
	<b>▼</b> (2	GW = 23.49 mbg 2Oct2014)	
	50 P	50 mm 010 slot PVC pipe	-
			Sheet 2 of 3

					CLIENT: Summit Aggregates Resource	ВО	REHOLE	LOG
	SLR (	SL CONSULTING	R G (CA	ANADA) L	PROJECT: Hydrogeological Assessment NW 31-026-3 W5M Alberta PROJECT No. 203.50065.00001		MW14-1 1299.81 m	103 <sup>TM</sup> COORDINATE 5683100 N 680739 E
	PE					TEST DATA	N ÆL	
Ē	E	E D	very	/PE	COIL DESCRIPTION	■SPT Count	ETIC	WELL
DEPTH (m)	SAMPLE TYPE	SAMPLEID	% Recovery	SOIL TYPE	SOIL DESCRIPTION	◆ % Moisture	WELL COMPLETION WATER LEVEL	WELL FOR COMPLETION NOTES
27-								silica sand
		WP20 WP21		× × ×		7.4		hydrated bentonite chips
					\Below 27.7 m: Siltstone, grey, dry	7.7		
					End of borehole at 27.7 m  Well Completion Details: Screened interval from 22.6 m to 27.1 m below surface			
					Elevation at top of pipe (TOP) = 1300.720 m  Groundwater Information:			
					Depth to groundwater from TOP = 24.40 m (2Oct2014)			
_	DRIL	LING MET	L THOE	): 	Becker Hammer Notes: GRAB	SAMPLE		
	DRIL	L DATE:	1 (	October 2	2014 LOGGED BY: MH		She	et 3 of 3

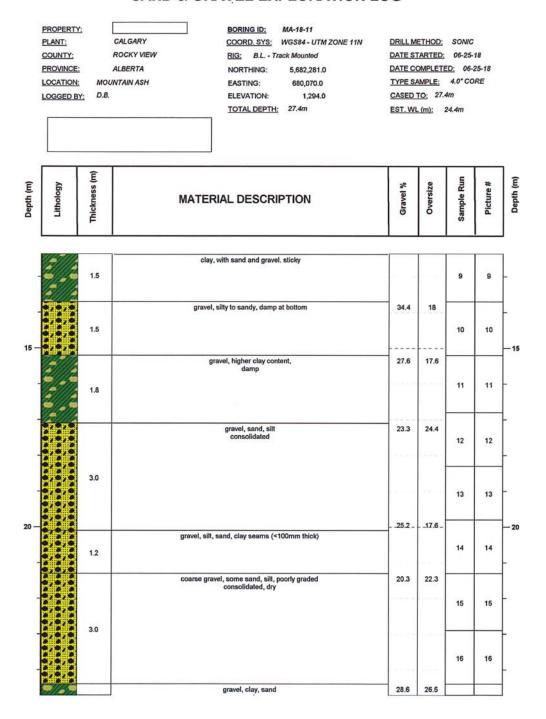
PROPERTI PLANT: COUNTY: PROVINCE LOCATION LOGGED I	E: <u>N:</u> MO	CALGARY ROCKY VIEW ALBERTA UNTAIN ASH	BORING ID: MA-18-06  COORD. SYS: WGS84 - UTM ZONE 11N  RIG: B.L Track Mounted  NORTHING: 5,682,650.0  EASTING: 680,079.0  ELEVATION: 1,294.0  TOTAL DEPTH; 27.4m	DATE S  DATE C  TYPE S  CASED	TARTED: OMPLETE AMPLE: TO: 27 L (m):	06-26- ED: 06- 4.0° CC	-18 -26-18	
Lithology	Thickness (m)	MAT	ERIAL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
o	0.3	I	topsoil					
O	0.9		silty till			1	1	-
0	1.8		clay till, stiff			2	2	-
	3.0	s	andy gravel, medium to fine sand thin clayey seam @ 5.6m	28.5	16.9	3	3	-
		80				4	4	-5
	1.8	S	andy gravel, medium to fine sand	31.6	22	5	5	
	0.3		clay seam, moist	25.5	18.4			-
	0.9		silty gravel, fine sand, dry	31.9	12.5	6	6	
	1.2		gravel, clay, fine sand, moist	28.1	24.7	7	7	-10
444	0.3		clay seam					
	2.1	gravel, fi	ine to medium sand, silty, poorly graded consolidated thin silt seams.	30.6	19.1	8	8	-



