



## MEMORANDUM

TO: Ted Moore, Authorizations Officer – Water (FLNRORD)  
Dave Vanderwal, Owner (River Ranch Cattle Company)

CC: Kelley Pelletier, QWD (JR Drilling Central)

DATE: April 10, 2020

FROM: Thierry M. Carriou, M.Sc., P.Eng

FILE: 18007.2 Professional Well Development Services:  
Groundwater-Based Irrigation Development

SUBJECT: **GROUNDWATER-BASED IRRIGATION DEVELOPMENT:  
IRRIGATION PLAN INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE  
PUMPING TEST AND INTERPRETATION OF CONNECTIVITY WITH THE  
COLDWATER RIVER**

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Ted,

### 1.0 BACKGROUND

#### 1.1 Introduction

The River Ranch Cattle Company (the “Ranch”) purchased the property in 2017. Please refer to Appendix A for an outline of current landholdings. It is the understanding of BC Groundwater Consulting Services (“BCGW”) that the Ranch was informed, at the time of land purchase, that an adequate surface water license allocation was in place to irrigate the property. Unfortunately, the Ranch discovered that this was not the case and the supply (i.e. the pump and intake on the Coldwater River installed by the previous landowner) was inadequate to irrigate the landholdings south of the Coldwater River.

**“ Focusing on sustainable development, protection and management of our groundwater resources ”**

## 18007.2 RIVER RANCH CATTLE COMPANY

PROFESSIONAL WELL DEVELOPMENT SERVICES: IRRIGATION WELL EXPLORATORY BOREHOLE  
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BCGW understands that P. Farmer of *Ministry of Forests, Lands, Natural Resources and Rural Development* ("FLNRORD") advised D. Vanderwal (Ranch owner) on June 24<sup>th</sup> 2017 that increased Coldwater River allocation would not be considered. The Coldwater River is known for water scarcity leading to salmonid access issues and thermal stress during the summer months. We are very familiar with these issues having carried out some of the first surface water - groundwater interaction studies on the Coldwater River dating back to the 1990's and early 2000's. It is our understanding that FLNRORD identified a groundwater supply as the only potential option to supplement existing irrigation presently drawn from the Coldwater River.

### 1.2 Exploratory Borehole Drilling (2018)

D. Vanderwal contacted BCGW in 2018 to drill an exploratory borehole in the search for a groundwater-based irrigation supply. We completed geologic reconnaissance of the area and staked three (3) potential drilling locations on July 6<sup>th</sup> 2018. Please refer to that field report and our work program in the appendix for details. A nominal Ø6" cased flowing exploratory borehole (EB2018-1) was drilled October 12<sup>th</sup> - 18<sup>th</sup> 2019 to a depth of 155 ft-bgl (47.2 m) and intercepted a productive sand and gravel water-bearing zone at 84 - 145 ft-bgl (25.6 - 44.2 m) observed to free-discharge at 30 USgpm (1.9 L/s or 163 m<sup>3</sup>/day). The borehole was permitted to free-discharge and provide time for the cement surface seals to cure.

T. Carriou, P.Eng. (BCGW) supervised gradual shut-in of the well commencing January 15<sup>th</sup> 2019 at 3 psi(g). The well was permitted to continue free-discharging, due to freezing temperatures, dissipating to 1.0 psi(g) by March 18<sup>th</sup> 2019 and then increasing to 2.5 psi(g) by April 1<sup>st</sup> 2019. The pressure control valve (PCV) was gradually closed to 50 % over several days until it reached 8 psi(g) on April 11<sup>th</sup>. The PCV was further closed over the next few days until preliminary shut-in was reached at 13½ psi(g) on May 14<sup>th</sup> rising to 15 psi(g) by May 22<sup>nd</sup> 2019. In the absence of a nearby relief well to control down-hole hydraulic pressures (DHHP) acting at the base of the well and on the shallow modified-Halliburton cement surface seal, we generally allow 1 - 2 psi(g) pressure buildup per week. A total of seventeen (17) weeks were provided for shut-in reaching 73 psi<sup>1</sup> DHHP at a depth of 155 ft-bgl (47.2 m).

### 1.3 Exploratory Borehole Testing (2019): Free-Discharge and Impoundment

EB2019-1 was tested in May and August 2019. The objective of the first test was to determine the available rate of discharge from the well when allowed to flow with varying backpressures, such as is common practice when impounding water over the winter in ponds, and for livestock watering. The volume available for off-season impoundment (October 1<sup>st</sup> - April 30<sup>th</sup>) is estimated at

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<sup>1</sup> EB2019-1 DHHP on May 22<sup>nd</sup> 2019 calculation: 15.0 psi (g) shut-in + 2.5 psi (6 ft-agl) + 55.4 psi (135 ft-bgl x 0.41 psi/ft) = 73 psi.

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9,000,000 - 14,000,000 USgal (34,000 - 53,000 m<sup>3</sup>) based on a nominal free-discharge rate of 30 - 45 USgpm (1.9 - 2.8 L/s) over that time.

Results of long-term discharge from October 2018 - May 2019 indicate that a 1½ psi(g) decline of the available 15 psi(g) shut-in piezometric pressure occurred over that period of free-discharge. This represents a 10% decline of the shut-in gauge pressure or 2% of the DHHP over that period. The shut-in pressure rebounded to a static condition in a couple of days.

- *BCGW recommends that River Ranch consider off-season impoundment of EB2019-1 free-discharge as part of their long-term irrigation solution. Initial indications are that off-season discharge and impoundment will not affect the future production well yield during the irrigation season.*

#### 1.4 FLNRORD Request to Transition Off-River (February 20, 2020)

BCGW is of the understanding that D. Vanderwal was informed by P. Farmer (FLNRORD) on February 20<sup>th</sup> 2020 that the Ministry may request, or will require, that the Ranch transition its irrigation supply from the Coldwater River to groundwater. This is a startling request given that:

1. The Ranch has only recently secured funds available to commence groundwater-based irrigation development (planned for this year).
2. Many unknowns exist regarding the sustainability of groundwater use in such large quantities from an unproven groundwater.
3. Those unknowns will continue until such time as groundwater pumping has occurred for a period of two years to measure summer drawdown, gauge the effects on well yield and confirm year-to-year aquifer replenishment.

Our experience with transitioning existing surface water license allocations to groundwater authorizations has been generally positive, so long as the groundwater supply demonstrates limited connection to the licensed surface water. River Ranch is fortunate that high-pressure artesian conditions were encountered at EB2019-1, as it indicates that recharge to the intercepted water-bearing zone likely originates from a source other than the immediate reaches of the Coldwater River. This increases the likelihood that groundwater can be withdrawn from the underlying aquifer without undue impact to the Coldwater River. However, licensing also considers the possibility that groundwater flow to the river will be intercepted and withdrawn (i.e. Coldwater River as it relates to environmental flow needs).

It is important that the potential connectivity of the water-bearing zone intercepted by EB2018-1 to the Coldwater River is considered given the extreme sensitivity of water use in this watershed. The need for understanding that potential connectivity is heightened by the February 2020 conversation with FLNRORD described above. BCGW looks forward to a future joint conversation with the Ranch and the Ministry regarding the next steps towards developing a sustainable groundwater-based irrigation supply.

BCGW dispatched our geologist (P. Grunenberg, P.Geo.) to carry out a detailed assessment of site geology for the purpose of supporting the interpretations and forecasts presented in this report. P. Grunenberg has worked with T. Carriou in the Coldwater River valley for more than 20 years on regional mapping studies and assignments from Kingsvale to the City of Merritt, including the Coldwater Indian Band IR1/2/3 and addressing the large uncontrolled flowing well at the former Merritt Mountain Music festival grounds. Results of that geologic assessment are included in this report.

## **2.0 OBJECTIVE**

The first objective of this report is to describe the groundwater development program that will be executed by the Ranch over the next two years in support of the proposed short-term groundwater use authorization. That authorization request is specifically intended to gain clarity regarding the potential yield, allocation (volume) and sustainability of long-term groundwater-based irrigation over the coming years from the aquifer identified by exploratory borehole EB2018-1 and potentially from the surficial aquifer as well if the Ranch elects to explore that target also. Please refer to the attached June 6<sup>th</sup> 2018 field report that references alternate drilling locations “A” and “B”, which we believe have a greater potential for intercepting shallow groundwater in direct connection with the Coldwater River.

The Ranch intends to construct a nominal Ø8” (200 mm) or Ø10” (250 mm) production well this Spring into the flowing artesian water-bearing zone identified at BH2018-1. That well is referred to as PW2020-1 from this point forward. By way of this report, T. Carriou declares that he has agreed to be the “person responsible” for the successful control of flowing conditions at PW2020-1 as described in the *Act and Regulation* if BCGW is retained by the Ranch to proceed with construction of that well.

