Desktop Hydrogeologic Assessment: District Lot 3421, Vernon, BC

Prepared for:

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TABLE OF CONTENTS

List of Tables

List of Figures

Appendices

1.0 INTRODUCTION AND BACKGROUND

Cassiar Geoscience Consulting Ltd. (CGC) is pleased to provide the following report which is comprised of a desktop review of publicly available geological and hydrogeological information for District Lot 3421 Osoyoos Division Yale District (the "subject property") located approximately 11 kilometers (km) northeast of Vernon, British Columbia (BC). The intent of the report is to gain knowledge regarding the groundwater resource potential for a proposed residential development at the subject property. The report also focuses on understanding underlying geological controls to the potential groundwater flow system (major faults, rock types, and anticipated groundwater flow directions).

This work was performed in accordance with an email scope of work between CGC and Doug Griffin of Black Stream Holdings Ltd., dated April 26, 2021. This report has been prepared by CGC for the sole benefit and use by Black Stream Holdings Ltd, M2MS Holdings Ltd., and EAG Holdings Ltd. In performing this work, CGC relied in good faith on information provided by others and has assumed that the information provided by those individuals is both complete and accurate as the author of this report did not conduct a site visit. The findings presented herein should be considered within the context of the scope of work; further, the findings are time sensitive and considered valid only at the time this report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations. CGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on these opinions.

1.1 Property Details

The subject property (District Lot 3421) consists of 153 acres of undeveloped land located in Electoral Area "C" of the Regional District of North Okanagan (RDNO) and is situated southwest of the end of Forsberg Road (which spurs off Silverstar Road) (**Figure 1**). CGC understands the proposed development would rezone the property into five-acre residential lots in accordance with the Area "C" Official Community Plan (OCP). The subject property is bounded to the east and west by undeveloped Crown land and by undeveloped private property to the north and south. The parcel at the northeast corner of the property consists of residential acreages along Forsberg Road.

1.2 Information Sources

This desktop review consisted of gathering publicly available online information from various sources including:

- iMap BC
- Available public sources (hydrogeology consulting reports)
- Geological Survey of Canada
- Data BC Catalogue

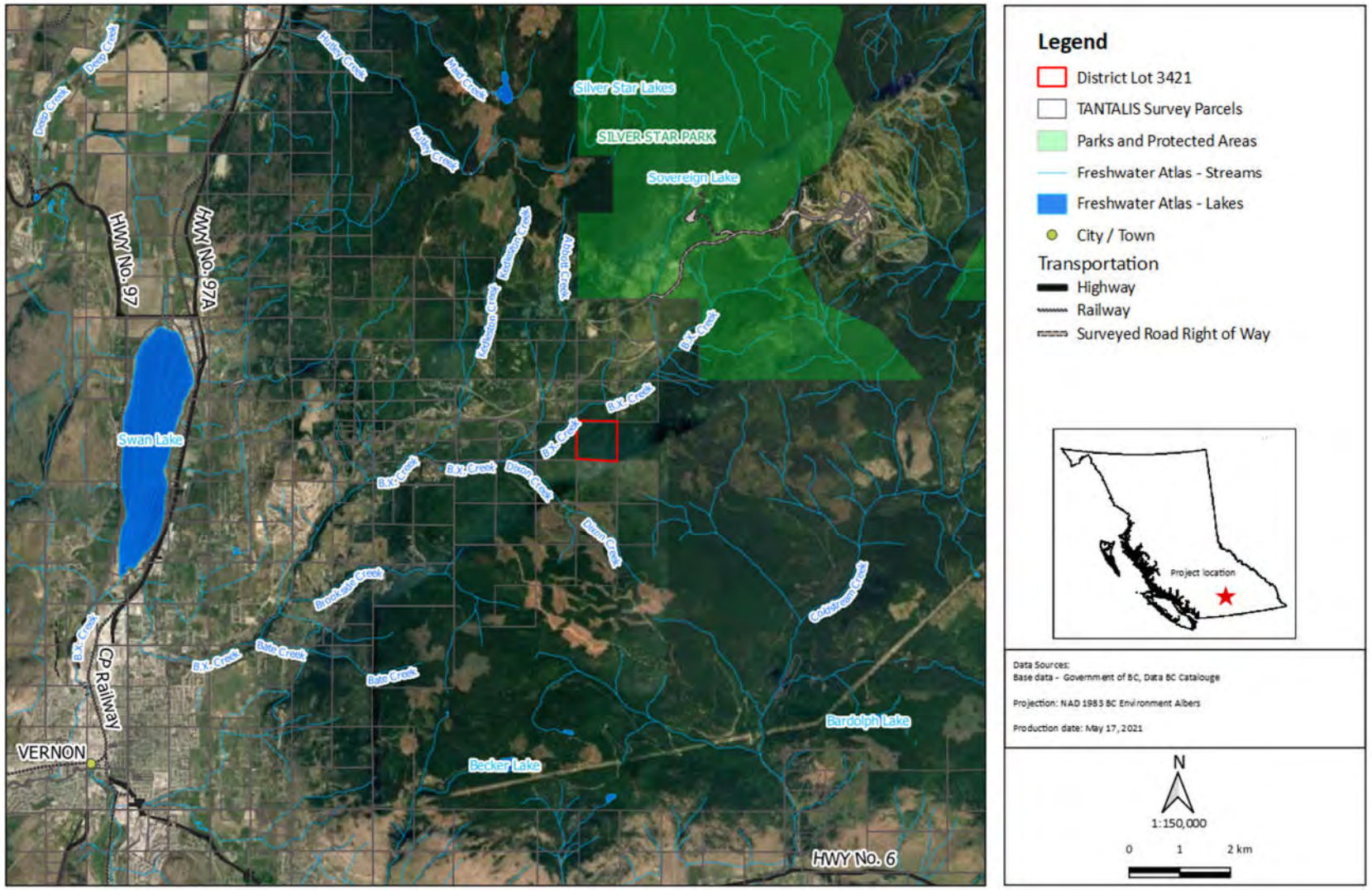

Figure 1. Site Location – District Lot 3421, Regional District of North Okanagan, BC

2.0 PROPERTY INFORMATION

The following subsections describe the climate, topography, bedrock, and surficial geology within the general area of the subject property boundary.

2.1 Climate

The climate in the area is characterized by cool, moist winters and warm and dry summers. There are two long-term Environment Canada weather stations near the subject property (Vernon North Station – 9 km to the west and Vernon Coldstream Ranch – 11 km to the south). The available historical climate data for these two stations is for the period from 1981 to 2010 (Environment Canada, 2021).

Based on a review of the climate data, the mean annual total precipitation at the Vernon North station was 487 millimeters (mm) (345 mm of rain and 142 centimeters (cm) of snow). The mean annual total precipitation at the Vernon Coldstream Ranch station was generally similar to the Vernon North Station with 500 mm (383 mm of rain and 117 cm of snow).

Snowfall can occur during every month from October to April with the majority falling in December and January. Rainfall can occur during each month of the year with the majority falling during May and June. Overall, the greatest amount of precipitation (rain and snow combined) occurs in November, December, and June at the Vernon Coldstream Ranch station and from November to January at the Vernon North station. The lowest amount of combined precipitation occurs from February to April at both weather stations. As the elevation of the subject property is approximately 400-600 m higher than the two weather stations it is expected that there will be a greater amount of precipitation at the subject property than the valley bottoms.

Silver Star Mountain Resort, located 6 km to the northeast of the property (Figure 1) and 600 m higher in elevation, also collects daily precipitation data throughout the ski season and sporadically throughout the off-season (Golder, 2008). This data has not been obtained or reviewed for this report.

2.2 Topography and Surface Water

The general topography slopes from the southeast towards the northwest with an approximate grade of 18%. The elevation on the property varies from approximately 1100 m above sea level (m asl) along the southeast corner to 900 m asl along the northwest corner.

Based on the desktop research, there are no surface water features within the property boundaries. Ephemeral drainage channels reported by the property owners were observed during a site visit in May 2021. They appeared to be two separate drainage channels that were intercepting near surface runoff, one of which reported to a water receiving area where some ponding occurred. BX Creek is situated approximately 100 m downgradient from the northwest corner of the property and runs from its headwaters near Silver Star Mountain in a southwesterly direction towards Vernon (Figure 1).

2.3 Bedrock and Surficial Geology

2.3.1 Bedrock Geology

The subject property lies within the Quesnel Terrane of the Omineca geomorphologic belt and is underlain by Upper Triassic aged sedimentary rocks (mudstone, siltstone, shale fine clastic sedimentary rocks) belonging to the Nicola Group (UTrNsf) (**Figure 2**) (Cui et. al. 1997). There are no major faults running beneath the property and there is believed to be no bedrock outcrop exposure on the subject property. The strike and dip of the bedrock beneath the subject property is unknown due to the lack of bedrock exposure within or adjacent to the property. Based on the topography of the subject property it is inferred that the bedrock dips to the northwest-west towards BX creek and would be encountered at a shallower depth on the eastern part of the property.

2.3.2 Surficial Geology

The surficial geology at the subject property is comprised of thick glacial till referred to as “till blanket” deposits (**Figure 3**) (BC Geological Service MapPlace). The sand, gravel, silt, or clay content of these deposits in the vicinity of the subject property are not known, as there are no soil logs available.