3 OF 3



	PROPERTY PLANT: COUNTY: PROVINCE: LOCATION: LOGGED B'	мои	CALGARY ROCKY VIEW ALBERTA INTAIN ASH	BORING ID: MA-18-11 COORD. SYS: WGS84 - UTM ZONE 11N RIG: B.L Track Mounted NORTHING: 5,682,281.0 EASTING: 680,070.0 ELEVATION: 1,294.0 TOTAL DEPTH: 27.4m	DRILL ME DATE ST/ DATE CO TYPE SAY CASED TO EST. WL	ARTED: MPLETE MPLE: O: 27.4	4.0°CO	25-18	
(m) undan	Lithology	Thickness (m)	MATER	RIAL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
0									
		1.5	dry silt, t	becoming hard and consolidated			1	1	0
	100			clay till, hard, stiff	- P	İ			1
2.5	000	2.4					2	2	
	00						3	3	
			sandy gravel, I	moderately to poorly graded sand / silt dry	34.1	23.2	3	3	-
5-		2.1					4	4	-5
		1.5		el, fine sand and silt, cobbles to 7.6m, thin (<100mm) clay lense at bottom	28.2	24.9	5	5	-
		2.4	sandy gravel, r	moderately graded, some coarse sand dry	27.6	14.2	6	6	
0 –							7	7	-10
CA C		0.6	sand, fine	to medium, with silt, trace gravel consolidated, dry	1	0			
		0.9	grav	vel ,silt, clay seam at 11.6m saturated	42.6	20	8	8	
		0.6	damp, t	noderately graded, some coarse sand use 25-33' as reference sample		11 50			-
	0200000		] clay,	with sand and gravel, sticky	35.2	16.1			1



3 OF 3

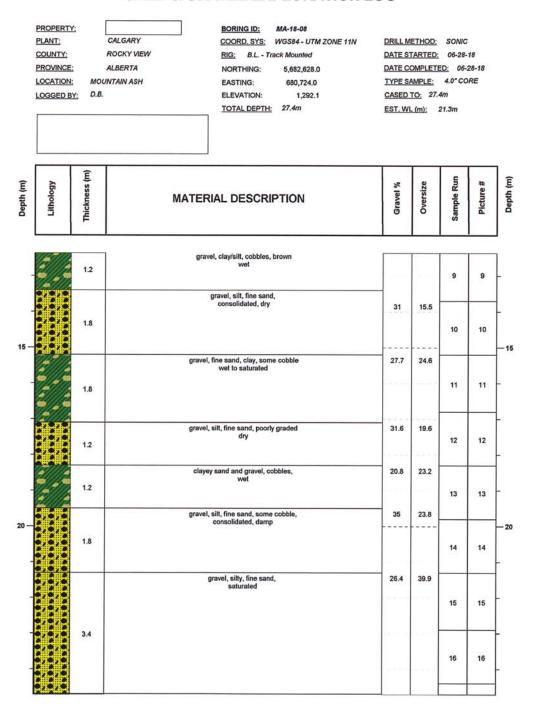
	PROPERTY PLANT: COUNTY: PROVINCE LOCATION LOGGED B	<u>:</u> : MOL	CALGARY ROCKY VIEW ALBERTA INTAIN ASH	BORING ID: MA-18-11 COORD. SYS: WGS84 - UTM ZONE 11. RIG: B.L Track Mounted NORTHING: 5,682,281.0 EASTING: 680,070.0 ELEVATION: 1,294.0 TOTAL DEPTH: 27.4m	DATE ST DATE CO TYPE SA CASED	ETHOD: FARTED: OMPLETE MPLE: TO: 27.	06-25- ED: 06- 4.0* CC	-18 -25-18	
Depth (m)	Lithology	Thickness (m)	MAT	ERIAL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
25 –		1.2		wet			17	17	-25
		1.8					18	18	-