- *Note that there are very few drilling companies in the province with the experience and tooling required to successfully execute the very shallow (36 ft-bgl) modified-Halliburton cement surface seal constructed at EB2018-1 on a larger scale (Ø8” or Ø10” production well). That well seal construction is required to contain the significant artesian pressures at*

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*depth and also blind off the shallow secondary artesian unit that exists in the surficial fluvial plain-terrace contact deposits.*

The second objective of this report is to describe the geologic and hydrogeologic framework of the interpreted glaciofluvial water-bearing zone intercepted by BH2018-1, which is currently interpreted to underlie the Ranch. Results and analysis of the short-term pumping test carried out in 2019 are described in this report. Forecasts of various well construction and development options are provided to gauge potential interaction with an identified off-site flowing well to the north (Lou Cook) and the River Ranch Cattle Company stock well to the south. The potential for influence on the Coldwater River due to long-term pumping of PW2020-1 will also be discussed.

### **3.0 LIMITATION**

This report has been prepared for, and in consideration of, the limited scope of responsibility that BC Groundwater Consulting Services Ltd. ("BCGW") and all those who are responsible for the assumptions and the conclusions contained in this report have to the River Ranch Cattle Company.

Use of this report is limited and restricted to those uses expressly contracted for by the River Ranch Cattle Company. Any person, partner, corporation or agency other than the Ranch that conducts him or herself in any way that relies upon the contents in this report does so entirely at their own risk and responsibility. Neither the author or BCGW shall assume any responsibility for damages or losses suffered as a result.

### **4.0 IRRIGATION PLAN**

The Ranch proposes to construct a moderate-capacity irrigation well this Spring (production well PW2020-1). Existing exploratory borehole EB2018-1 will be retained as a monitoring well per discussions between P. Farmer, T. Moore and D. Thomspson of FLNRORD during our July 3, 2019 site meeting.

The objective of PW2020-1 is to reach a maximum pumping rate of 350 USgpm (22.1 L/s or 1,900 m<sup>3</sup>/day) that will be adequate to irrigate the parcel in closest proximity to the exploratory borehole. This approach will provide the opportunity to operate PW2020-1 while monitoring the effects of use at EB2018-1 and monitor the rate of recovery to gauge the sustainability of use. The Ranch may consider installing a pump into EB2018-1 to supply livestock in the winter months and is prepared to commit to not operate both wells concurrently to ensure that an uninterrupted monitoring record is collected for future analysis. This is particularly important during periods of peak irrigation demand that typically occur after each hay crop is harvested.

The long-term irrigation plan will be to continue drilling irrigation wells, perhaps into the same aquifer identified by EB2018-1, until such time as long-term irrigation demands are met or monitoring identifies that a sustainable rate of withdrawal has been reached. It will not be possible for the Ranch to move away from surface water use (Coldwater River) for the next several years because of this gradual implementation of groundwater-based irrigation, not to mention the high cost of this transition, which assumes the identified groundwater source proves viable.

Sustainability of groundwater development will be a hallmark of the groundwater-based irrigation implementation proposed by the Ranch. BCGW has extensive experience with determining the rate of sustainable groundwater withdrawal from flowing artesian aquifers. We employ an empirical approach whereby the rate of withdrawal is slowly increased over time and particular attention is paid to off-season water level (piezometric) recovery as a diagnostic. BCGW will commit to working with the Ranch and assisting them with regular monitoring, and comparison to baseline monitoring information, to determine if groundwater withdrawals are sustainable under the premise of a short-term use authorization.

## **5.0 GEOLOGY**

### **5.1 Terrain Mapping**

There is no detailed terrain mapping available from the DataBC website. However, mapping along the Trans Mountain Expansion Project is available. A portion of that mapping covers the area of interest for River Ranch and was extracted for use in this report. A digitized and partially edited version of this mapping is presented in Figure 2.

According to the mapping, the Coldwater River has formed an immediate-margin fluvial-alluvial plain (**Fp**) that narrows and widens in the order of 100 to 500 m along the current river channel. Along the margins of the current fluvial plain, the terrain is also mapped as fluvial plain, an apparent older formation (edited from original as “Fp 100” on Figure 2) from when the river more fully filled the valley floor. More of this older fluvial plain is found on the east side, with only minor pockets on the west. This has been a consistent finding in the many mapping projects we have carried out in the Coldwater River valley.

Moving upslope and outwards from the lower river valley, the eastern flank of the valley is mapped as pockets of remnant fluvial plain and glaciofluvial terrace or terraces (**FGt**). Where creeks enter the main valley, the tributary gullies are mapped as fluvial plain and, at the deposition into the valley floor, as fluvial fans (**Ff**). Both sides of the valley transition from the fluvial and glaciofluvial materials to colluvium and till (**C, M**) dominated terrain above approximately 750 m-geod elevation.

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The terrain at higher slopes is dominated by bedrock and glacial till. Again, this is a consistent finding in the many mapping projects we have carried out in the Coldwater River valley.

## 5.2 Aquifers

Provincial aquifer mapping indicates that three aquifers have recently (2018) been proposed within 5 km of the area of interest (see Figure 3). The Paul's Basin aquifer (Aq ID #1166) located to the west in upper Midday Creek, is mapped as a bedrock aquifer of 12 km<sup>2</sup> in fractured crystalline rock, with moderate vulnerability, productivity and demand. Aquifer ID #1165 Kingsvale is also mapped as a bedrock aquifer of 7 km<sup>2</sup> located south of the area of interest along the Coldwater River valley. This aquifer is listed as fractured crystalline bedrock with low vulnerability, productivity and demand. Slightly closer to the site, and within a similar terrain setting, is aquifer ID #1164 (Coldwater Valley) of 0.8 km<sup>2</sup>. This aquifer is listed as confined in glacially derived sand and gravel, with moderate vulnerability, moderate productivity and low demand from multiple use.

| AQUIFER_ID | NAME             | LOCATION               | SUBTYPE                            | VULN     | PROD     | DEMAND   | AREA_SQKm |
|------------|------------------|------------------------|------------------------------------|----------|----------|----------|-----------|
| 1165       | Kingsvale        | Coldwater River Valley | Fractured crystalline bedrock      | Low      | Low      | Low      | 7.04      |
| 1164       | Coldwater Valley | Coldwater River Valley | Confined sand and gravel - glacial | Moderate | Moderate | Low      | 0.77      |
| 1166       | Paul's Basin     | Midday Creek Valley    | Fractured crystalline bedrock      | Moderate | Moderate | Moderate | 10.98     |

## 5.3 Water Wells

Water well locations and lithologies were downloaded from the DataBC website. Four (4) wells are shown to be located within 2 km of the River Ranch site (see Figure 4). The recorded wells are completed at depths ranging from 14 to 135 ft (4.3 to 41.2 m). Wells were completed in sand and gravel with yields ranging from "No Data Recorded" to 100 USgpm (6.2 L/s). Artesian flow was noted in two wells: WTN 071419 and WTN 116263 (River Ranch EB2018-1) listed as flowing at a rate of 30 USgpm (1.9 L/s).

EB2018-1 (WTN 116263) appears to intercept an upper fluvial plain sand and gravel (**Fp 100**) and a much deeper sand and gravel deposit that is likely of glaciofluvial origin. The lower sand and gravel (**FG**) deposit is overlain by a relatively thick layer of cemented boulder till, indicating potential glacial advance outwash fluvial deposits followed by prolonged till deposition when the valley became overrun by glaciation.

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| WELLTAGNO | UTM_N   | UTM_E  | SURNAME               | From (ft) | To (ft) | LITH_RAW                                         | Depth Well | Production (USGPM) | Artesian Flow Recorded |
|-----------|---------|--------|-----------------------|-----------|---------|--------------------------------------------------|------------|--------------------|------------------------|
| 70        | 5541668 | 651205 | ARCHIE FINK           | 0.00      | 4.00    | clay and topsoil                                 | 34.00      |                    | 0                      |
| 70        | 5541668 | 651205 | ARCHIE FINK           | 4.00      | 18.00   | sand and gravel                                  | 34.00      |                    | 0                      |
| 70        | 5541668 | 651205 | ARCHIE FINK           | 18.00     | 34.00   | rock and hardpan                                 | 34.00      |                    | 0                      |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 0.00      | 4.00    | TOP SOIL                                         | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 0.00      | 0.00    | FLOWING                                          | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 4.00      | 9.00    | GREY STICKY CLAY                                 | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 9.00      | 11.00   | DIRTY WATER BEARING COARSE GRAVEL                | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 11.00     | 20.00   | CEMENTED TILL & BOULDERS                         | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 20.00     | 62.00   | CEMENTED TILL & BOULDERS                         | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 62.00     | 66.00   | DIRTY WATER BEARING COARSE SAND & GRAVEL         | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 66.00     | 94.00   | COARSE WATER BEARING SAND & GRAVEL RED &         | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 94.00     | 104.00  | CLEAN WATER BEARING GRAVEL & FLOWING             | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 104.00    | 110.00  | CLEAN WATER BEARING FINE SAND FLOWING            | 110.00     |                    | 0.01                   |
| 71419     | 5541319 | 650853 | GLENWALKER CATTLE CO  | 110.00    | 112.00  | BACK FILLED                                      | 110.00     |                    | 0.01                   |
| 115219    | 5539249 | 648852 | River Ranch Cattle Co |           |         | No Data Recorded                                 | 13.80      |                    | 0                      |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 0.000     | 2.000   | brown, loose silt, dry                           | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 2.000     | 8.000   | sand with gravel, dry                            | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 8.000     | 34.000  | brown, loose sand with gravel, clay, wet         | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 34.000    | 38.000  | brown clay, dense/stiff, moist                   | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 38.000    | 84.000  | brown clay, sand with gravel, dense/stiff, moist | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 84.000    | 150.000 | brown, loose sand with gravel, high production   | 135.000    | 100.000            | 30                     |
| 116263    | 5540074 | 649799 | River Ranch Cattle Co | 150.000   | 156.000 | brown, loose sand with gravel, clay, wet         | 135.000    | 100.000            | 30                     |