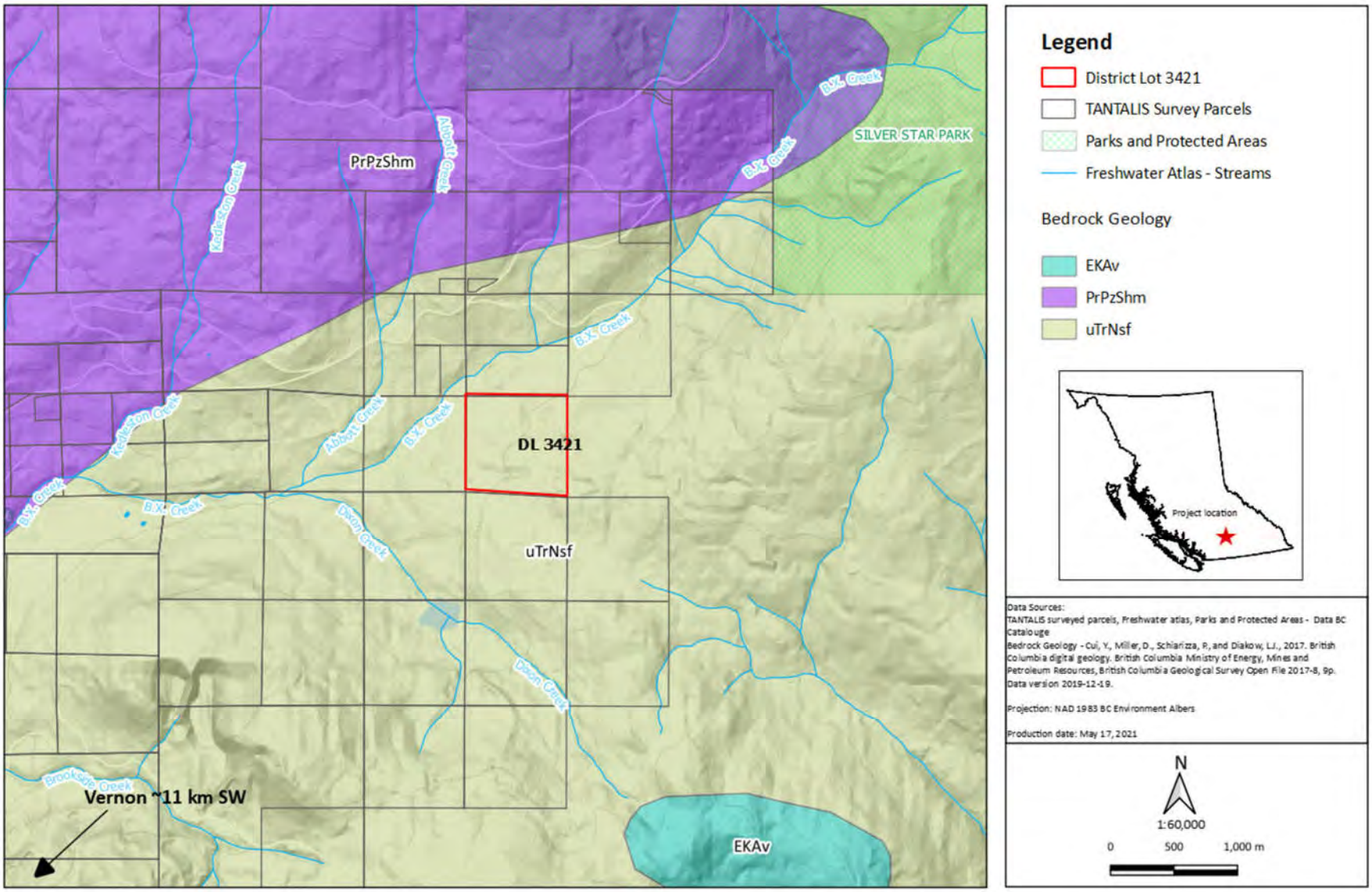

Figure 2. Bedrock geology map, District Lot 3421, Regional District of North Okanagan, BC

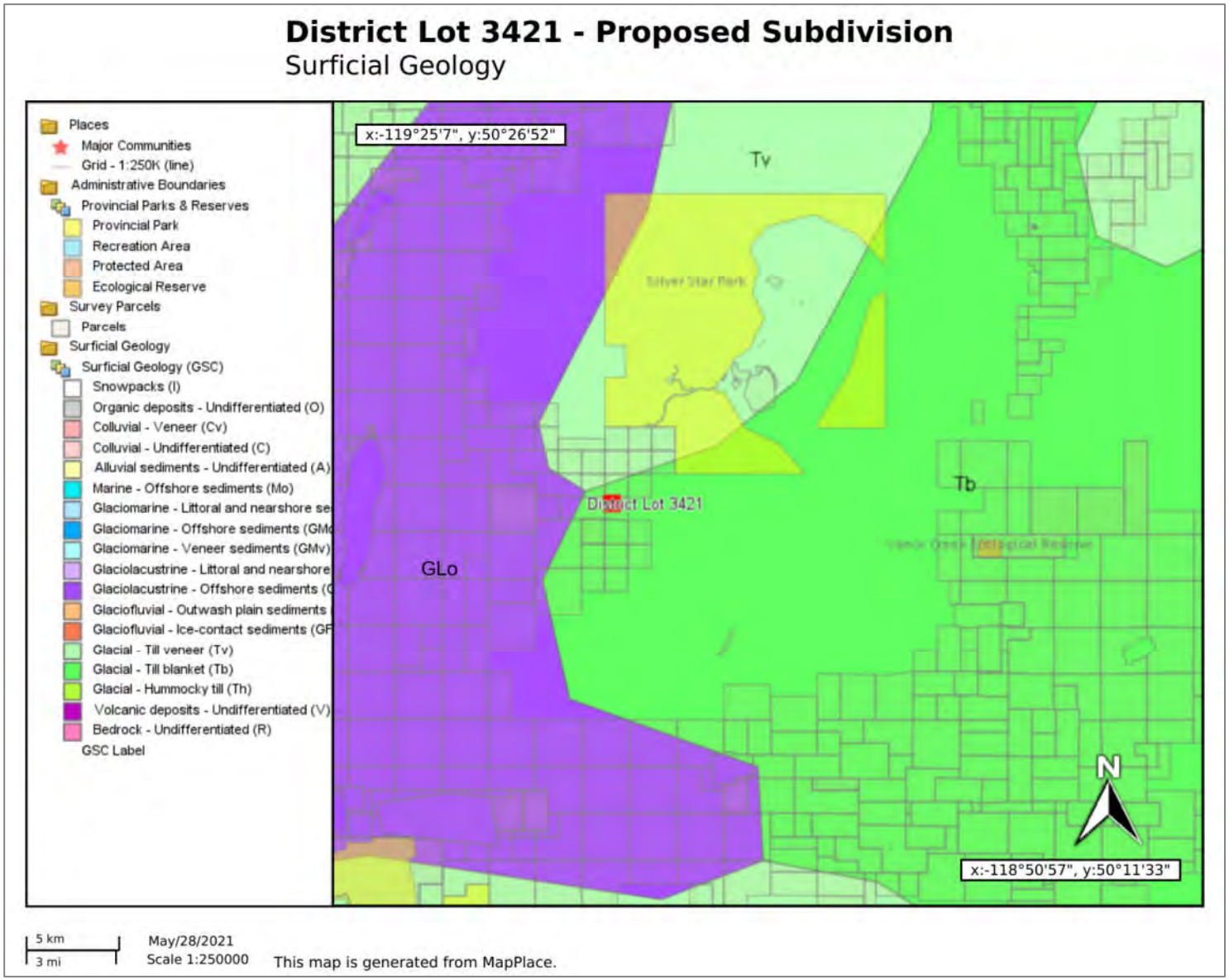

Figure 3. Surficial geology map, District Lot 3241, Regional District of North Okanagan, BC

2.3.2.1 Surficial Geology NE of the Property

Until a drilling investigation occurs, the thickness and lateral extent of the surficial deposits beneath the subject property is unknown. Well logs from two adjacent lots along Forsberg Road (approximately 485 m from the northeast corner of the subject property and on the south side of BX Creek) provide some lithological information for the general area to the northeast (IMAP, 2021). The two well logs (WTN 83508 and 83509) report clay rich material with rocks and boulders (glacial till) underlain by several units of coarser grained material (silty sand and gravel). These coarser grained units are inferred to be glaciofluvial deposits which were laid down during the glacial advance stage of the most recent Fraser Glaciation event. Well locations are shown on Figure 4 below.

As reported in well logs WTN 83508 and 83509 the coarser grained units are encountered at the following depth intervals below ground surface (the surface elevation of the drill holes is approximately 990 m asl):

- 44 to 59 feet (13.4 to 18 m);
- 203 to 208 feet (61.9 to 63.4 m); and
- 212 to 236 feet (64.6 to 72 m).

Additional surficial geology information for the area northeast of the subject property (approximately 680 m from the northeast corner) but on the north side of BX Creek is provided by another well log (WTN 87421) along Forsberg Road (approximate ground elevation of 985 m asl) (Figure 4). This borehole has similar surficial deposits as the two boreholes on the south side of BX Creek with 204 feet (62.2 m) of clay rich till with boulders underlain by 31 feet (9.5 m) of coarse-grained glaciofluvial deposits. All three of these boreholes are less than 200 m from BX Creek (Figure 4). The well logs are provided in **Appendix A**.

Bedrock was not encountered in either of these drill holes which implies that these glacial materials were deposited in a much larger trough/depression currently occupied by BX Creek. In addition, the 15 feet (4.6 m) of shallower coarse-grained material reported in WTN 83508 was either not logged or is not present in the other two boreholes. There are no other well logs available for the lots along Forsberg Road at this time.

2.3.2.2 Surficial Geology NW of the Property

The area to the northwest (on the north side of BX Creek and adjacent to both sides of Silver Star Road) has more development than the area northeast of the subject property with approximately 20 domestic water wells within one km of the northwest corner of the subject property. The three closest domestic water wells to the northwest corner of the property are WTN 62568 (approximately 400 m), WTN 87401 (approximately 430 m) and WTN 103975 (approximately 500 m) (well logs provided in **Appendix A**). These water wells are all approximately 300 m north of BX Creek and are shown on Figure 4.

In general, the surficial geology at these locations is similar to the geology reported northeast of the subject property. There is a thick unit of clay rich glacial till overlying a coarser-grained glaciofluvial unit.

The glaciofluvial unit is encountered at a depth of 223.5 feet below ground surface (ft bgs) (68 m below ground surface (m bgs)) at WTN 62568 and at a depth of 257 ft bgs (78.4 m bgs) at WTN 87401.

The well log for WTN 103975 reports two layers of deeper glaciofluvial material as opposed to just one in the other well logs. The shallower of the two glaciofluvial units is approximately 12 m thick (top of the unit is 61 m bgs) while the deeper glaciofluvial unit is at least 3.5 m thick (top of the unit is 90 m bgs). This borehole was terminated in the glaciofluvial unit at a depth of 93.3 m. This confirms the existence of multiple glacial outwash events between glacial deposition events.

WTN 62568 and WTN 103975 both report a thin layer of sand and gravel (6 to 8 feet thick) from the surface down to the top of the glacial till unit. This uppermost coarse-grained unit was not reported in WTN 87401. A three-foot-thick layer of sand and gravel was reported from 175 to 178 feet (53.4 to 54.3 m) at WTN 87401.

Similar to the three boreholes adjacent to the northeast section of the subject property, bedrock was not encountered in either of these drill holes. The contact between the deeper glaciofluvial unit and the overlying glacial till unit at these three well locations is deeper than the contact between these two units reported at the Forsberg Road well locations. This suggests that the contact between these glacial units is not flat lying and has a northeast to southwest slope component which mimics the surface topography between the aforementioned wells and the flow direction of BX Creek.

There are no available well logs to provide detailed surficial or bedrock geology information for the area to the south, southwest, southeast, and east of the subject property as there is limited development in those areas.

3.0 HYDROGEOLOGY

The following subsections describe the expected hydrogeology at the subject property based on the water well logs from the adjacent residential lots.

3.1 Mapped Aquifers

A search of iMapBC indicates that there is no mapped aquifer beneath the subject property, although there are two mapped aquifers adjacent to the west-northwest boundary of the property (**Figure 4**). **Table 1** below summarizes information from the aquifer factsheets and mapping reports for these two aquifers. Copies of the factsheets and mapping reports are provided in **Appendix B**.