	PROPERTY PLANT: COUNTY: PROVINCE: LOCATION: LOGGED B'	моц	CALGARY ROCKY VIEW ALBERTA INTAIN ASH	BORING ID: MA-18-07  COORD. SYS: WGS84 - UTM ZONE 111  RIG: B.L Track Mounted  NORTHING: 5,682,664.0  EASTING: 680,393.0  ELEVATION: 1,287.8  TOTAL DEPTH: 19.8m	DRILL ME DATE ST. DATE CO TYPE SAI CASED T EST. WL	ARTED; MPLETE MPLE; O; 19.8	06-26- <u>D:</u> 06-2 4.0" CO	26-18	
Depth (m)	Lithology	Thickness (m)	MATERI	AL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
0			eilh	till, unconsolidated, tan					<b>⊤</b> ₀
- 83	0000	2.1	any	an, unconsumated, tall	100 East 10		1	1	
100	.10		clay	till, very stiff, hard, brown			2	2	-
	000000	4.0					3	3	-
5-	000						4	4	-5
		3.0	gravel, silty, poor	ly graded fine sand, some cobble, tan solidated thin silt seams	37.2	19.3	5	5	
-							6	6	
10 —		1.8	grave	el, clay, fine sand, brown, wet	21.2	23.2	7	7	-10
		1.2	96. 1000 1000 200 200 200	ly graded fine sand, some cobble, tan dry	21.9	24.6	8	8	-
	CHILD HELD		gravel, s	silt and clay, clay-rich seams	25.0	40 a h			1

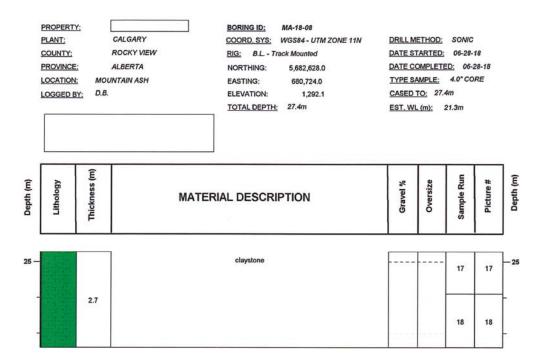
2 OF 2

	PROPERTY PLANT: COUNTY: PROVINCE: LOCATION: LOGGED BY	мои	CALGARY ROCKY VIEW ALBERTA JINTAIN ASH	BORING ID: MA-18-07 COORD. SYS: WGS84 - UTM ZONE 11N RIG: B.L Track Mounted NORTHING: 5,682,664.0 EASTING: 680,393.0 ELEVATION: 1,287.8 TOTAL DEPTH: 19.8m	DATE ST DATE CO TYPE SA CASED	ETHOD: TARTED: OMPLETE MPLE: TO: 19.0	06-26- ED: 06- 4.0" CO	18 26-18	
Depth (m)	Lithology	Thickness (m)	MAT	TERIAL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
		1.5	9	ravel, silt and clay, clay-rich seams wet			9	9	]
15 -		1.5		ided fine sand, some cobble - increasing with depth, tan y, getting wet near the bottom of run	30.3	24.1	10	10	-15
2.5		3.0	med	gravel, silt and clay, fine sand, dium sand seam (>150mm) @ 16.5m wet	11.7	47.3	11	11	
		0.0					12	12	-
		0.6		siltstone					
		0.6		sand and gravel, wet	-		13	13	ŀ
		0.3		siltstone / claystone	_				