#### 5.4 Site Reconnaissance

A site reconnaissance was conducted on February 7, 2020. Waypoints (WPs) were collected with a hand-held GPS using coordinate system UTM NAD83 Zone 10. Waypoint locations are summarized in the following table and presented in Figure 5.

| WP | Date      | Time     |    | UTM Zn | E      | N       | Elev | Description Summary                                                                                                  | Photos |
|----|-----------|----------|----|--------|--------|---------|------|----------------------------------------------------------------------------------------------------------------------|--------|
| 42 | 07-Feb-20 | 10:49:36 | am | 10 U   | 648792 | 5538125 | 817  | clwtr road cut, cg till (5), F (FG) terrace to west (pic3,4)                                                         | 3-5    |
| 43 | 07-Feb-20 | 10:56:46 | am | 10 U   | 649005 | 5538765 | 772  | rolling topo terrace, M/F.FGt                                                                                        | 6      |
| 44 | 07-Feb-20 | 10:59:37 | am | 10 U   | 649279 | 5539168 | 759  | gravel pits, boulder sg near massive. \$sgFGt?or simple Ft                                                           | 7-8    |
| 45 | 07-Feb-20 | 11:08:56 | am | 10 U   | 649021 | 5539159 | 746  | Patchet road, undulating plain, sloping, Fp w Mv cover, shallow pit exposes rounded cobble \$sgFt colluviated apron? | 9-10   |
| 46 | 07-Feb-20 | 11:14:04 | am | 10 U   | 648689 | 5538999 | 731  | at Cldwt river, about 5-10m drop from Ft                                                                             | 11-12  |
| 47 | 07-Feb-20 | 11:34:41 | am | 10 U   | 650171 | 5540081 | 747  | road side above cross section view                                                                                   | 13-16  |
| 48 | 07-Feb-20 | 11:42:03 | am | 10 U   | 650007 | 5540104 | 725  | dug out, inflow water down creek from E                                                                              | 17     |
| 49 | 07-Feb-20 | 11:47:52 | am | 10 U   | 650117 | 5539984 | 741  | creek at Coldwater road, section sketch, overview facing N                                                           | 19-20  |
| 50 | 07-Feb-20 | 12:08:08 | pm | 10 U   | 649813 | 5540073 | 716  | well plate 46314, slight undulating Fp below rhF(G) t, pockets of F gravel on west side of clwtr river               | 21-24  |
| 51 | 07-Feb-20 | 12:28:11 | pm | 10 U   | 650126 | 5539945 | 750  | view facing north for cross section sketch                                                                           | 25-27  |
| 52 | 07-Feb-20 | 12:35:00 | pm | 10 U   | 650193 | 5539970 | 760  | borwn cgM on slope                                                                                                   | 27     |

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| WP | Date      | Time     |    | UTM Zn | E      | N       | Elev | Description Summary                                                                       | Photos |
|----|-----------|----------|----|--------|--------|---------|------|-------------------------------------------------------------------------------------------|--------|
| 53 | 07-Feb-20 | 12:39:39 | pm | 10 U   | 650337 | 5539978 | 794  | slight benched area, till, M/FGt?                                                         | 28     |
| 54 | 07-Feb-20 | 12:42:59 | pm | 10 U   | 650429 | 5539988 | 793  | sloping up to E, bedrock control, brown cgM                                               | 29     |
| 55 | 07-Feb-20 | 12:47:59 | pm | 10 U   | 650492 | 5540172 | 765  | Spring, N end of terrace, sketched, pockets of FG along cldwtr river valley?              | 30     |
| 56 | 07-Feb-20 | 1:07:18  | pm | 10 U   | 650612 | 5540504 | 729  | view north section sketch, also road cut brown cgC.M                                      | 31-32  |
| 57 | 07-Feb-20 | 1:20:32  | pm | 10 U   | 650990 | 5541241 | 723  | rolling and hummocky sloped surface, M/FGrh? Facing south                                 | 33     |
| 58 | 07-Feb-20 | 1:24:49  | pm | 10 U   | 651507 | 5541940 | 738  | rock subcrop along road, oc bluffs to N                                                   | 34     |
| 59 | 07-Feb-20 | 1:36:52  | pm | 10 U   | 651189 | 5541670 | 732  | steep slope to W, isolated mound of Ft remnant in valley bottom, possibly eskered terrain | 35     |
| 60 | 07-Feb-20 | 1:45:00  | pm | 10 U   | 650956 | 5541227 | 721  | pumphouse (well) next to road (Tag 071419?), on slope above Fp, M/Ft.FGt                  | 36     |
| 61 | 07-Feb-20 | 1:52:13  | pm | 10 U   | 650953 | 5541277 | 718  | layered sand and gravel sgFt or fan, loose brown pebbly                                   | 37-38  |
| 62 | 07-Feb-20 | 1:52:15  | pm | 10 U   | 650955 | 5541279 | 719  | same as above and view across valley facing W sketch                                      | 39-40  |

In general, the site and area reconnaissance confirms the regional mapping as described in Figure 1. Areas to the east mapped as glacial till, found at waypoints 42, 52, 53 and 54, are comprised of dense brown clay and angular gravel. A pocket of colluvium found at WP 56 appears to be the result of slope remobilized till.



Glacial till exposed at waypoints 43 and 52

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Bouldery colluvium exposed in road cut, WP 56



Spring draining an interpreted sand and gravel (FG) formation at WP 55.

Excavation pits located at WP 44 expose relatively sorted but not significantly layered coarse gravel with sand and some silt. This area is mapped as a fluvial terrace located well above the current river valley, at or near the outflow of Salem Creek where a fluvial fan has been mapped. A spring located at WP 55 appears to be sourced from a buried sand and gravel deposit. The slightly bumpy and rolling surfaced terrace in this area is interpreted as fluted or drumlinized glacial till overlying an older glaciofluvial sand and gravel deposit.

In other locations along the valley margins, at a similar elevation and topographic setting as WP 44, glaciofluvial deposition has been mapped as relatively un-laminated sand and gravel. It is possible that much of the upper elevation benches along the margins of the valley are composed of glaciofluvial deposits from ice-contact deposition, with some glacial till cover. Landforms and materials found at WP 55 and 57, and above WP 60, also suggest rolling and hummocky topography of glacial till overlying glaciofluvial terrace.

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The upper elevations along the valley margin are topographically controlled by bedrock. Bedrock exposures are found along the Coquihalla Highway to the east of the site, and at WP 58 to the north of the site.



Slightly ridged terrace at WP 57, till overlying glaciofluvial sand and gravel

The lower terraces that are closer to the current fluvial plain of Coldwater River are slightly sloping to the valley center, with very minor rolling or ridged topography. The underlying materials are exposed at WP 61 showing well layered loose pebbly sand and gravel. The mildly ridged topography may be the result of deposition in levees along the ancient riverbanks. Deposits of fine silt to clay may be present at surface and in layers within the older river deposits.



Layered sand and gravel exposed in pit at WP 61, (Ft)

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Fluvial terraces have a marked sloping bench transition downslope to fluvial plain materials formed from the historic flow of the Coldwater River, which was much higher than today (**Fp 100** on map). The slightly sloping topography of the Fp 100 terrain is mildly ridged, possibly from levee formation along the ancient river banks. Fine sediments have been intersected at surface in well drilling, which supports sorting of sediments along the river margins.



WTN 116203 (WIPN 46314) at WP 50, slight ridged Fp 100 terrain



View facing north at WP 51 showing variable terrain

### 5.5 Summary

The terrain surrounding the River Ranch includes abundant sand and gravel deposits, in places overlain by glacial till. At the drill site, EB2018-1 (WTN 116263) intercepted surficial sand and

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gravel, underlain by glacial till, with a deeper glaciofluvial sand and gravel deposit that was found to be water-bearing and flowing artesian. This assemblage of materials is likely similar to that described by the DataBC mapped aquifer 1164 Coldwater Valley, where the aquifer materials are described as “confined sand and gravel of glacial origin”. Much of the Coldwater River valley may contain similar deep glaciofluvial sand and gravel deposits.