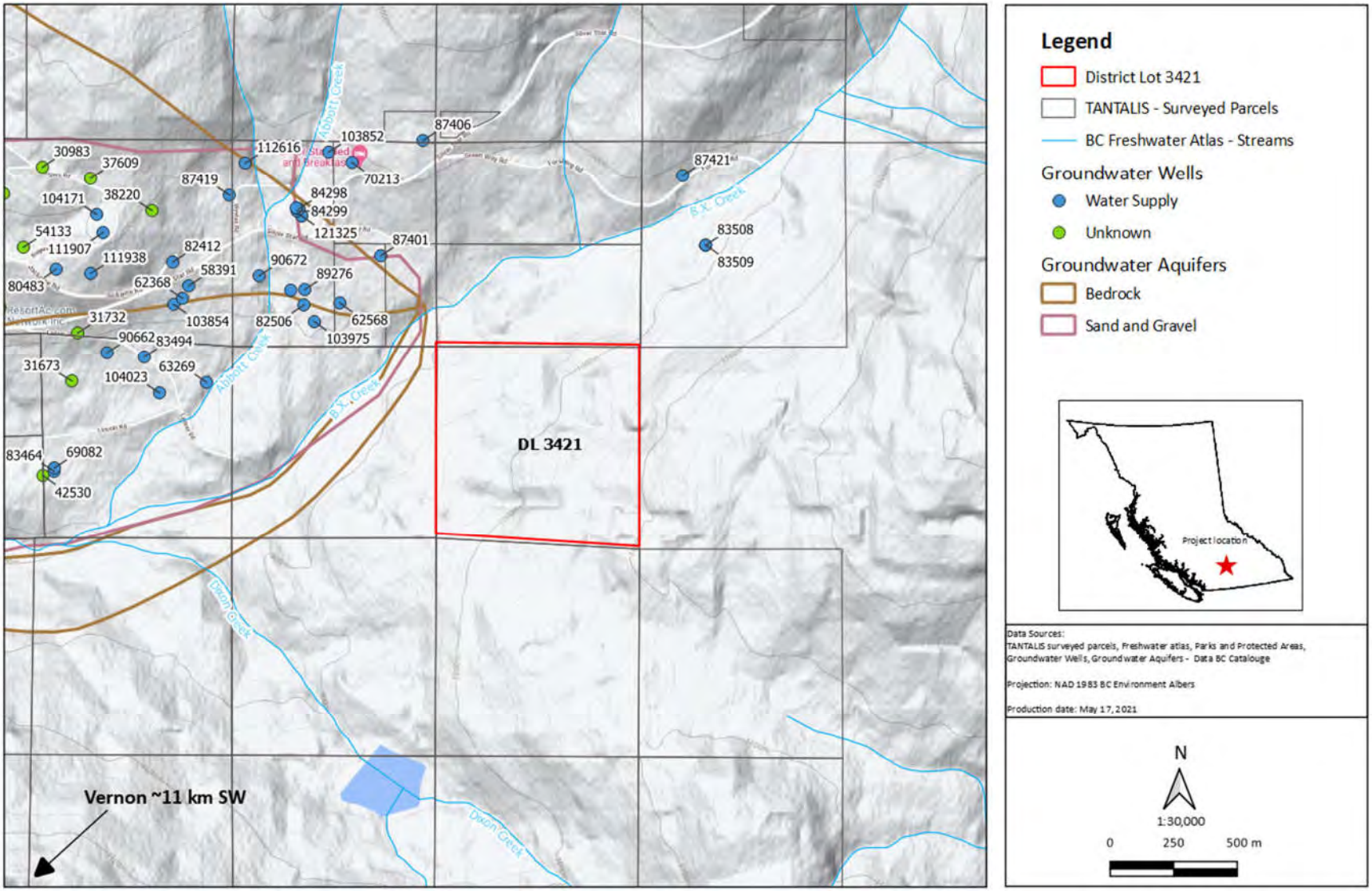

Figure 4. Mapped aquifers adjacent to District Lot 3421, Regional District of North Okanagan, BC

Table 1. Mapped aquifers adjacent to the west-northwest of the District Lot 3421

Aquifer #	Location	Aquifer Classification/Type	Confined/Unconfined	Recharge	Vulnerability/Production
349	W-NW of the property	IIC (Confined Glaciofluvial sand and gravel)	Confined (average thickness of confining material is 31 m)	Inferred to be from mountain block recharge as well as meteoric recharge through the confining layer	Low vulnerability/low to moderate productivity
350	W-NW of the property	IIC (Fractured Bedrock)	Confined (beneath Aquifer #349)	Likely from upland areas to the south and direct precipitation	Low vulnerability/low productivity

The northeast boundary of the confined sand and gravel Aquifer #349 is approximate and there is potential this aquifer may extend beneath the subject property. This aquifer has a limited recharge capacity and limited storage due in part to the overlying confining layer. This was confirmed by a pumping test in one of the provincial observation wells (MOE well #322) which intercepted a hydraulic boundary. This aquifer is also heavily utilized with a well density of 15 wells per square kilometer (km) (256 wells correlated to this aquifer) which raises concern that this aquifer is overutilized and may continue to experience issues into the future. This aquifer also exhibits flowing artesian conditions which are most commonly reported in wells below the base of steep south facing slopes (13 reported artesian wells in this aquifer). The average estimated well yield in this aquifer is 1.2 liters per second (L/s) (19 gpm) (Aquifer Classification Work Sheet #349, 2017). The wells discussed in Section 2.3.2.2 above are screened in this aquifer.

The other aquifer (Bedrock Aquifer #350) may also extend towards the direction of the subject property and may outcrop within the property or the upland area to the east of the property. The uplands to the east of the subject property may be part of the recharge area for this aquifer. The reported well yields for this aquifer range from 0.15 L/s (2 gpm) to 5.1 L/s (67 gpm). There are multiple domestic and industrial users of this bedrock aquifer although it currently does not have the quantity concerns that Aquifer #349 has. The only note of concern is that groundwater level monitoring has been requested by people using the aquifer due to groundwater withdrawals by Clearly Canadian Beverage Corporation, although it is unknown if this is still a concern. This aquifer does not have the artesian concerns associated with Aquifer #349 as the reported depth to water varies from 5 to 250 ft bgs (1.5 to 76 m bgs) (Aquifer Classification Work Sheet #350, 2012).

3.2 Physical Hydrogeology for Nearby Wells

Table 2 summarizes pertinent physical details such as estimated well yield and static water levels for the water wells closest to the property. Five of the six wells are screened at depths greater than 65 m bgs (> 213 ft bgs). The estimated well yields range from 2 gpm to 100 gpm with four of the six wells reporting well yields of 20 gpm or less. Artesian flow was reported in three of the deeper wells while the shallowest

well (WTN 83508) reported a static water level of 5.2 m bgs (17 ft bgs). The water quality for these domestic wells was not provided in the associated well logs.

Table 2. Estimate well yields and static water levels for wells adjacent to District Lot 3421

Well Tag #	Location	Date Drilled	Aquifer #	Estimated Well Yield (gpm)	Static Water Level (m bgs)	Well Screen Interval (m bgs)
87421	680 m NE of the property (Forsberg Road)	August 21, 2005	Unmapped	10	Not provided	70.4 to 71.6
83508	485 m NE of the property (Forsberg Road)	January 27, 2005	Unmapped	20	5.2	16.8 to 18
83509	485 m NE of the property (Forsberg Road)	January 24, 2005	Unmapped	100	Artesian (flow of 30 gpm)	Bottom of well set at 72 m bgs
87401	430 m NW of the property	January 19, 2006	349	60	Artesian (7 m ags and a flow of 30 gpm)	81.4 to 82.6
103975	500 m NW of the property	July 18, 2007	349	6	Not provided	92.1 to 93.3
62568	400 m NW of the property	October 31, 1992	349	2	Artesian (flow of 0.5 gpm)	68 to 69.2

Notes: m bgs – meters below ground surface, gpm – gallons per minute

4.0 REGULATORY REQUIREMENTS

The following provides a brief overview of the regulatory requirements for the proposed development within Electoral Area "C" of the Regional District of North Okanagan.

4.1 Regional District of North Okanagan

The preliminary plan for the subdivision must take into consideration the full potential build out of the parcel, estimated at 30 five acre (two hectare) lots, therefore the requirements of the RDNO Subdivision Servicing Bylaw No. 2600 (2013) must be abided by for providing a source of potable groundwater for each lot. The basic requirements of this bylaw (Section 406) are summarized below:

- Site Plan indicating the location of the constructed well;

- A well yield test must be conducted by a Qualified Well Driller, Qualified Well Pump Installer or a person working under them or under a Qualified Professional. The well yield test results must be submitted to the Regional District and if the test demonstrates a well yield of a minimum of 14 liters per minute (lpm) (3 gpm) then the water quantity requirements set out in this bylaw are considered satisfactory;
- If the well yield test reports less than 14 lpm (3 gpm), then a pumping test must be conducted. The pumping test will be carried out by one of the qualified individuals noted above. A hydrogeological report must be prepared by a Qualified Professional and then submitted to the Regional District.
- The pumping test shall be conducted between August 1 and March 1 (dry months of the year) or during another time of year as confirmed in writing by the Qualified Professional. The pumping test is required to determine the year round capacity of the well;
- In Electoral Area "C" (location of District Lot 3421), the report must demonstrate that the drilled well can provide at a minimum 6,550 liters per day (1 gpm) of potable water per parcel;
- The pump test, well yield tests, and all hydrogeology reports must be dated not more than five years prior to the date of subdivision application.

The duration of a pumping test is dependent on what type of aquifer the well is screened in. Typically, a longer duration pump test is required for wells screened in bedrock aquifers than unconsolidated aquifers. A minimum of 72 hours may be required for a bedrock well and anywhere from a minimum of 24 to 48 hours for a well screened in an unconsolidated aquifer.

4.2 BC Government

Under the new BC *Water Sustainability Act* (enacted February 29, 2016), a water licence is not required for a household well or groundwater used for domestic purposes, therefore if a well was drilled for each proposed lot a licence would not be required.

Domestic purpose is defined under Part 1 (Interpretation and Application) Section 2 of the *Water Sustainability Act* as:

> *the use of water for household purposes by the occupants of, subject to the regulations, one or more private dwellings, other than multi-family apartment buildings, including, without limitation, hotels and strata titled or cooperative buildings, located on a single parcel, including, without limitation, the following uses:*
>
> *(a) drinking water, food preparation and sanitation;*
>
> *(b) fire prevention;*
>
> *(c) providing water to animals or poultry kept*
>
> *(i) for household use, or*
>
> *(ii) as pets;*
>
> *(d) irrigation of a garden not exceeding 1 000 m^2 that is adjoining and occupied with a dwelling;*

If groundwater from a drilled well is provided to more than one parcel then a licence would be required under Part 2 (Licensing, Diversion and Use of Water) Section 9 of the *Water Sustainability Act.* The level of technical assessment required to support the licence application would be dependent on whether the well is screened in a bedrock aquifer or an unconsolidated aquifer and the proposed quantity of water use (Todd et. al., 2020).

For instance, if one well was used to supply groundwater to 30 lots that each require the RDNO mandated 6,550 liters per day then a total of approximately 197,000 L/day (36 gpm) would be required for all of the lots combined.

If this well were screened in an unconsolidated sand and gravel aquifer then a Level 1 technical assessment would be required as the threshold for a Level 1 assessment is 300,000 L/day. A pumping test would not be required for a Level 1 technical assessment although information such as the well drillers report, well yield test, record of neighbouring wells would be required. If the Statutory Decision Maker (SDM) is concerned that the well may impact nearby well users or may be hydraulically connected to BX Creek then a higher level of assessment may be triggered.