	PROPERTY: PLANT: COUNTY: PROVINCE: LOCATION: LOGGED BY:	RC AL	ILGARY ICKY VIEW BERTA AIN ASH	BORING ID: MA-18-08  COORD. SYS: WGS84 - UTM ZONE 1  RIG: B.L Track Mounted  NORTHING: 5,682,628.0  EASTING: 680,724.0  ELEVATION: 1,292.1  TOTAL DEPTH: 27.4m	DATE S' DATE C' TYPE S. CASED	ETHOD: TARTED: OMPLETE AMPLE: TO: 27.4 L(m): 2	06-28- D: 06- 4.0" CO	18 28-18	
Depth (m)	Lithology	Thickness (m)	MATER	RIAL DESCRIPTION	Gravel %	Oversize	Sample Run	Picture #	Depth (m)
0				silty till					
	000	3.0			5-0-0 to 6		1	1	-
	0000	10 No.			- 1, - 1	-,-	2	2	-
	00000	1.8		clay till, stiff, hard			3	3	
5-		1.2	sandy gravel, fine t	o medium sand, moderately graded, brown	44.9	16 -	4	4	-5
		2.1	,	gravel, fine sand, brown, wet	28.1	35.1	5	5	
		0.6		clay, some gravel	25.9	7.7	6	6	
-		0.9	gravel, silt, fi	ne sand, poorly graded, tan to brown dry,	37.9	14.7			†
10 -		0.9	grav	rel, clay/silt, cobbles, brown wet	30.6 _	25.5 _	7	7	-10
		1.5	201000 <b>A B</b> 4000000 000000	o medium sand, moderately graded, brown dry	48.8	12.3	8	8	



3 OF 3



	SI	P		CLIENT: Mountain Ash Limited PROJECT: Proposed Summit Pit			Ν/Ι\Λ	110	== 3_1	LOG 08 <sup>UTM COORDIN</sup> 6803	۷A <sup>-</sup>
SLR C	CONSULTING	G (CANAL	DA) LTD.	NW 31-026-03 W5M Co	ochrane, AB	BOREHOLE NO: SURFACE ELEVATION:	1293.6			56821	
						TEST DATA		NC NC	Æ		
DEPTH (m) SAMPLE TYPE	SAMPLE ID	Recovery	TYPE	SOIL DESCRIPTION		■ SPT Count		WELL	WATER LEVEL	WELL	
DEPTH (m) SAMPLE TY	MPL	Rec	SOILT	OOIE BEOOKII HOW		◆ % Moisture	-	MP!	ATE	COMPLETION NOTES	
<u> </u>	δ	% 8	S			, woodard	3	₹8 •	🔌		_
]								$\exists$			
										above ground steel	
										protector	
0-			CI	Ground Surface  LAY TILL							+
-			Fi	ne trace gravel, dark grey brown, minor sa	imple recovery, dry						
-			$\  \ $								
1-					-						
-											
-				4.5 0							
				1.5 m: Some fine to coarse gravel						hydrated bentonite chips	
2-					_		- —			chips	
-											
1											
3-											
"]											
-			∷∷ s/	AND AND GRAVEL	3.35						
-			Fi	ne to coarse sand and gravel, brown, dry			) <u>-</u>	) S-			
-									ğ		
4-									ğ		
									9		
-		0	50 54	ANDY GRAVEI	4.57				Ž		
-		0	∑, W	ANDY GRAVEL edium to coarse gravel, coarse sand, brow	n, dry				ģ I		
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	LING METH	- 1)	Sonic/O	odex No	tes: GRAB SAMPL	.E	B	ГĘ	1		_
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					CLIENT: Mountain Ash Limite			\		ELOG	
		SL	R		PROJECT: Proposed Summit Pi NW 31-026-03 W5M 0	t Cochrane. AB	BOREHOLE NO:			08 <sup>UTM COORDIN</sup> 6803	1AT 386
ŞI	LR Ç	ONSULTIN	G (CA	NADA) L		700: II a. 10, 7 <u>—</u>	SURFACE ELEVATION:	1293.6	4 m	56821	
	<u>H</u>						TEST DATA		Z U		
( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	SAMPLE TYPE	SAMPLE ID	Recovery	SOIL TYPE	COUL DECORUPTION				COMPLETION WATER LEVEL	WELL	
:	APL	APLE	\eco		SOIL DESCRIPTION		■ SPT Count	-	ᆌ	COMPLETION	
3	SAI	SAN	8	SOI			♦ % Moisture	إ	COMPLETION WATER LEVEL	NOTES	
-					GRAVELLY SAND	9.14		i i	X		Ţ
-					Fine to coarse sand and gravel, yellow bro	wn, dry			X		-
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С	ORILL	ING MET	HOD:	So	nic/Odex N	otes: GRAB SAMF	PLE				