Water wells drilled along the Coldwater River margins may also intercept a thin layer (1 to 3 m) of fine sediment at surface, indicating grading along the riverbanks which meandered over time. Glaciofluvial sand and gravel found along the upper terraces along the valley margins are seen to be capped by glacial till of somewhat thicker quantity. Mapping to the north, within the Coldwater Indian Band IR 1, also identified fluted or drumlinized till overlying glaciofluvial deposits, which is the formation utilized for groundwater withdrawal on the reserve.

Two interpreted schematic geologic sections are provided in Figure 6, one oriented NE - SW along the Coldwater River, and the other NW - SE crossing the valley through the site at EB2018-1 (WTN 116263). The geologic symbols follow *Ministry of Environment* Manual 10 Terrain Classification System, with **Fp** for fluvial plain (generally silt, sand and fine gravel - \$, s, g); **M** for glacial till clay and gravel - c, g; **FG** for glaciofluvial (generally coarser mixed sand and gravel), **Ft** for fluvial terrace sand and gravel, and a herein interpreted **Fp 100** for older fluvial plain materials elevated above the current river plain.

The general geology is of a sand and gravel fluvial plain overlying glacial till, which overlies a buried glaciofluvial sand and gravel layer. Bedrock was apparently intercepted at approximately 10 m-bgl in Well Tag 0070, but is expected to be much deeper in the central part of the valley. The productive layer intercepted in EB2018-1 (WTN 116263) may extend for some distance along the Coldwater Valley, reaching at least as far as WTN 071419 to the northeast and a similar distance to the southwest.

## 6.0 EXPLORATORY BOREHOLE EB2018-1 PUMPING TEST RESULTS

EB2018-1 was tested during the Summer of 2019 after shut-in pressures were achieved (described above). Testing was carried out in two distinct steps. The first step focused on evaluation of free-discharge rates from the well in support of site impoundment / storage, evaluation of pressure decline from continuous discharge, and for comparison to volumes expected from well pumping during the irrigation season. The second task involved a pumping test of EB2019-1 to gain a preliminary understanding of aquifer hydraulics, specific capacity for irrigation well designs and insight into the potential effects of the aquifer boundaries (physical and hydraulic).

Results of the EB2018-1 pumping test are described below and presented in Appendix E:

1. The shut-in pressure was recorded at 15 psi(g) immediately prior to testing. Free-discharge was recorded at 30 USgpm at the start of the test.
2. EB2018-1 was pumped for 48 hours at a rate of 60 USgpm (3.8 L/s) from an open and flowing condition.
3. Water level drawdown in EB2018-1 reached 10.4 m-btoc (34.1 ft-bgl) after 48 hours of continuous pumping. This equates to an apparent 0.3 L/s/m (1.5 USgpm/ft) specific capacity or 0.16 L/s/m (0.8 USgpm/ft) when the original shut-in pressure is considered. Caution must be exercised when considering these results given the narrow width of the aquifer and likelihood of associated negative boundary condition effects.
4. The apparent water level drawdown stabilized very quickly from a semi-logarithmic and logarithmic. Again, caution must be exercised when considering these results given the potential for boundary conditions in this narrow aquifer and the very short installed test screen. Nevertheless, the results clearly suggest rapid drawdown stabilization likely originating from aquitard leakage. Our experience in the region indicates similar early-time responses. Subsequent long-term tests usually confirm leaky-confined conditions with storativity in the  $10^{-3}$  range. BCGW utilizes  $10^{-5}$  as a lower-bound value for sensitivity analysis of artesian (confined) systems.
5. Drawdown at EB2018-1 was limited to about  $\frac{1}{2}$  of the aquitard thickness during this preliminary test to gauge aquifer hydraulics from this single-well test. Pushing well drawdown into the confined water-bearing sediments often initiates transition to a dewatering response, which can provide misleading results about the aquifer as a whole, especially in confined aquifers demonstrating leaky conditions.
6. Preliminary analysis of the drawdown reached during the test was carried out using the method described by Walton (1987) in Groundwater Pumping Tests: Design and Analysis.
  - a. This method estimates the aquifer transmissivity based on the observed 24-hour specific capacity making the assumption of artesian (confined) storativity. There are many assumptions and limitations inherent to this method, but it does have the advantage of recognizing limitations of data from a single-well test.
  - b. The method estimated EB2018-1 transmissivity in the order of  $2 \times 10^{-4}$  to  $4 \times 10^{-4}$  m<sup>2</sup>/s using the apparent and theoretical specific capacity values described above. Those

values suggest the range of hydraulic conductivity is in the order of  $1 \times 10^{-5}$  to  $3 \times 10^{-5}$  m/s based on a saturated thickness estimate of 15.5 to 21.0 m (51 to 69 ft).

- i. It is important to recognize that glacial outwash deposits of the type underlying the Ranch are complex and usually demonstrate localized compartmentalization because more than one glacial advance / recession cycle is responsible for aquifer deposition.
  - ii. Water samples were collected during drilling to evaluate the saturated thickness of the aquifer at EB2018-1. Produced water was observed over the interval 25.6 - 46.6 m-bgl (84 - 153 ft-bgl). Piper Analysis confirms that the aquifer located at EB2018-1 is likely comprised of two water bearing zones (Appendix F). The 8 ft screen installed at EB2018-1 is likely only exposed in the upper zone.
  - iii. Future production well PW2020-1 will need to be screened over the entire saturated thickness interval with a screen diameter large enough to accept a suitable submersible pump in an overshot configuration (i.e. operated with the pump intake set below the screen) with the operating depth to water limited at 70 % of the aquifer thickness. This style of operation is expected to result in depressurization to only a very small distance from the well (i.e. 5 m or so) with the remainder of the cone of depression remaining hydrostatic and steady. Additional details regarding well design options are described further in this report.
- c. The above hydraulic conductivity values estimated by the method described by Walton suggest that sediments contributing to EB2018-1 are “fine clean sand” to “fine-coarse silty sand” based on the observed results. This is much finer than the boney sand and gravel observed within much of the sequence. Given the low values suggested by the specific capacity estimates, BCGW considers it likely that partial penetration and boundary conditions are reflected in the observed results.
7. Commonly accepted literature values for the nominal 21 m (69 ft) thick water-bearing sequence are in the range of  $10^{-6}$  to  $10^{-1}$  m/s. This range reduces to  $10^{-5}$  to  $10^{-3}$  m/s assuming the  $d_{10}$  fraction is controlled primarily by sand. Gravel matrix controlled yield are generally in the range of  $10^{-2}$  m/s and higher, which BCGW considers to be overly optimistic for the purpose of analysis and forecast.

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8. BCGW has selected the following parameters for PW2020-1 design and preliminary forecasts of piezometric surface decline within the confined water-bearing zone identified in Figure 6:

|                |             |                                         |
|----------------|-------------|-----------------------------------------|
| Transmissivity | Lower-Bound | $3 \times 10^{-4} \text{ m}^2/\text{s}$ |
|                | Upper-Bound | $7 \times 10^{-4} \text{ m}^2/\text{s}$ |
| Storativity    | Lower-Bound | $1 \times 10^{-5}$                      |
|                | Upper-Bound | $1 \times 10^{-3}$                      |

9. BCGW has generated a series of drawdown / piezometric decline forecasts using the above values. The lower- and upper-bound transmissivity values at 24 hours confirm that drawdown at the Lou Cook well (the only available observation well at similar elevation and depth as BH2018-1) too small for observation. Our field observations corroborate that analytical forecast suggesting the diffusivity range of the design transmissivity and storativity values above are within the realm of possibility. This is the best level of crude “calibration” that can be expected from a single-well test in a previously undeveloped aquifer. Note that Piper Analysis (Appendix F) suggests that the Lou Cook well geochemistry is different from EB2018-1, so this conclusion must be considered with caution. This report will not provide comment on the differing geochemistry of that well, but we are glad to provide a stand-alone letter of opinion about Lou Cook's well if requested.

## 7.0 HYDROGEOLOGY

### 7.1 Principal Hydrostratigraphic Unit

Our geologic investigation suggests the glaciofluvial aquifer intercepted by EB2018-1 is localized and nearly constrained by the River Ranch parcel boundaries. We have made the working assumption that the Lou Cooke well is part of this same unit. However, the hydrogeology and potential for input / interaction from the shallow fluvial plan and terraces overlying the aquifer are a distinct possibility in that uncontrolled well.

### 7.2 Piezometric Profile (Forecast)

Our experience within many similar confined (some flowing artesian) aquifers in the Coldwater River and Nicola River valleys makes it clear that the piezometric elevation is consistent within these aquifers, unless interrupted by operating or uncontrolled wells. Based on this experience, BCGW makes an assumption that the baseline piezometric elevation within the aquifer intercepted by EB2018-1 is equal to 10.5 m / 35 ft above the EB2018-1 wellhead elevation. In other words, the

piezometric elevation equal to 15 psi(g) at EB2018-1 is consistent throughout the area of potential influence from PW2020-1 irrigation well pumping.