If the well were screened in a bedrock aquifer then a Level 3 technical assessment would be required as the Level 3 threshold is 100,000 to 300,000 L/day which means that a pumping test would be required. If the SDM has reason to believe that the bedrock aquifer is hydraulically connected to BX Creek then an Environmental Flow Needs (EFN) assessment would also be required. In addition, if there are groundwater users within 1 km also using this bedrock aquifer then a higher level of assessment may be triggered.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on a desktop review of available water well and aquifer data it is inferred that groundwater is likely present beneath the subject property (District Lot 3421), which would be sufficient to service the full build out (up to 30 lots) of the development and have negligible effect on any neighbouring wells. It is anticipated that either a bedrock aquifer or an unconsolidated glacial aquifer could be encountered within 300 feet (91 m) of the ground surface. As there is no well log or aquifer information directly from the subject property this inference is based on well log details from water wells adjacent to the northwest and northeast sections of the property (within 700 m).

The topography of the subject property slopes from the east towards the west, therefore it is anticipated that the glacial unconsolidated deposits become thicker downslope on the western side of the subject property. There may be more than one sand and gravel unit within these unconsolidated deposits which is able to transmit a sufficient amount of groundwater (1.2 gpm per parcel) and it is expected that these aquifers are confined by a glacial till aquitard. Flowing artesian conditions may be encountered due to the confined nature of the deposits especially as you go further downslope towards BX Creek.

Bedrock is not expected to be encountered within 200 feet (61 m) on the downslope western part of the property but may be encountered within 200 feet (61 m) on the upslope eastern part of the property. As there is sufficient vertical relief (over 200 m) upslope of the property, the presence of an adequate

recharge area could result in pressure heads within a bedrock aquifer resulting in flowing artesian conditions.

In regard to water quality, groundwater within confined aquifers generally has a higher chance of having elevated concentrations of certain metals (e.g. iron and manganese) which can generally be alleviated with standard in-home water treatment methods.

It is recommended as the project progresses to subdivision to drill a minimum of one test well to add certainty to the abundance of groundwater within the subject property. A pumping test may be required depending on the lithology encountered and the results from a standard well yield test. The water quality can be tested by collecting a water quality sample at the end of the well yield test and sent to a certified lab (e.g. ALS Labs).

Considering the potential for artesian conditions, a registered driller (under the *Water Sustainability Act*) with artesian experience and the proper equipment should be engaged for the drilling of the test well(s). An unregistered driller may also undertake the drilling if supervised by another registered well driller or a professional (with competency in stopping or controlling artesian flow and can be engaged should artesian conditions be encountered).

Report prepared by:
Cassiar Geoscience

Cody Cameron, B.Sc., P.Geo.
Hydrogeologist

6.0 REFERENCES

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APPENDIX A

Well Reports

BRITISH COLUMBIA

WTN87421

Ministry of Water, Land and Air Protection
Water, Air & Climate Change Branch

WATER WELL RECORD

Date 05 08 19 (YR MO DY)

BCGS MAP 082L.035.1.4.2 | WELL No. | ELEV | Location Accuracy

UTM Z 11 | 348795 E | 5577218 N | UTM | Date 20__ | Well Type | Well ID Plate #

Owners Name & Address: JOY YORK 8990 EASTSIDE RD. VERNON B.C. V1H 1J9

Legal Description & Address: PROPOSED SUB. DIV. OF LOT 1 PL. KAP 45287, D.L. 4672 O.D.Y.D., PROPOSED LOT 2 FORSBERG RD.

Descriptive Location: GPS. N. 50° 19' 39.5" W. 119° 07' 27.8" +/- 23'

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES: NONE

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing
casing height above ground level 2 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	13	BROWN CLAY TILL	+2
13	204	GREY CLAY TILL WITH BOULDERS	
204	225	GREY SILTY SAND	
225	235	GREY SAND AND GRAVEL FINE TO COARSE	

7. CONSULTANT: _____
Address: _____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other _____

							units
Hole Diameter							ins
Diameter	8	6					ins
from	0	0					ft
to	35	231					ft
Thickness	0.250	0.188					ins
Weight	24	12.92					lb/ft

Pitless unit _____ ft 1 ☐ above 2 ☐ below ground level
1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used
Perforations: _____

Shoe(s): YES 6 INCH
Open hole, from _____ to _____ ft Diameter _____ ins
Grout: 8 INCH PRESSURE GROUTED (CEMENT BENTONITE)

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size
Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other _____
Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other _____
Set from 229 to 235 ft below ground level

RISER, SCREEN & BLANKS							units
Length	2	4					ft
Diam. I D	5	5					ins
Slot Size	BLANK	020					ins
from	229	231					ft
to	231	235					ft

Fittings, top KPACKER RISER bottom PLATE
Gravel Pack _____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other _____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 05 08 21 (YR MO DY)
Rate 10 USgpm Temp ____ °C SWL before test ____ ft
Water Level ____ ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	220 ft	APPROX 10 USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy
colour _____ smell _____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

EMS SITE No. _____

16. FINAL WELL COMPLETION DATA ESTIMATE

BCGS MAP 082L.035.1.4.2 WTN 87421 WELL NO. 001

WATER WELL RECORD

MINISTRY OF WATER, LAND AND AIR PROTECTION — VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT 2 SEC. ____ TP. ____ R. ____ D.L. ____ LAND DISTRICT O.D.Y.D. PLAN 45287

DESCRIPTIVE LOCATION ____ LICENCE NO. ____ DATE ____

OWNER'S NAME Joy York ADDRESS 8990 East side

DRILLER'S NAME Schibli Drilling ADDRESS ____ DATE COMPLETED 5/81

DEPTH 235' ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 8 LENGTH ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DISTANCE TO WATER ____ ☐ ESTIMATED WATER LEVEL

FROM ____ ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE Domestic

Z ____ WELL NO. ____

____ E

____ N

Z X Y NO.

NAT. TOPO. SHEET NO. ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

ESTIMATED WELL YIELD ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($CaCO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ____

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

SOURCES OF INFORMATION ____

LITHOLOGY

FROM	TO	DESCRIPTION

NORTH

WEST

EAST

SOUTH

CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

BRITISH COLUMBIA

BC Environment

Water Management Division

082L035142 WTN 83508

WATER WELL RECORD

Date 05 02 03 (YR MO DY)

NTS MAP | WELL No. | ELEV | Location Accuracy

UTM Z 11 | 349877E | 5576941N | 6 | UTM | Date 19__ | Well Type

Owners Name & Address: MRS. JOY HERBERT YORK 8990 EASTSIDE RD. VERNON BC. V1H 1J9

Legal Description & Address: PROPOSED SUB. DIV. OF LOT 1 PL. KAP 45287, D.L. 4672 O.D.Y.D.

Descriptive Location: PROPOSED LOT 3 FORSBERG RD.

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES: —

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

casing height above ground level 2 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	8	BROWN SILTY SAND & GRAVEL (FINE TO MEDIUM)	
8	12	BROWN CLAY, ROCKS & BOULDERS	
12	44	GREY CLAY, ROCKS & BOULDERS (TILL)	
44	59	GREY SILTY SAND & GRAVEL (FINE TO MEDIUM)	17

7. CONSULTANT: ____ Address: ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	8	6					ins
from	0	0					ft
to	40	55					ft
Thickness	.269	.188					ins
Weight	28	12.92					lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used

Perforations: ____

Shoe(s): 6" & 8"

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: 0-40'

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 55 to 59 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5						ins
Slot Size	.020						ins
from	55						ft
to	59						ft

Fittings, top K PACKER bottom PLATE

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 05 01 27 (YR MO DY)

Rate ~20 USgpm Temp ____ °C SWL before test 17 ft

Water Level 18 ft after test of 1.5 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	50 ft	APROX. 15 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA EST.

BRITISH COLUMBIA

BC Environment

082L035142 WTN 83509

Water Management Division

WATER WELL RECORD

Date 05 02 03 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z 11 3464674 E 5576942 N 6 UTM Date 19__ Well Type ____

Owners Name & Address MRS. JOY HERBERT YORK 8990 EASTSIDE RD. VERNON B.C. V1H 1J9

Legal Description & Address PROPOSED SUB. DIV. OF LOT 1 PL. KAP45287, DL. 4672 O.D.Y.D.

Descriptive Location PROPOSED LOT 2 FORSBERG RD.

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES: —

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	12	BROWN CLAY TILL	
12	145	GREY CLAY TILL + BOULDERS	
145	170	GREY CLAY WITH ROCKS (SOFTER)(MOIST)	
170	203	GREY CLAY TILL WITH ROCKS (DRY)	
203	208	GREY SILTY SAND & GRAVEL	
208	212	GREY SILT, CLAY + ROCKS	
212	236	BROWN SILTY SAND + GRAVEL (FINE TO COARSE)	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	6						ins
from	0						ft
to	236						ft
Thickness	.188						ins
Weight	12.92						lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used

Perforations: ____

Shoe(s): YES

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top ____ bottom ____

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 05 04 12 4 (YR MO DY)

Rate ~100 USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	200 ft	APROX. 30 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 236 ft Well Yield EST. 100 US gpm

Static Water Level ____ ft Artesian Flow 30 US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion WELL SEAL & VALVE INSTALLED BENTONITE & CEMENT PLACED BETWEEN 10 FT. & 15 FT.

17. DRILLER PLEASE PRINT SURNAME SCHIBLI FIRST NAME DAVID

Signature David Schibli

18. CONTRACTOR, SCHIBLI DRILLING

Address BOX 729 LUMBY B.C. V0E 2G0

Member, BCWWDA ☑ yes ☐ no ; ____

87401

BRITISH COLUMBIA — BC Environment — Water Management Division

WATER WELL RECORD

Date 06/01/19 (YR/MO/DY)

NTS MAP 082L035123 WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z 11 347598 E 5576937 N — UTM Date 19__ Well Type ____ WTN 87401

Owners Name & Address PAUL STACK 8566 GREENAWAY RD VERNON B.C. V1B 3M6

Legal Description & Address LOT A, DL. 2242, ODYD, PLAN KAP60353

Descriptive Location APSN. 50° 19' 29.3" W. 119° 08' 27.9" +/- 20' WELLTAG # 15919

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other ____

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES NONE

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level 2 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	175	GREY CLAY TILL	+17'
175	178	GREY SAND AND GRAVEL	
178	257	GREY CLAY TILL	
257	271	BROWN SAND & GRAVEL	

7. CONSULTANT ____ Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	8	6					ins
from	0	0					ft
to	16	267					ft
Thickness	0.025	0.0188					ins
Weight	25	12.42					lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used

Perforations: ____

Shoe(s): YES 6 INCH

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 267 to 271 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5						ins
Slot Size	0.020						ins
from	267						ft
to	271						ft

Fittings, top K PACKER bottom PLATE

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 06/01/19 (YR/MO/DY)

Rate 60 USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	260 ft	APPROX 60 USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR/MO/DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 271 ft Well Yield ESTIMATE 60 US gpm

Static Water Level +23 ft Artesian Flow 30 US gpm Pressure Head +23 ft

Back filled ____

Well Head Completion ~~CAP~~ WELL SEAL INSTALLED SEALED BETWEEN 8" AND 6"

17. DRILLER PLEASE PRINT SURNAME SCHIBLI FIRST NAME DAVID

Signature David Schibli

18. CONTRACTOR, Address SCHIBLI DRILLING BOX 729 LUMBY B.C. V0E 2G0

Member, BCWWDA ☐ yes ☐ no ; ____

The Province of British Columbia accepts no responsibility for the contents or accuracy of this record.