		CI			CLIENT: Mountain Ash Limit PROJECT: Proposed Summit	ted Partnership	В	DREH	OLE	LOG	JAT
		SL			NW 31-026-03 W5M	l Cochrane, AB	BOREHOLE NO:			08 <sup>UTM COORDIN</sup>	
		ONSULTIN	G (CA	NADA) L			SURFACE ELEVATION:	1293.64	-	5682	
	SAMPLE TYPE	₽	ery	뭐			TEST DATA	WELL	COMPLETION WATER LEVEL		
DEPIR (m)	4PLE	SAMPLE ID	% Recovery	SOIL TYPE	SOIL DESCRIPTION		■ SPT Count	-	H H H	WELL COMPLETION	
3	SAN	SAN	%	SOII			◆ % Moisture	WEI		NOTES	
-					@ 19.2 m: Trace silt present to 20.7 m						_
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7-					SAND Some gravel, brown, fine to coarse sand	26.8 and gravel, dry	· — — — — — — — — — —				-
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_	ORILL	ING METI	HOD:	So	nic/Odex	Notes: GRAB SAM	PLE				
	ו וום	DATE:	Jui	ne 3, 2019	LOGGED BY: NY				Shee	et 3 of 4	

		SL	D		PROJECT: Proposed Sumn	imited Partnership nit Pit	В		1 <u>0</u>		LOG 08 <sup>UTM COORDIN</sup> 6803	  ATE
-	N P C	ONSULTIN			NW 31-026-03 W	/5M Cochrane, AB	BOREHOLE NO: SURFACE ELEVATION:	1VIVV 1293.6			UO 6803 5682	
- 1	SAMPLE TYPE	SAMPLE ID	Recovery	TYPE	SOIL DESCRIPTIO		TEST DATA  SPT Count		COMPLETION	WATER LEVEL	WELL COMPLETION	
DEP	SAM	SAMI	% Re	SOIL ∴			◆ % Moisture	: HW		WATI	NOTES	+
-												-
30-										Ψ	GW = 1263.34 m	-
-				× × × × × × × × × × × × × × × ×	BEDROCK Siltstone, grey, dry	30.48				_	(5June2019) filter pack sand	-
31-				× × × × × ×				- — - <del>.</del>				-
-				× × × × × × × × × × × × × × × × × × ×								-
32-									₹. 			-
33-				× × × × × × × × × × × × × × × × × × ×								-
-				X X X X X X X X X X X X X X X								
34-								. — — -				-
-				X X X X X X X X X X X X X X X							bentonite pellets	-
35- -				× × × × × × × × × × × × × × × × × × ×								-
-												-
36-						-						
				× × ×	End of borehole at 36.6 m	36.6						
	DRII I	LING METH	HOD.	Sc	nic/Odex	Notes: GRAB SAMPI	I F					
		<b>-</b> //				THOUSE.	<b></b>					

	SI	R	CLIENT: Mountain Ash Limited Partnership PROJECT: Proposed Summit Pit		\/\\/	19_	E LOG 109 <sup>UTM COORDIN</sup> 56818	TAV
SLR C	CONSULTING	(CANADA)	NW 31-026-03 W5M Cochrane, AB TD. PROJECT No. 212.06650.00003	BOREHOLE NO: SURFACE ELEVATION:	1271.68		6806	
SAMPLE TYPE		% Recovery SOIL TYPE	SOIL DESCRIPTION	TEST DATA  SPT Count		COMPLETION	WELL COMPLETION	
SAM	SAM	% R		◆ % Moisture	WEI	00 \$	NOTES	
-						1	above ground steel	-
-			Ground Surface				protector	-
0		•.	CLAY TILL Trace fine gravel, dark brown, moist					
-								-
1-								
			@ 1.5 m: Some fine gravel				hydrated bentonite	
2-							chips	
-								
3-		• •			·			
4-			SAND AND GRAVEL Coarse sand, fine to coarse gravel, grey brown, dry  3.6	66		NO.		
						NOW N		
						CON CO		
5-								
						NOW.		
			GRAVELLY SAND 5.4 Fine to coarse gravel and sand, grey brown, dry	9	NO N	MOM		
6-						X28K		
						KO		
7-						0000	alaurah aurah 15°°	
-							slough and backfill	
1					NO N	NOW.		
8-					3	NOW.		
						2007		
						0000		
9-	I INC 1 ===		DEV Air Datus Dellins					
DRIL	LING METH	IOD: (	DEX Air Rotary Drilling Notes:					