### **7.3 Is there a Potential Concern Regarding Surface Water Depletion (Coldwater River) ?**

BCGW is of the opinion that the risk of Coldwater River depletion from EB2018-1 and the proposed irrigation well PW2020-1 during current periods of summer stress is low. Our rationale follows:

1. The aquifer under investigation is located within glacial moraine. The permeability of that moraine is very low as evidenced by the degree of confinement exhibited (i.e. a high shut-in pressure).
2. A potential source bed for leakage is located within the fluvial terraces and fluvial plan in direct communication with the Coldwater River. The first evidence of interaction will be observed in those source beds.
  - a. Our standard practice is to install nominal 3 m (10 ft) standpipes immediately around artesian wellheads to confirm the “zero-leakage” condition required by the regulations. This has been completed at EB2018-1 and BCGW confirms full control below grade in the attached signed and sealed field report .
  - b. Those standpipes are also measured during the pumping test to determine if there is any obvious leakage from the shallow overlying source bed, and to observe the typical water level rise which occurs due to skeletal compression and localized subsidence. Recall the that location of peak leakage and compression will occur at the wellhead, baring any obvious geologic discontinuities at a distance from the well.
    - i. BCGW did not observe any declining water levels in the shallow standpipes during the test suggesting a low potential for significant downward vertical leakage.
    - ii. BCGW did not observe rising water levels, leading us to the belief that the moraine is stiff and of limited permeability.
  - c. Based on the results above, BGGW is of the opinion that there is a very low opportunity for downwards vertical leakage from the surface source bed to the aquifer under investigation. Rather, the clear leakage response observed at EB2018-1 likely originates from upward leakage (upconing) from the deeper moraine, or perhaps via partings in the moraine itself that source recharge from

the east side of the valley. Note that BCGW completed a detailed geologic investigation of Coldwater Band IR2 (Paul's Basin) in 2018 which mapped lower (northeast) remnants of glaciofluvial sand and gravel, which may also daylight into the Coldwater River valley. These are another potential source of recharge<sup>2</sup>.

3. BCGW will develop a groundwater monitoring plan in conjunction with the PW2020-1 drilling and construction plan when authorized by the Ranch.

#### **7.4 Is there a Potential Concern Regarding Groundwater Supply Sustainability ?**

BCGW is of the opinion that the rate of EB2018-1 and PW2020-1 pumping will be controlled by the effective grain size of the sediments in communication with the well screens. For this reason, we do not have concerns about potential aquifer depletion. We are more concerned with the sediments being able to provide the volume of water required by the Ranch.

The steady day-to-day discharge rate and rapid return to static shut-in pressure after the extended period of free-discharge provided for EB2018-1 cement surface seal curing, and after the pumping test, indicates that the rate of replenishment is very high. PW2020-1 will be tested in a staged fashion with drawdown first limited to the aquitard thickness, then the rate increased to draw the water level into the aquifer. As described above, we anticipate minor depressurization and dewatering locally around the well, but only within a few meters of the wellhead, as demonstrated in the Appendix F forecasts.

In our experience, aquifers of this type require at least two years of seasonal pumping to understand sustainability of operation. BCGW will develop a groundwater monitoring plan in conjunction with the PW2020-1 drilling and construction plan when authorized by the Ranch.

#### **8.0 IRRIGATION WELL DESIGN, CONSTRUCTION AND TESTING**

BCGW has evaluated several potential designs for irrigation well construction. The proposed well designs, operation estimates and potential impacts on existing wells are described below.

##### **1. Conventional Ø8" (Nominal) Wells**

- a. Wellhead construction is comprised of a Ø20" surface caisson installed by excavation with two (2) adjoining Ø2" standpipes to a nominal depth of 6 ft-bgl (1.8

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<sup>2</sup> BCGW is unable to present further information from that study due to privacy issues and ongoing litigation between the Coldwater Indian Band and the Trans Mountain Expansion Program.

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- m) in the same manner as BH2018-1 construction. The surface seal will be comprised of a 16"x10" modified-Halliburton seal drilled and set to a nominal depth of 40 ft-bgl (12.2 m). The seal cannot be set any deeper due to the presence of shallow flowing artesian conditions.
- b. A nominal Ø8" production casing will be drilled to a nominal depth of 155 ft-bgl carefully noting the depth to produced water and any aquifer compartmentalization. BH2018-1 will be monitored during the drilling to determine when hydraulic connectivity has been achieved. The screen length, interval and aperture will be selected based on grain-size analysis and maximizing the length of the screen.
- c. Preliminary well yield estimates in Appendix F (forecast "E" and "F") suggest a potential yield of 88 - 150 USgpm per well depending on the pump set depth, actual transmissivity of sediments at that location, aquifer storativity and the effect of boundary conditions (physical and hydraulic). This will produce 12,600,000 – 21,600,000 USgal (48,000 - 82,000 m<sup>3</sup>) if operated continuously during a nominal 100 day irrigation season.
- i. To put the above annual volume into perspective, this is only 50 % greater than the volume discharged by EB2018-1 during the 2018 - 2019 curing and shut-in process described in Section 1.3 of this report.
- ii. Operation of a nominal Ø8" conventional well in this manner represents a very small incremental stress to the aquifer when compared to the 2018 - 2019 curing and shut-in process that resulted in only a 1½ psi(g) decline at EB2018-1 during that timeframe.
- d. The advantage of constructing one or more nominal Ø8" wells relates primarily to the lower capital cost when compared to a nominal Ø10" well. However, the submersible pump will need to remain above the K-packer in a well of this diameter given the nominal Ø6" diameter pump and motor required to achieve the potential yields. This may lead to a situation requiring the well screen to be set as deep as possible so that the pump can be set as deep as possible. This may work against productivity if the sediments in the lower portion of the well are less productive than the upper portion. The power cost of operating the irrigation well will likely offset the advantage of capital cost savings when compared to a Ø10" well.

- e. Drawdown is anticipated to reach the Lou Cook well after a nominal 100 day irrigation season, but the forecast suggests his well will remain flowing. Please refer to drawdown forecasts in Appendix F (see forecasts “E” and “F”).

2. Overshot Ø10” (Nominal) Wells

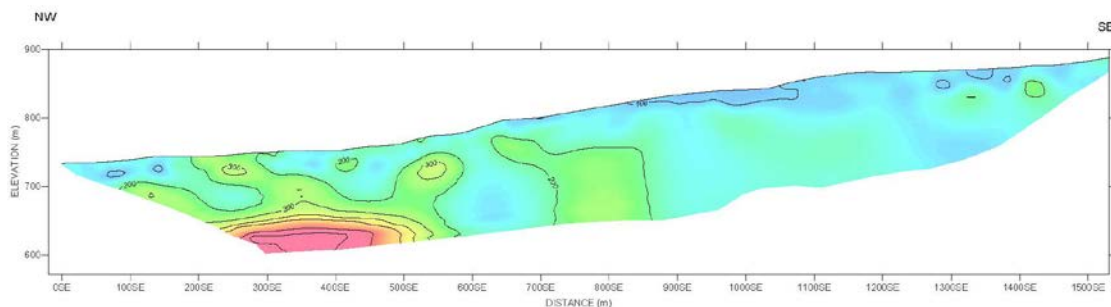
- a. Wellhead construction is comprised of a Ø20” surface caisson installed by excavation with two (2) adjoining Ø2” standpipes to a nominal depth of 6 ft-bgl (1.8 m) in the same manner as BH2018-1 construction. The surface seal will be comprised of a 16”x12” modified-Halliburton seal drilled and set to a nominal depth of 40 ft-bgl (12.2 m). The seal cannot be set any deeper due to the presence of shallow flowing artesian conditions.
- b. A nominal Ø10” production casing will be drilled to a nominal depth of 155 ft-bgl carefully noting the depth to produced water and any aquifer compartmentalization. BH2018-1 will be monitored during the drilling to determine when hydraulic connectivity has been achieved. The screen length, interval and aperture will be selected based on grain-size analysis and maximizing the length of the screen.
- c. Preliminary well yield estimates in Appendix F (forecast “G” and “H”) suggest a potential yield of 280 - 350 USgpm per well depending on the pump set depth, actual transmissivity of sediments at that location, aquifer storativity and the effect of boundary conditions (physical and hydraulic). This will produce 40,300,000 – 50,400,000 USgal (153,000 - 191,000 m<sup>3</sup>) if operated continuously during a nominal 100 day irrigation season.
  - i. To put the above annual volume into perspective, this is 300 % greater than the volume discharged by EB2018-1 during the 2018 - 2019 curing and shut-in process described in Section 1.3 of this report.
  - ii. Operation of a nominal Ø10” overshot well in this manner represents a large incremental stress to the aquifer when compared to the 2018 - 2019 curing and shut-in process. Careful monitoring of groundwater withdrawals and potential impacts will be required during the proposed two-year temporary authorization.
- d. The advantage of constructing nominal Ø10” wells relates primarily to the fact that the nominal Ø6 - Ø7½” submersible pump can be installed in an overshot

configuration below the well screen. This permits the well to be constructed independently of the pump infrastructure leading to maximum screen length and installation within the best interval of the aquifer sediments.