BCGS MAP 082L.035.1.2.3 WTN 87401 WELL NO. 003

WATER WELL RECORD

MINISTRY OF WATER, LAND AND AIR PROTECTION

VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT A SEC. ____ TP. ____ R. ____ D.L. 2242 LAND DISTRICT O.D.Y.D PLAN 60353

DESCRIPTIVE LOCATION ____ LICENCE NO. ____ DATE ____

OWNER'S NAME Paul Stack ADDRESS 8566 Greenaway Road

DRILLER'S NAME Schist Drilling ADDRESS ____ DATE COMPLETED ____

DEPTH 271 ft ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 8 LENGTH ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DISTANCE TO WATER ____ ☐ ESTIMATED WATER LEVEL

FROM ____ ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE Domestic

Z ____ WELL NO. ____

____ E

____ N

Z X Y NO.

NAT. TOPO. SHEET NO. ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

ESTIMATED WELL YIELD ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Ca CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ____

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

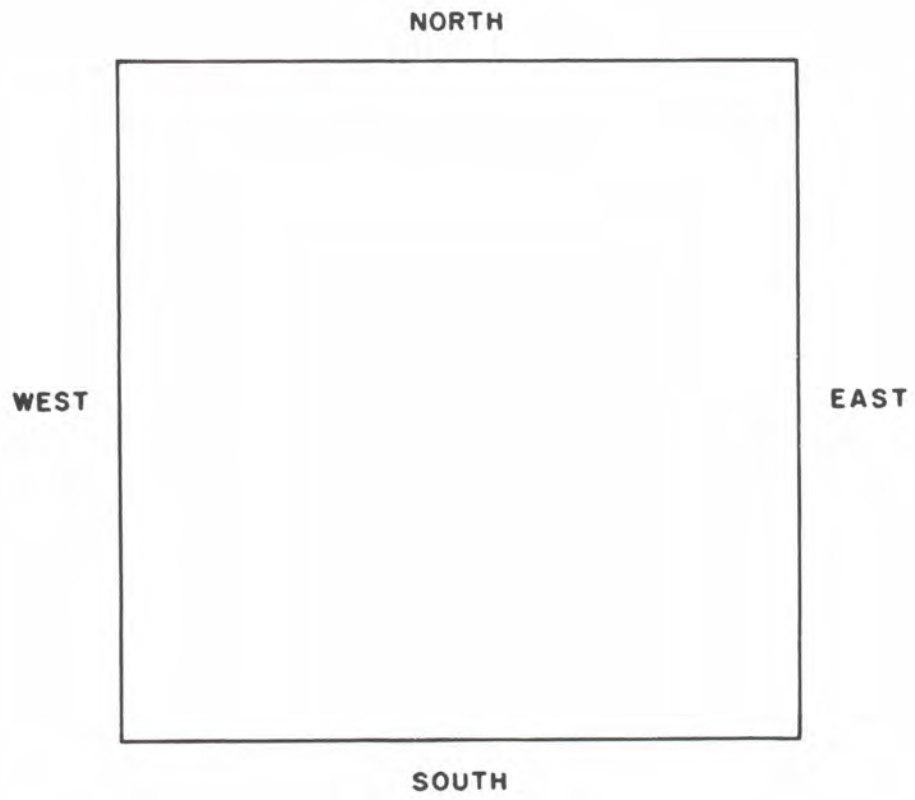
☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

SOURCES OF INFORMATION ____

LITHOLOGY

FROM	TO	DESCRIPTION



CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

97941

ENV 1995

BRITISH COLUMBIA
Ministry of Environment

WTN 103975

☑ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

SCHIBLI DRILLING
Stamp company name/address/ phone/fax/e-mail here, if desired.

Ministry Well ID Plate Number:
Ministry Well Tag Number: 15991
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: TIM AND DIANE WATTS

Mailing address: 8498 SILVERSTAR RD Town VERNON Prov. B.C. Postal Code V1B3M7

Well Location: Address: Street no. Street name Town

(or) **Legal description:** Lot Plan D.L. Block Sec. Twp. Rg. Land District

(or) **PID:** (and) **Description of well location (attach sketch, if nec.):** EAST 1/2 OF THE SOUTH WEST 1/4 OF DL 2242, ODYD EXCEPT PLANS KAP63862 AND KAP74621

NAD 83: Zone: (see note 2) (and) **UTM Northing:** m **UTM Easting:** m (or) **Latitude (see note 3):** N. 50° 19' 20.9" **Longitude:** W. 119° 08' 41.1" +/- 30'

Method of drilling: ☑ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):

Orientation of well: ☑ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 4):

Class of well (see note 5): **Sub-class of well:**

Water supply wells: indicate intended water use: ☑ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	6		BROWN	SAND AND GRAVEL		
6	18		BROWN	CLAY TILL		
18	163		GREY	CLAY TILL		
163	185		GREY	CEMENTED SAND AND GRAVEL		
185	201		BROWN	CEMENTED SAND AND GRAVEL		
201	215		BROWN	CLAY		
215	295		GREY	CLAY TILL		
295			BROWN	CEMENTED SAND AND GRAVEL		
			BROWN	SAND AND GRAVEL		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	302	6	STEEL	0.188	YES

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
302	306	5		0.020

Surface seal: Type: BENTONITE Depth: 20 ft
Method of installation: ☑ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: Depth: ft
Liner: ☐ PVC ☐ Other (specify):
Diameter: in Thickness: in
From: ft (bgl) To: ft (bgl) Perforated: From: ft (bgl) To: ft (bgl)

Intake: ☑ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☑ Stainless steel ☐ Plastic ☐ Other (specify):
Screen opening: ☑ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Bail ☐ Plug ☑ Plate ☐ Other (specify):
Filter pack: From: ft To: ft Thickness: in
Type and size of material:

Developed by:

☑ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): Total duration: 4 hrs
Notes:

Well yield estimated by:

☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify):
Rate: APPROX 6 USgpm Duration: 4 hrs
SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☑ Fresh ☐ Salty ☐ Clear ☑ Cloudy ☐ Sediment ☐ Gas
Colour/odour: NONE Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): DAVID SCHIBLI
Registration no. (see note 20): WD 05101403
Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.

Signature of Driller Responsible David Schibli

Final well completion data:

Total depth drilled: 306 ft Finished well depth: 306 ft (bgl)
Final stick up: 30 in Depth to bedrock: ft (bgl)
SWL: ft (btoc) Estimated well yield: 6 USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: PLATE Well disinfected: ☐ Yes ☐ No
Where well ID plate is attached: CASING

Well closure information:

Reason for closure:
Method of closure: ☐ Poured ☐ Pumped
Sealant material: Backfill material:
Details of closure (see note 17):

Date of work (YYYY/MM/DD):

Started: 2007/07/09 **Completed:** 2007/07/18
Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet of

082L.035.123

62568

WELL LOG

CAPRI DRILLING (1985) LTD.

DOMESTIC IRRIGATION EXPLORATION

BOX 306, STN. A
KELOWNA, B.C.
V1Y 7N8

PHONE: (604) 769-3408
(604) 762-1362

No

Be 'WELL' Satisfied

Name: Paul Stack
Address: 8566 Greenaway Road.
Address: Vernon BC

WELL LOCATION: Lot _____ PL _____ DL _____

PROPOSED USE: Domestic ✓ Industrial _____ Municipal _____
Irrigation _____ Test Well _____ Other _____

TYPE OF WORK: Owner's number of well, (if more than one) One
New Well ✓ Air Rotary ✓
Deepened _____ Rotary _____
Reconditioned _____ Jetted ✓
Liner Installed _____ Pressure Fractured _____

DIMENSIONS: Diameter of well 6" inches
Drilled 227' ft. Depth of completed well 227' ft.

CONSTRUCTION DETAILS:
CASING INSTALLED: 6 5/8 " Diam. from 0 ft. to 223½' ft.
Threaded __ _____ " Diam. from _____ ft. to _____ ft.
Welded ✓ _____ " Diam. from _____ ft. to _____ ft.

PREFORATIONS: Yes ☐ No ☑
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

SCREENS: Yes ☑ No ☐
Manufacturer Johnson Imperial
Type Stainless Steel Model No. wire wound.
Diam. 5" Slot Size .030 from 227 ft. to 223' ft.
Diam. _____ Slot Size _____ from _____ ft. to _____ ft.

GRAVEL PACKED: Yes ☐ No ☑ Size of Gravel _____
Gravel placed from _____ ft. to _____ ft.

SURFACE SEAL: Yes ☑ No ☐ Depth _____ ft.
Material Used In Seal 6 5/8 steel Casing
Method of Sealing strata off Drive shoe + Casing Hammer

PRODUCTION DATA AT TIME OF DRILLING:
Static Level Flowing ½ G.P.M. ft.
Measured from 226' ft. With air lift
Pumping level 226' ft. at 2 GPM
Recommended Pump Setting 200' ft.
If Flowing Well ½ GPM
Recommended Max. Pump Output 120 GPH
Water Clear ✓ Coloured _____ Silty _____ Sandy _____
Duration of test 5½ hrs Developing Hrs.

DATE: Spudded Oct 28 /92 Completed Oct 31/92
Rig # Two Other Equip. _____

DEPTH:
Overburdon 227' ft. Tool Push _____
Bedrock — ft. Driller Jim Genereux
Total 227 ft. Roughneck Doug Kilburn

FORMATION

DEPTH

FROM	TO	
GROUND LEVEL 0	6 ft	Sand + Gravel with Sand Seams
6 ft	8 ft	moist Sand + Gravel with
		some sandy Clay
8 ft	13½ ft	Brown Clay with Gravel + Bolders
13½ ft	223½ ft	Blue Clay + Gravel Till
		with Cobbles + Bolders
223½'	227 ft	water Bearing gravel + Sand
		with Trace of Clay

WELL OWNER:

I Paul Stack Hereby Agree work has been completed in accordance with the contract and all material used has been of top quality.

CAPRI DRILLING (1985) LTD. _____

GENERAL REMARKS
water bearing Gravel seam is Being recharged at 2 G.P.M.

IT IS HEREBY AGREED THAT FORMATIONS, QUALITY, QUANTITY AND TYPE OF WATER, ALONG WITH ALL OTHER REMARKS, ARE TRUE ONLY TO THE BEST KNOWLEDGE OF THE PERSONNEL AND COMPANY, AND THEY CANNOT BE HELD RESPONSIBLE FOR A MISTAKE IN CALCULATION.