					CLIENT: Mountain Ash L	imited Partnership	В	OREH	OLE	LOG	
_		SL	.K		PROJECT: Proposed Sumi NW 31-026-03 V	V5M Cochrane, AB	BOREHOLE NO:			109 <sup>UTM COORDIN</sup> 56818	
	- 1	ONSULTIN	IG (CA	NADA) L	TD. PROJECT No. 212.06650.0000	3	SURFACE ELEVATION:	1271.68	$\overline{}$	6806	
Ē	SAMPLE TYPE	₽	ery	ᆈ			TEST DATA	WELL	WATER LEVEL		
	APLE	SAMPLE ID	% Recovery	SOIL TYPE	SOIL DESCRIPTION	DN	■SPT Count	-		WELL COMPLETION	
1	SAN	SAN	%	SO.			◆ % Moisture	WE	<u>§</u>	NOTES	
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-					SANDY GRAVEL	11.58					Ĺ
٦					Fine to coarse gravel and sand, grey	brown, dry					-
2-										filter pack sand GW = 1259.36 m	-
-				00						(5June2019)	-
-											-
3-											ŀ
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4-				000	DEDDOOK	44.00					L
-					BEDROCK Could not determine lithology with m	14.02 inimal returns					-
]											-
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5-							<b></b>			bentonite pellets	-
1											-
-											L
+	+			Y///>	End of borehole at 15.8 m	15.8					+
					Groundwater Information: Depth to groundwater from TOP = 1	2.32 m (5June2019)					
						(					
	\D" /	INC N	1105		DEV Air Daton ( Dellin )	Tw.					
L	,KILL	JING MET	HOD:	0	DEX Air Rotary Drilling	Notes:					
С	RILL	DATE:	Ju	ne 4, 201	9 LOGGED BY: NY				She	eet 2 of 2	

SLR		CLIENT: Mountain Ash Limited PROJECT: Proposed Summit Pit	•		V \/\ \	<u></u>	<u> </u>	LOG 10 <sup>UTM COORDIN</sup> 56820	VΑ
SLR CONSULTING (CA	NADA) I TD	NW 31-026-03 W5M 0 PROJECT No. 212.06650.00003	Cochrane, AB	BOREHOLE NO: SURFACE ELEVATION:	1 <b>VIV V</b> 1291.1			<b>1U</b> 56820	
				TEST DATA					
SAMPLE TYPE SAMPLE ID % Recovery	SOIL TYPE	SOIL DESCRIPTION		■ SPT Count		WELL	WATER LEVEL	WELL	
SAMPL SAMPL	OIL 1	SOIL BLOOM! HOW		◆ % Moisture	-   i	WELL OMP	ATE	COMPLETION NOTES	
- N N N N	σ					≤ O	<		_
-									
1								above ground steel protector	
0		Ground Surface				ЦL		protector	
<u> </u>		AY TILL ace gravel, dark brown, moist							
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1	+								
3-									
-	SA	ND AND GRAVEL	3.35						
1	Fin	ne to coarse sand and gravel, yellow brown	vn, dry						
4-									
-									
1	GF	RAVELLY SAND	4.57	-					
5-	Fin	ne to coarse sand and gravel, reddish bro	own, ary						
-									
1	@	5.5 m: Yellow brown to 11.6 m						hydrated bentonite chips	
6-									
-									
]									
7-									
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-									
]									
8-									
]									
9-									
DRILLING METHOD:	ODEX A	ir Rotary Drilling No	otes: GRAB SAM	<u>l</u> PLE					-