- e. Drawdown is anticipated to reach the Lou Cook well after a nominal 100 day irrigation season. The forecast suggests that his well may stop flowing. Please refer to drawdown forecasts in Appendix F (see forecasts “G” and “H”).

### 7.3 Geophysics

- a. The high cost of constructing any well emphasizes the need to ensure that the well is located in the best possible location to maximize the yield. Our experience in the Coldwater River and Nicola River valleys is very clear that the footprint of these types of aquifers is generally very narrow. Likewise, the zones of maximum permeability (i.e. the “sweet spot”) are also quite narrow.
- b. BCGW is very pleased with the sediments identified at EB2018-1, but we suggest that as part of moving forward, the Ranch consider performing an ERT geophysical survey to confirm this location, and potentially identify future drilling locations. This is considered especially important in light of recent FLNRORD comments regarding the Coldwater River irrigation supply. An example of output from a nearby investigation is shown. The red area is a narrow valley-bottom aquifer similar to the Ranch target.



### 7.4 PW2020-1 Surface Seal Curing, Shut-In and Pumping Test

- a. A pumping test of PW2020-1 will be performed after time is provided for the cement seals to cure and shut-in is completed. The rate of shut-in can be accelerated compared to EB2018-1 given that EB2018-1 will be used as a relief well for that procedure if PW2020-1 is drilled close enough. T. Carriou, P.Eng. (BCGW) will sign

and seal a brief field report confirming the well has been completed in a manner that meets the *Act and Regulation*, and note any current or potential future deficiencies.

- b. The first phase of testing will include a pressure-buildup test to gauge the rate of free-discharge available from the well for impoundment and livestock purposes. This generally requires about a week and Ranch staff will actively participate similar to previous testing. EB2018-1 and neighbouring wells will be closely monitored during this timeframe and results plotted against the Appendix F forecasts.
- c. The second phase of testing will include step-discharge and constant-discharge pumping tests of PW2020-1 using our conventional procedures.
  - i. The step-discharge test will gradually increase the pumping rate to a depth equal to 70 % of the aquifer thickness to gauge the potential for localized depressurization and transition to aquifer dewatering. Monitoring from PW2020-1 and EB2018-1 will be plotted against the Appendix F forecasts to determine any potential risks with operating the well in that manner. This generally requires about 1 - 2 days and will be directly supervised by BCGW.
  - ii. The constant-discharge test will pump the well at a steady rate for 3 - 5 days with the objective of allowing the drawdown to gradually increase over time and move through the transition to the top of the aquifer, again to test the potential for depressurization or dewatering. This information will be analyzed, reported to the Ranch / FLNRORD and used to recommend the yield of the well. Monitoring from PW2020-1 and EB2018-1 will be plotted against the Appendix F forecasts. Testing will be directly supervised by BCGW.

#### 7.5 Transition to Immediate Use

- a. BCGW recommends that the Ranch immediately begin to use the well upon the completion of testing under the auspices of a short-term authorization.
- b. The “wheel-line” irrigation system currently located directly adjacent to PW2020-1 will provide an excellent opportunity to use the water beneficially and also conduct a 100-day test of the well to gauge effects on the aquifer and understand what the boundary effects (positive or negative) actually are. BCGW recommends the use of a nominal 25 kW diesel generator during the first few weeks as electrical service is

installed. Connection to existing irrigation can be accomplished by above ground irrigation pipe.

- c. Results of the first summer of operation will inform the Ranch and FLNRORD regarding the opportunities and/ limits of the aquifer proposed for long-term groundwater development. BCGW has been very successful with this gradual phased approach at many irrigation projects. It also recognizes the expenses related to infrastructure required to support long-term changes to established irrigation systems.
- d. One advantage the ranch has is that EB2018-1 was drilled purposely next to the existing power service line. We recommend that PW2020-1 is not drilled too far away for ease of connection. That said, the Ranch is aware of the cost inherent with the BC Hydro heavy upgrade that will likely be required to connect the well.

## **9.0 RISKS AND UNKNOWN INHERENT TO GROUNDWATER SUPPLY DEVELOPMENT**

This report summarizes the work carried out to date in an effort to understand the potential for groundwater-based irrigation at the Ranch from the aquifer intercepted by EB2018-1. BCGW is optimistic that the identified aquifer is potentially suitable for that use. Actual well yields and interaction with nearby wells and surface water must be carefully monitored.

Development of a groundwater supply that will meet the short-term and long-term needs of the Ranch cannot be guaranteed. Forecasts and analyses described in this report are preliminary based on groundwater exploration and testing performed to date. The recommendations developed from those results do not express a guarantee, nor are they considered a warranty.

BCGW looks forward to working with the Ranch to develop groundwater-based irrigation. The Ranch must also exercise its responsibility to carefully scrutinize the results described in this report and determine if the recommendations outlined below are in their best interest.

## **10.0 RECOMMENDATION**

BCGW recommends that the Ranch proceed with drilling a nominal Ø10" irrigation well as described in Section 7.0 and implement curing, shut-in, testing and transition to immediate use per a two-year short-term use authorization. A brief ERT geophysical survey is recommended to confirm the PW2020-1 drilling location. T. Carriou, P.Eng. is willing to take on the role as the "person responsible" as defined in the *Act and Regulation*, as it pertains to construction of the flowing well.

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**11.0 AGENCY REQUESTS FOR FURTHER ANALYSIS, INTERPRETATION AND FORECASTS**

BCGW recognizes that groundwater development in this sensitive basin will be under intense scrutiny. We look forward to preparing additional correspondence to address any questions from FLNRORD to the degree that it can be supported by available information. T. Carriou, P.Eng. has no concern with preparing a *Letter of Assurance* to that agency confirming his role as the “person responsible” prior to construction of the anticipated PW2020-1 flowing well.

**12.0 CLOSURE**

Thank you for providing the opportunity for BCGW to conduct grassroots exploration of the flowing artesian aquifer system that underlies the River Ranch Cattle Company. We look forward to dialogue with FLNRORD and supporting you with the next phase of work.

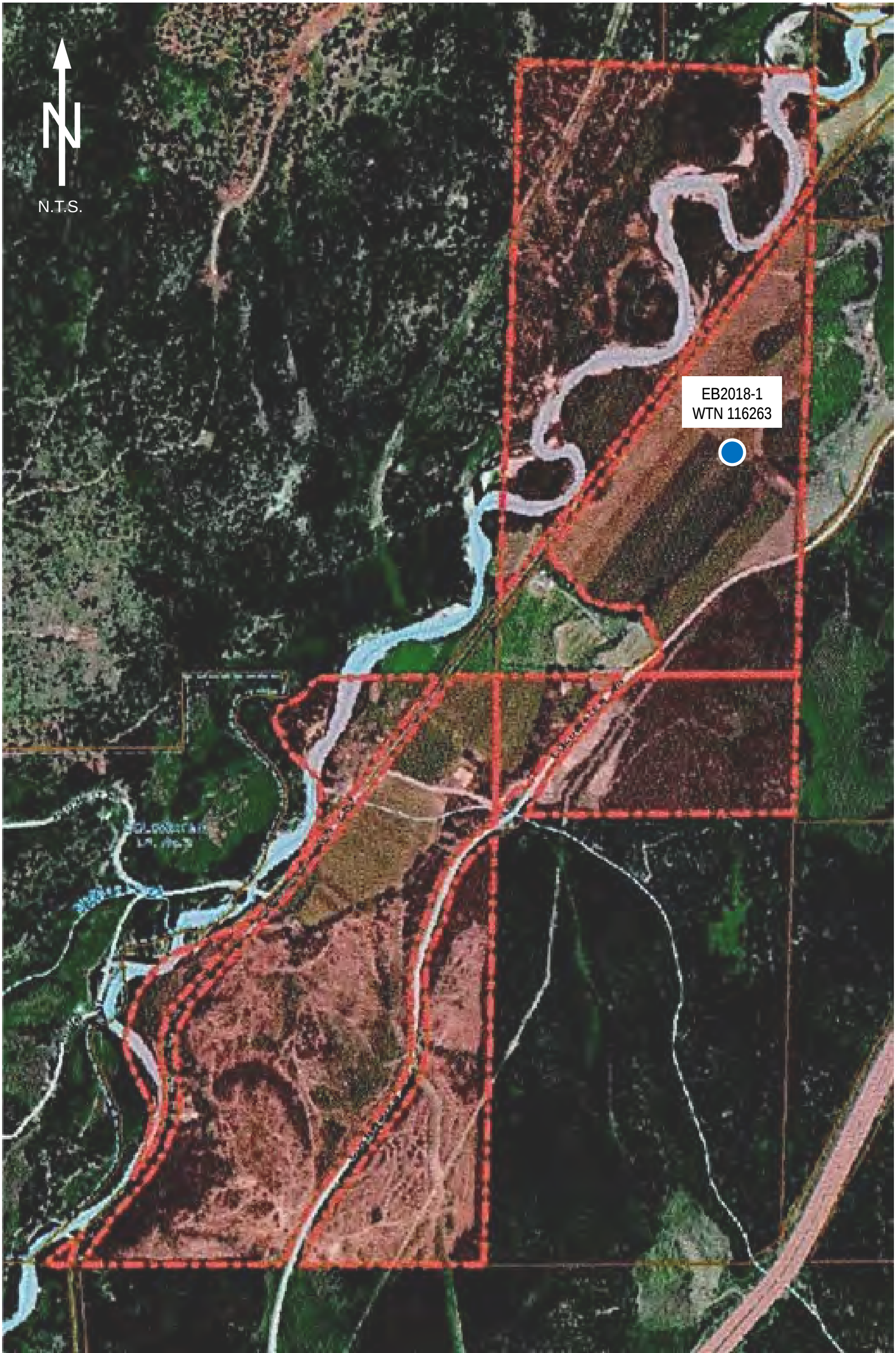
Sincerely,

**BC Groundwater Consulting Services Ltd.**



A handwritten signature in blue ink, appearing to read "T.M. Carriou", positioned to the right of the professional seal.