THE COMPANY WILL NOT BE HELD RESPONSIBLE FOR PUBLIC LIABILITY OR PROPERTY DAMAGE CAUSED BY FLOWING WELL WASH OUTS OR ANY OTHER MISHAPS.

ALL MATERIALS SHALL REMAIN PROPERTY OF **CAPRI DRILLING** UNTIL ACCOUNT IS PAID IN FULL.

Well owner's Name Paul Stack

Telephone 542-485

Area Vernon

Legal Description: Lot _____ Plan _____

District Lot _____ Land District _____

Township _____ Range _____ Section _____

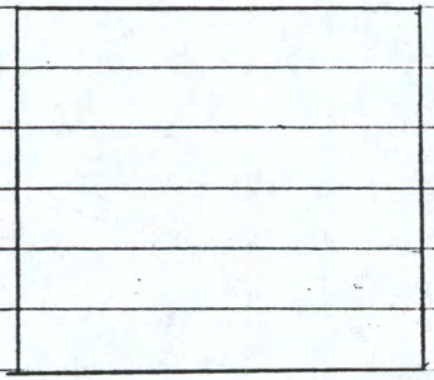
Type of Well

Domestic ☑

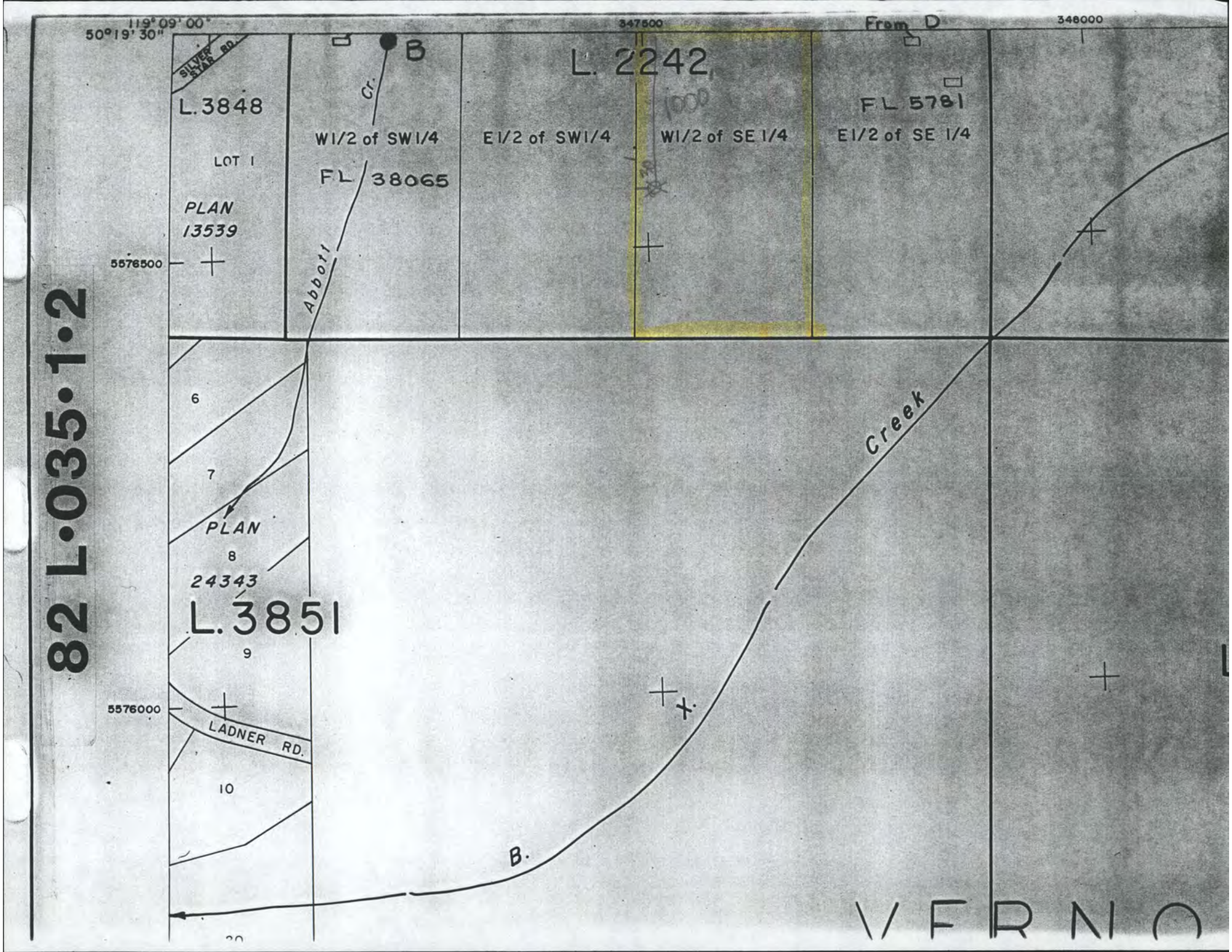
Irrigation ☐

Waterworks ☐

Location Sketch



Any problems with the well?


119°09'00"
50°19'30"
347500
From D
346000
SILVER STAR RD.
L.3848
LOT 1
PLAN 13539
5576500
B
Cr.
W1/2 of SW1/4
FL 38065
Abbott
L. 2242
E1/2 of SW1/4
W1/2 of SE 1/4
FL 5781
E1/2 of SE 1/4
82 L·035·1·2
6
7
PLAN 8 24343
L.3851
9
5576000
LADNER RD.
10
Creek
B.
VERNO

WTN 62568

BCGS MAP 082L • 035 • 1 • 2 • 3

WELL NO. 001

WATER WELL RECORD

MINISTRY OF ENVIRONMENT WATER MANAGEMENT DIVISION — VICTORIA, BRITISH COLUMBIA

Z ___ WELL NO. ___ E ___ N ___ Z X Y NO.

LEGAL DESCRIPTION: LOT W1/2 of SE 1/4 SEC. ___ TP. ___ R. ___ D.L. 2247 LAND DISTRICT ODYD PLAN ___

DESCRIPTIVE LOCATION Greenhaven Rd LICENCE NO. ___ DATE ___

OWNER'S NAME Paul Stack ADDRESS Vernon

DRILLER'S NAME ___ ADDRESS ___ DATE COMPLETED ___

NAT. TOPO. SHEET NO. ___

DEPTH 227 ELEVATION OF ___ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 6 5/8" LENGTH 223½'

METHOD OF CONSTRUCTION ___ CASING DIAM ___ LENGTH ___

SCREEN LOCATION ___ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

PERFORATED CASING ☐ LENGTH ___ PERFORATIONS FROM ___ TO ___

GRAVEL PACK ☐ LENGTH ___ DIAM. ___ SIZE GRAVEL, ETC. ___

DISTANCE TO WATER ___ ☐ ESTIMATED WATER LEVEL

FROM ___ ☐ MEASURED ELEVATION ___ ARTESIAN PRESSURE ___

DATE OF WATER LEVEL MEASUREMENT ___ WATER USE ___

PRODUCTION TEST SUMMARY

DATE Oct 28, 1992

TEST BY ___

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ___

RATE ___ DRAWDOWN ___

WATER LEVEL AT COMPLETION OF TEST ___

AVAILABLE DRAWDOWN ___ SPECIFIC CAPACITY ___

PERMEABILITY ___ STORAGE COEFF. ___

TRANSMISSIVITY ___

ESTIMATED WELL YIELD 2 gpm

RECOMMENDED PUMPING RATE ___

RECOMMENDED PUMP SETTING ___

CHEMISTRY

TEST BY ___ DATE ___

TOTAL DISSOLVED SOLIDS ___ mg/l TEMPERATURE ___ °C pH ___ SILICA (SiO_2) ___ mg/l

CONDUCTANCE ___ μmhos/cm AT 25°C TOTAL IRON (Fe) ___ mg/l TOTAL HARDNESS ($CaCO_3$) ___ mg/l

TOTAL ALKALINITY ($CaCO_3$) ___ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ___ mg/l MANGANESE (Mn) ___ mg/l

COLOUR ___ ODOUR ___ TURBIDITY ___

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
• TKN. (NITROGEN)					
PHOSPHORUS (P)					

• TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ___

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ___ DATE ___ EQUIPMENT USED ___

LITHOLOGY

FROM	TO	DESCRIPTION
0	6	Sand + Gravel
6	8	moist Sand + Gravel w/ some sandy clay
8	13½	Brown clay w/ gravel + boulders
13½	223½	Blue Clay + Gravel till w/ cobbles + boulders
223.5	227.5	Water bearing Gravel + Sand

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ___

SOURCES OF INFORMATION ___

NORTH

WEST

EAST

SOUTH

CARD BY _____ DATE _____

ADDITIONAL DATA ADDED BY _____

REMARKS

Query Mar 21/95
NA Mar 23/95

97941

ENV 1995

APPENDIX B

Aquifer Classification Sheets

AQUIFER CLASSIFICATION WORKSHEET

DATE: May 2017

AQUIFER REFERENCE NUMBER: 349

DESCRIPTIVE LOCATION OF AQUIFER: BX Creek

NTS MAP SHEET:

BCGS MAP SHEET:

Aquifer Summary:

CLASSIFICATION: [e.g., I C] RANKING: [e.g., 12]

Aquifer Size: 9.6 km^2
Aquifer Sub-type: 4b [Wei et al. (2009).]

Observation Wells: Observation wells 322 (inactive; WTN60266) and 311 (WTN59305)

Mapping Level**:** Stage II Detailed – For more information consult Water Science Series WSS2017-03 North Okanagan Aquifer Mapping & Geologic Modelling (Stewart & Allard 2017) Available at: http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-science-data/water-science-series)

Aquifer Boundaries:

- Roughly bounded to the south by the trace of BX creek, and to the north by the limit of overburden on higher elevation slopes.
- The aquifer narrows to a thin connected channel below BX creek, where it becomes steep and narrow above Vernon
- The northeast boundary of the aquifer is approximate, and is inferred based on probable thinning of the overburden below steeper slopes.
- The aquifer is defined up to the margin of the main valley in which Vernon is situated

Geologic Formation (overlying materials):

- Predominantly confined, partially cut back by holocene erosion and deposition along BX Creek
- Overlain by grey to blue clay, or till; can be locally compacted or cemented
- Noted organics (including wood) in silty sands below coarser aquifer material (WTN 5598, WTN 5600)

Geologic Formation (aquifer):

- Sand and gravel
- Preglacial or early glacial colluvium/alluvium

Confined / Partially Confined / Unconfined:

Confined

Vulnerability:

Low; This aquifer is of limited extent and is confined by significant till cover in the upper BX Creek valley.

Productivity:

Low to Moderate - Geomean 0.9 L/s; This aquifer is heavily utilized, however it has a limited source water catchment, limited storage and limited recharge capacity due to confining geology. Pumping test data from MOE observation well 322 indicates transmissivity values of 0.19 to 0.43 m^2/day, hydraulic conductivity values of 0.22 to 0.5 m/day and 100 day specific capacity of 0.0028 L/s/m for this aquifer (Carmichael et al, 2009). This test intercepted a hydraulic boundary indicative of limited local extent to the aquifer.