		CI					ountain Ash Lim oposed Summi		ship		ВС	DREI	HC	)LE	LOG	ΙΝΔΤ
		<b>DL</b>	.K			N\	N 31-026-03 W5	M Cochrane	, AB	BOREHO		MV 1291.			10 <sup>UTM COORDI</sup>	10A1 2058 0788
		ONSULTIN		NADA) L	_TD.	PROJECT No. Z	12.06650.00003			SURFACE ELE TEST D					001	7/00
E)	SAMPLE TYPE		Recovery	YPE		20	IL DESCRIPTION			■SPT (			WELL	WATER LEVEL	WELL	
DEPIH (M)	AMPL	SAMPLE ID	Reco	SOIL TYPE		30	IL DESCRIPTION			<b>-</b> 3F1 \			ELL OMPL	ATEF	COMPLETION NOTES	
5	ŷ	<i>S</i>	%	S S	@9	1 m· Clav laver	dark brown, mois	t to 10 1 m					≥ö	<b>≥</b>		_
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-					GRA Fine	to coarse sand	<b>D</b> and gravel, yellow	brown, dry	11.58					D A		
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	DRILL	LING METI	 HOD:		] DEX Air I	Rotary Drilling		Notes:	GRAB SAM	L PLE			¥1 £	71		
								-		<del></del>						
E	ORILL	_DATE:	Ju	ne 4, 201	19	LOGGED BY:	NY							Shee	et 2 of 4	

	C				CLIENT: PROJECT:	Mountain Ash Li Proposed Sumn	mited Partner	ship		В	ORE	H(	<u>)</u>	E LOG	TANIC
	2		1			NW 31-026-03 W	/5M Cochrane	, AB	1	BOREHOLE NO:				110 <sup>UTM COORE</sup>	
	CONSUL	TING (	ANADA)	LTD.	PROJECT N	lo. 212.06650.0000	3			ACE ELEVATION:	1291		$\neg$		80788
SAMPLE TYPE	: □	2								EST DATA		WELL	COMPLETION WATER   EVE	<u> </u>	N
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DR	RILLING M	ETHO	J:	UDEX A	Air Rotary Drilling		Notes:	GRAB SAM	1PLE						
DE	RILL DATE		une 4, 20	)19	LOGGE	ED BY: NY							Q.	neet 3 of 4	

		CI			CLIENT: Mountain Ash Lim	No. 212.06650.00003    SURFACE LEVATION   1291.14 m	LOG	10.			
		SL	.K	PROJECT: Proposed Summit Pit NW 31-026-03 W5M Cochrane, AB PROJECT No. 212.06650.00003  SOIL DESCRIPTION  BEDROCK Sillstone, grey, dry  X X X X X X X X X X X X X X X X X X X	M Cochrane. AB	BOREHOLE NO:	MW1	9-1	10 TM COORDIN 56820	NA I 058	
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				1 × × × 1	PROJECT Proposed Summit MW 31-025-03 WSM Cochrane, AB  ID. PROJECTNo. 212.08690.00003  TEST DATA  SOIL DESCRIPTION  BEDROCK 29.3  BEDROCK 29.3  BEDROCK 29.3  Bedrocked at 33.2 m  Groundwater Information: Depth to groundwater from TOP = 28.85 m (5June2019)  DEX.Air Rebry/Drilling  Notes: ■ GRAB SAMPLE			:	:		-
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				$\times \times \times$		ROJECT NO WAY-1-026-03 WSM Cochrane, AB ROJECT No 212.06650.00003  TEST DATA  SOIL DESCRIPTION  PSPT Count  SIFT Count  MELL  SIFT ACT  SIFT Count  MELL  ME					
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+					End of borehole at 33.2 m	33.2					$\pm$
					Groundwater Information:						
					Depth to groundwater from TOP = 28.8	35 m (5June2019)					
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	יי דוום	VIC NAFTI		000	EV Air Potony Drilling	Notes: COMPONIE	N.E.				_
D	RILLIN	NG METH	HOD:	ODE	EX Air Rotary Drilling	Notes: GRAB SAMP	PLE				