Thierry M. Carriou, M.Sc., P.Eng.  
Hydrogeologist (1993)



REF: PROVIDED BY THE RIVER RANCH CATTLE COMPANY (DATE)



MARCH 30<sup>TH</sup> 2020



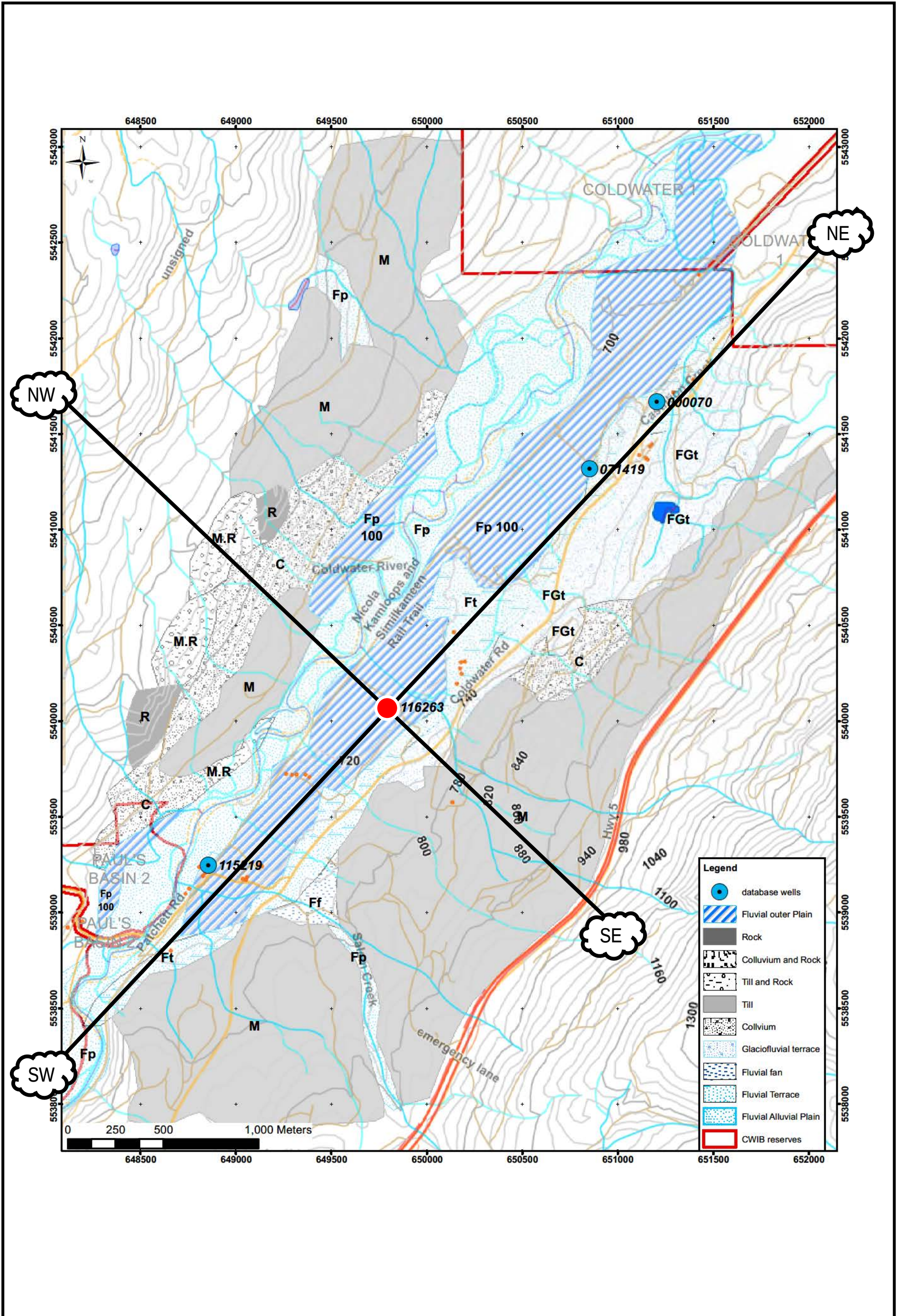
## MAP OF CURRENT RIVER RANCH LANDHOLDINGS

GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN  
INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE PUMPING TEST AND  
INTERPRETATION OF CONNECTIVITY WITH THE COLDWATER RIVER

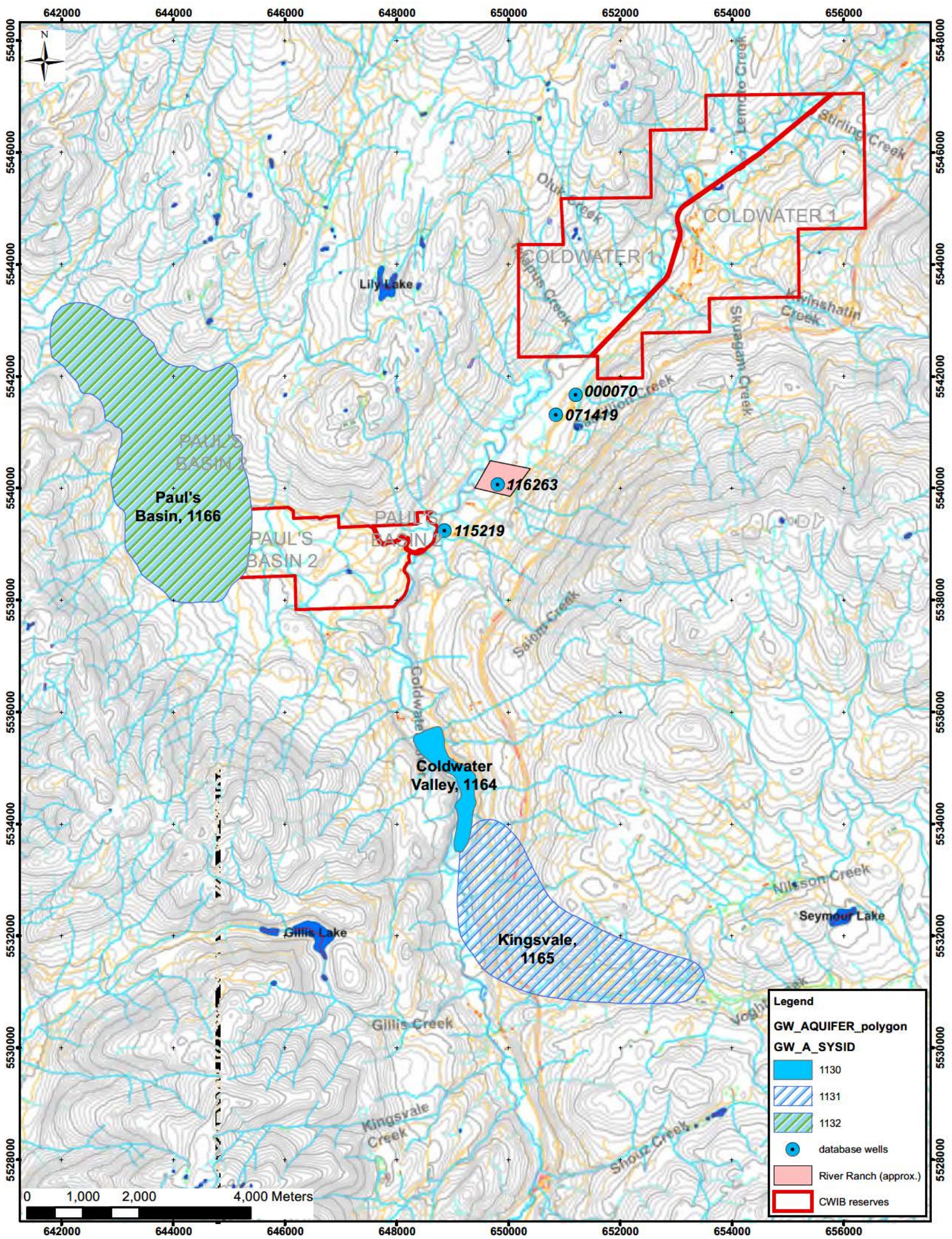
FILE 18007.2

CLIENT RIVER RANCH CATTLE COMPANY

FIG. 1



REF: FROM BGC ENGINEERING INC FOR TRANS MOUNTAIN PIPELINE (MAP #42 OF 54)