Depth to Water:

Variable; Groundwater depths range from at or near surface, to deep (>50m) below ground surface where the aquifer is well-drained. Depth to groundwater is not entirely controlled by topographic elevation due to mountain block recharge which can generate significant artesian head conditions in the aquifer. Artesian groundwater pressures are found across much of the aquifer, particularly below the base of steep south facing slopes.

Direction of Groundwater Flow:

Groundwater flow is assumed to be topographically driven and therefore is downslope towards BX Creek, subsequently following the flow of BX Creek down-valley, west towards Vernon.

Recharge:

Recharge is inferred to be from mountain block recharge, as well as infiltration of meteoric recharge through the overlying confining unit. There is likely some communication with BX Creek , however, due to the relatively steep topography it is likely that the aquifer largely discharges to the creek rather than being recharged by it.

Domestic Well Density: High – 14.8 wells/km^2; The aquifer has a high density of wells, relatively spread out across the footprint of the aquifer.

Type of Known Water Use: Domestic

Reliance on Source: Conjunctive. Several water licenses exist on BX Creek.

Conflicts between Users: none documented

Quantity Concerns: Recent studies suggest this aquifer is overutilized and will continue to experience issues into the future.

Quality Concerns: none documented

Comments:

Stage II Detailed Mapping has been completed. If warranted, future studies could include, but would not be limited to well head surveys to verify the locations of boreholes in key locations, groundwater level and flow characterization, and Stage III Mapping Refinement together with development of a numerical groundwater model in key areas (Stewart and Allard 2017).

Water Budget: none documented

Groundwater Model(s): none documented

References:

Berardinucci J. and K. Ronneseth, 2002. *Guide to Using the BC Aquifer Classification Maps for the Protection and Management of Groundwater*. BC Ministry of Water, Land and Air Protection, Water Air and Climate Change Branch, Water Protection Section.

Carmichael, V., Kenny, S., Allen, D.M., and Gellein, 2009. Compendium of Aquifer hydraulic properties from re-evaluated pumping tests in the North Okanagan, British Columbia. Prepared for the BC Ministry of Environment Water Stewardship Division. 804 pages.

Hy-Geo Consulting, Hodge Hydrogeology Consulting, and Azar & Associates. 2009. Provincial Observation Well Network Review British Columbia. Prepared for the BC Ministry of Environment Water Stewardship Division.]

Stewart, M. and Allard, R. 2017. North Okanagan Digital Mapping Project: Summary of Results and 3D Geological Modeling. Water Science Series, WSS2017-03. Prov. B.C., Victoria B.C. http://www2.gov.bc.ca/gov/content/ECCSironment/air-land-water/water/water-science-data/water-science-series.

Wei, M., D. M. Allen, A. P. Kohut, S. Grasby, K. Ronneseth, and B. Turner. 2009. Understanding the Types of Aquifers in the Canadian Cordillera Hydrogeologic Region to Better Manage and Protect Groundwater. Streamline Watershed Management Bulletin, FORREX Forum for Research and Extension in Natural Resources.

AQUIFER CLASSIFICATION AND RANKING

Ranking Component:	***Ranking Value***
Productivity:	1, 2 or 3
Vulnerability:	1, 2 or 3
Size:	1, 2 or 3
Demand:	1, 2 or 3
Type of Use:	1, 2 or 3
Quality Concerns:	0, 1, 2 or 3
Quantity Concerns:	0, 1, 2 or 3
Total:	Total Ranking Score (from 5 to 21)

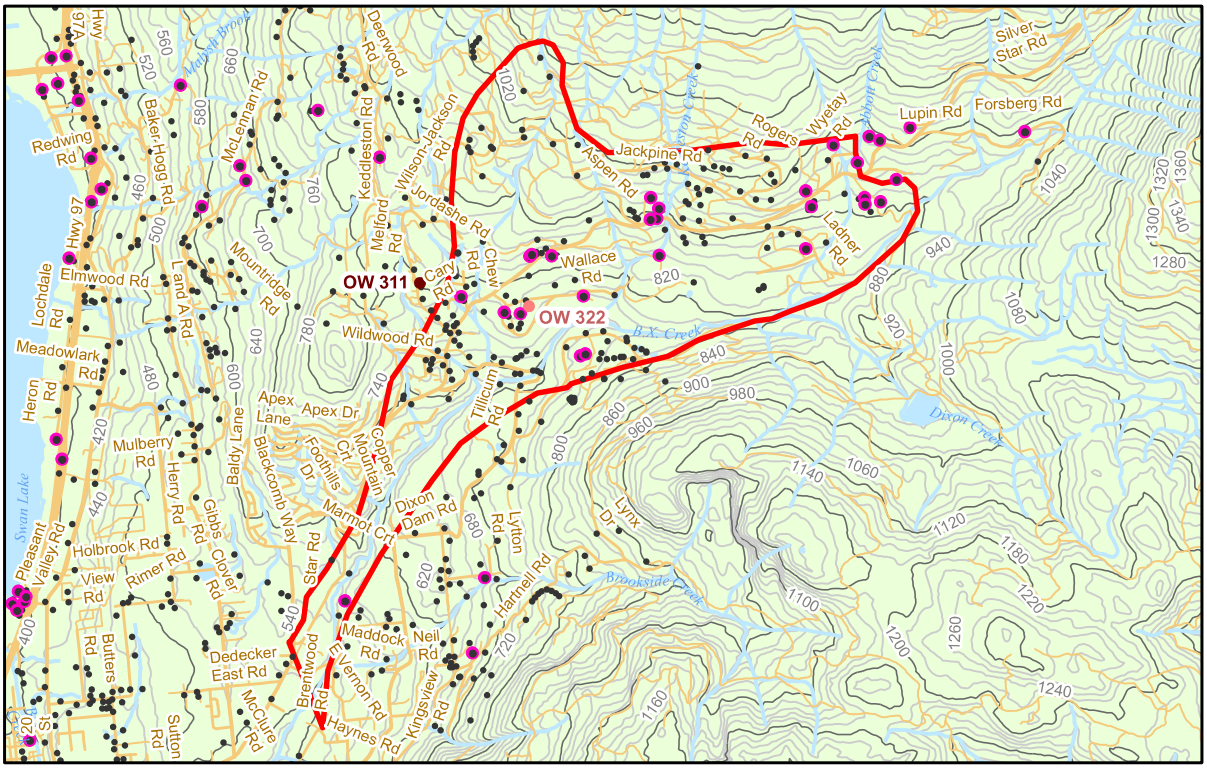
*** Demand may be based of water budget/demand models where available or if unavailable a higher level assessment based on domestic well density, irrigation and commercial/industrial wells, large diameter wells that have been drilled (i.e., greater than 20 cm) as well as general knowledge of well use and land use in the area. If demand assumes that the reported well capacity is the amount of water used, a note should be included to explain that the reported well capacity is often higher than actual use.**

Statistical Summary of Well Data for Aquifer

Total number of wells available for statistical analysis: 142

	Depth to Bedrock (m bgs)	Well Depth (m bgs)	Depth to Water (m bgs)	Reported Est. Well Yield (L/s)	Est. Thickness of Confining Materials (m)
Number of Wells	30	142	98	112	74
Minimum	2.4	1.6	0.3	0.1	2.1
Maximum	121.3	182.9	73.2	6.4	86.9
Median	41.8	38.8	9.1	0.6	32.3
Average	41.0	45.4	18.3	1.2	31.0
Geometric Mean	30.5	30.0	9.2	0.7	23.6

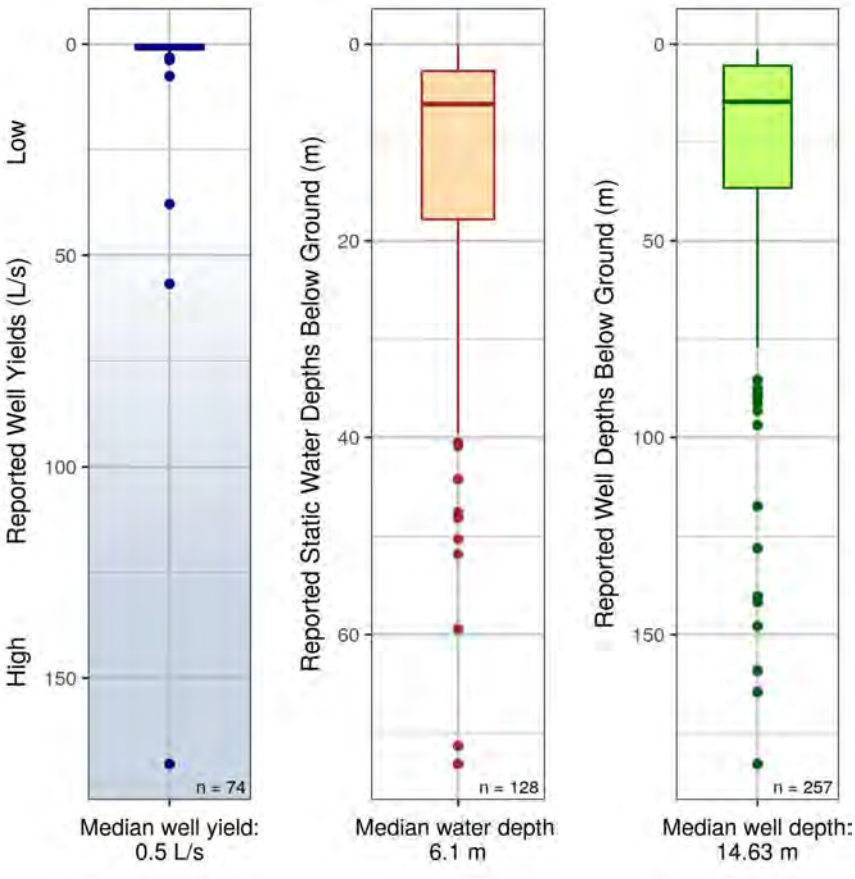
Aquifer #349



Aquifer Description (Mapping Report - 2017): Confined Glacio-fluvial sand and gravel aquifers underneath till, in between till layers, or underlying glacio-lacustrine deposits (subtype = 4b).

Aquifer Details	
Region	Thompson-Okanagan
Water District	Vernon
Aquifer Area	9.6 km^2
No. Wells Correlated to Aquifer	257
Vulnerability to Contamination	Low
Productivity	Moderate
Aquifer Classification	IIC
Hydraulic Connectivity[1]	Not Likely
Aquifer Stress Index	Method not applicable - confined aquifer
No. Water Licences Issued to Wells	1
Observation Wells (**Active**, Inactive)	322

[1] Based on broad regional assessment



Detailed methods for all figures are described in the companion document (Aquifer Factsheet - Companion Document.pdf).

Factsheet generated: 2020-08-06. Aquifers online: https://apps.nrs.gov.bc.ca/gwells/aquifers.

AQUIFER CLASSIFICATION WORK SHEET

DATE:
January 29, 1999 (Updated March 31, 2012)

AQUIFER LOCATION:

REFERENCE NUMBER:
350
DESCRIPTIVE LOCATION:
North East of Vernon and to the south of BX Creek.
NTS MAP SHEET:
082L/6.

WELL LOCATION MAPS:
Osoyoos District, Sheet 7.
BCGS Map Sheets 082L.025.3; 082L.035.1.
BCGS Mapping Area

RANKING: 9 **CLASSIFICATION:** 11C

Aquifer Size: **7.0 km^2**

Aquifer Boundaries:
Follows the south side of BX Creek Valley. The boundaries have been delineated with borehole data and bedrock and surficial geology maps.

Aquifer Sub-type: **5a & 6b**
Characterized as fractured sedimentary rock aquifers, primarily found in association with old sedimentary basins (5a) and fractured crystalline (igneous intrusive or metamorphic, meta-sedimentary, meta-volcanic, volcanic) rock aquifers (6b).

Geologic Formation (overlying):
Till and clay.

Geologic Formation (aquifer):
Bedrock aquifer.

Confined/Unconfined/Bedrock:
Confined.

Productivity:
Low: One well for Clearly Canadian Beverage Corporation is reported to produce 5.1 L/s (67 USgpm) The reported well yields range from 0.15 litres per second (2gpm) to 5.1 litres per second (67 Usgpm).

Vulnerability:
Low.

Depth to Water Table:
The water levels vary from 5 to 250 feet depending on the well head elevation.

Direction of Flow:
Additional water level data are required to better determine the flow pattern.

Recharge:
Probably from direct precipitation and at higher elevations to the south.

Domestic Well Density:
Low.

Users/Level of Use:
Multiple. Groundwater is used for domestic and industry from this aquifer.

Reliance on Source:
Conjunctive. Several water licenses exist on BX Creek.

Conflicts Between Users:
People have requested monitoring due to withdrawals by Clearly Canadian Beverage Corporation from this aquifer.

Quantity Concerns (type, source, level of concern):
None documented.

Quality Concerns (type, source, level of concern):
None documented.

Notes:
The median reported depth of bedrock in this area and the bedrock aquifer on the north side of BX Creek is 61 metres or 200 feet (Hodge, 1993).

References:

Fulton, R. J. 1975. Quaternary Geology and Geomorphology, Nicola-Vernon Area, British Columbia. Geological Survey Memoir 380, Energy, Mines and Resources Canada.

Hodge, W.S., 1993. Construction, Development and Testing of Observation Well No. 322-BX Creek Area Northeast of Vernon, British Columbia. Unpublished report, BC Environment.

Johanson, D.A.1994. Vernon Creek Sub-Watershed, Okanagan Sub-Regional Fisheries and Water Management Plan, Groundwater Resource Evaluation. Groundwater Section Report, Hydrology Branch, Water Management Division, British Columbia Ministry of Environment (unpublished).

Jones, G.A., 1959. Geological Survey of Canada. Memoir 296. Vernon Map-Area, B.C. Map 1059A, Department of Mines and Technical Surveys, Canada.

Kelly, C.C. and R.H. Spilsbury, 1949. Soil Survey of the Okanagan and Similkameen Valleys, British Columbia. Report No. 3, Dominion Department of Agriculture. Map Sheet No. 3.

Kreye, R. and M. Wei, 1994. A Proposed Aquifer Classification System for Groundwater Management in British Columbia. Groundwater Section, Water Management Branch, Ministry of Environment, Lands and Parks, Victoria, B.C. File No. 00400-20. 68pp.

Le Breton, E. G. 1972. A Hydrogeological Study of the Okanagan River Basin. Canada-British Columbia Okanagan Basin Agreement Technical Supplement II To Final Report. Water Resources Service, Department of Lands, Forests, and Water Resources, British Columbia.

Nasmith, H. 1962. Late Glacial History and Surficial Deposits of the Okanagan Valley, British Columbia. Bulletin No. 46, Department of Mines and Petroleum Resources, British Columbia.

Topp, L.C., 1991. Clearly Canadian Beverage Corporation, Tillicum Valley Mineral Water Facility, 1991 Groundwater Investigation. Kala Groundwater Consulting, Vernon.

Wei, M., 1992. Observation Well Investigation in the BX Area. Unpublished memorandum, B.C. Environment, File 0183613-B.

AQUIFER CLASSIFICATION AND RANKING

AQUIFER LOCATION: **"BX Creek, South Bedrock Aqwuifer"**

REFERENCE NUMBER: **350**

CLASSIFICATION: **IIC** **RANKING VALUE:** **9**

Classification Component: **(II) Moderate level of development. Moderate demand and moderate yield.**

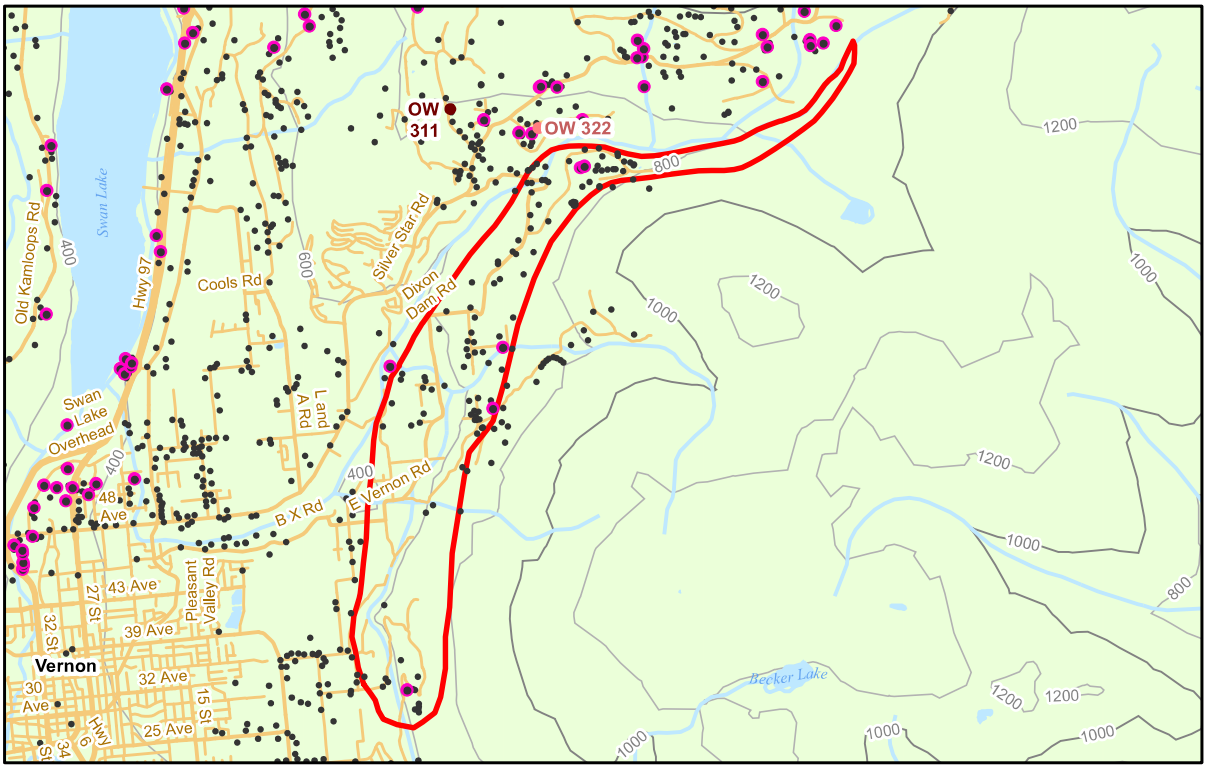
Vulnerability: **(C) Low vulnerability to contamination.**

Ranking Component:

	Value
Productivity:	**1**
Vulnerability:	**1**
Size:	**2**
Demand:	**2**
Type of Use:	**3**
Quality Concerns:	**0**
Quantity Concerns:	**0**

Total	**9**

Aquifer #350



Legend

- Registered Water Well - Artesian
- Registered Water Well
- Active Observation Well
- Inactive Observation Well
- Aquifer Boundary

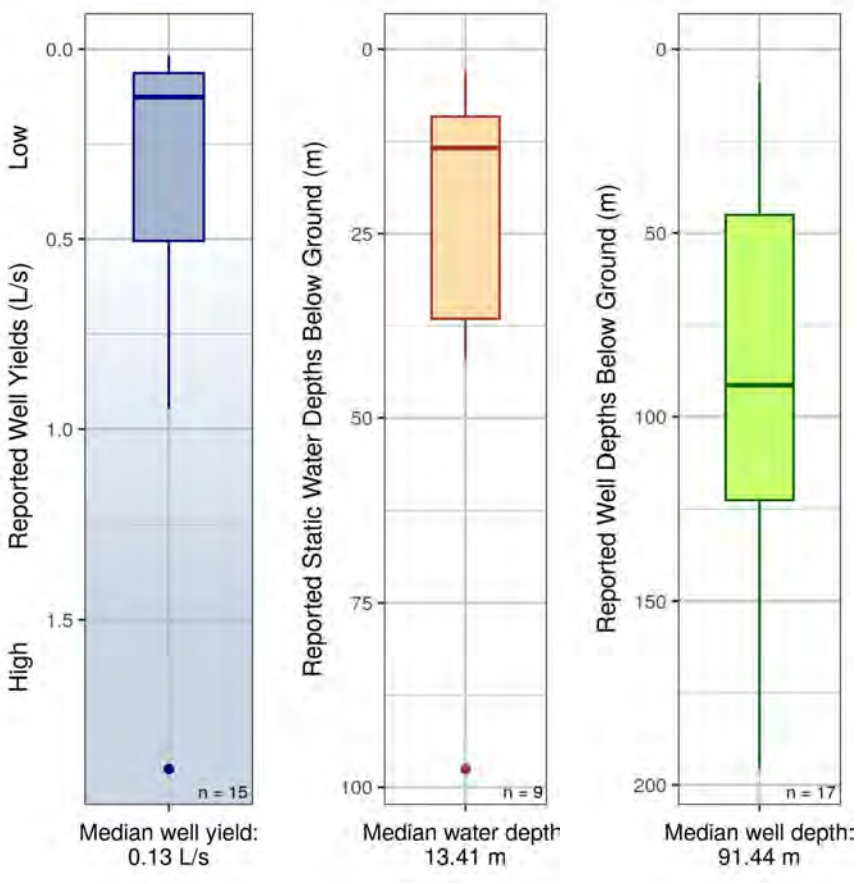
0 1 2 km

N

Aquifer Description (Mapping Report - 2012): Fractured sedimentary rock aquifers primarily found in association with old sedimentary basins (subtype = 5a).

Aquifer Details	
Region	Thompson-Okanagan
Water District	Vernon
Aquifer Area	7 km^2
No. Wells Correlated to Aquifer	17
Vulnerability to Contamination	Low
Productivity	Low
Aquifer Classification	IIC
Hydraulic Connectivity[1]	Not Likely
Aquifer Stress Index	Method not applicable - confined aquifer
No. Water Licences Issued to Wells	1
Observation Wells (**Active**, Inactive)	None

[1] Based on broad regional assessment



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Factsheet generated: 2020-08-06. Aquifers online: https://apps.nrs.gov.bc.ca/gwells/aquifers.