REF: DATA BC WEBSITE



MARCH 30<sup>TH</sup> 2020



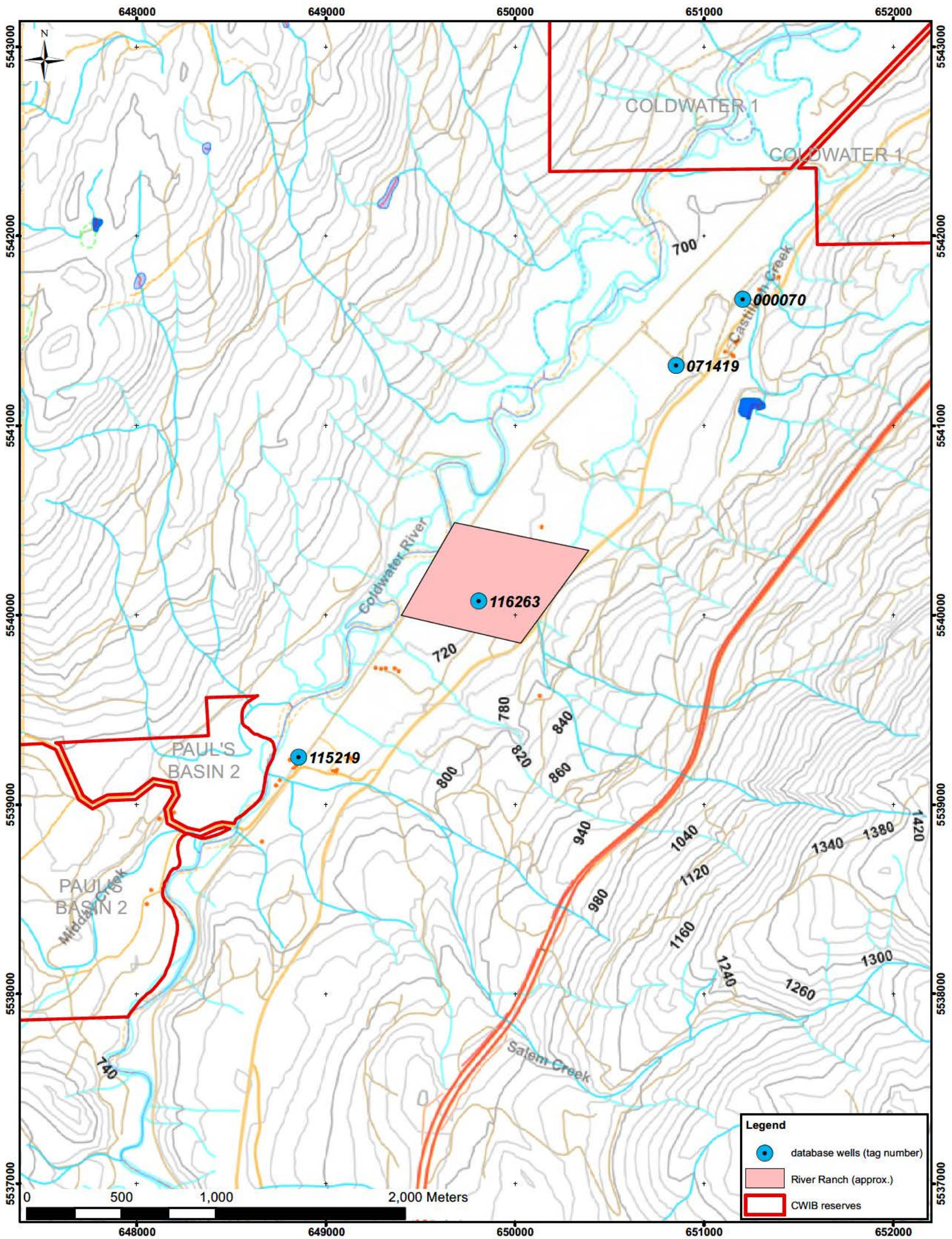
AQUIFERS AS DELINEATED BY FLNRORD

GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN  
INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE PUMPING TEST AND  
INTERPRETATION OF CONNECTIVITY WITH THE COLDWATER RIVER

FILE 18007.2

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FIG. 3



REF: DATA BC WEBSITE

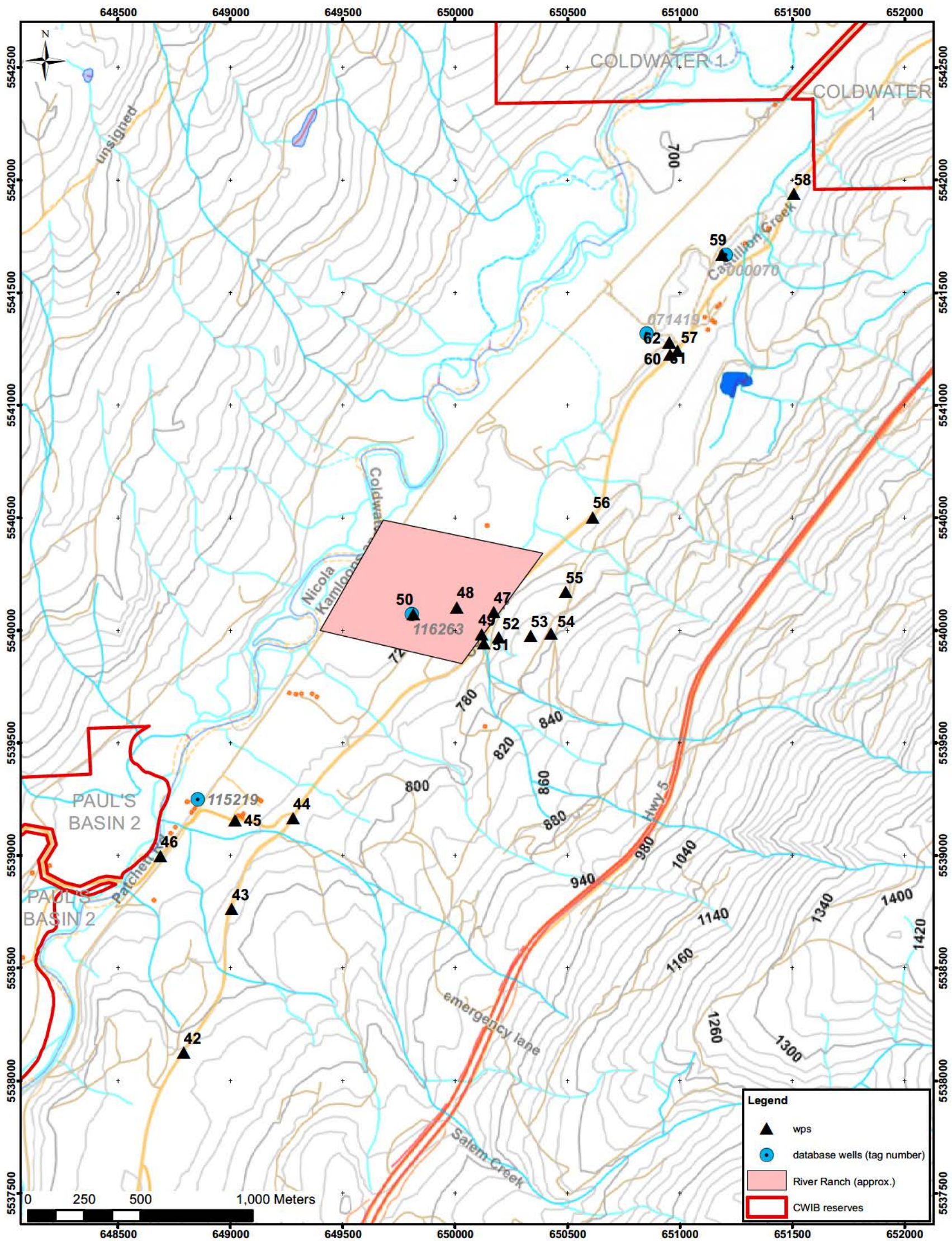


MARCH 30<sup>TH</sup> 2020



REGISTERED WATER WELLS RECORDED WITHIN AND AROUND THE AREA OF INTEREST

GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE PUMPING TEST AND INTERPRETATION OF CONNECTIVITY WITH THE COLDWATER RIVER



REF: DATABC WEBSITE



MARCH 30<sup>TH</sup> 2020



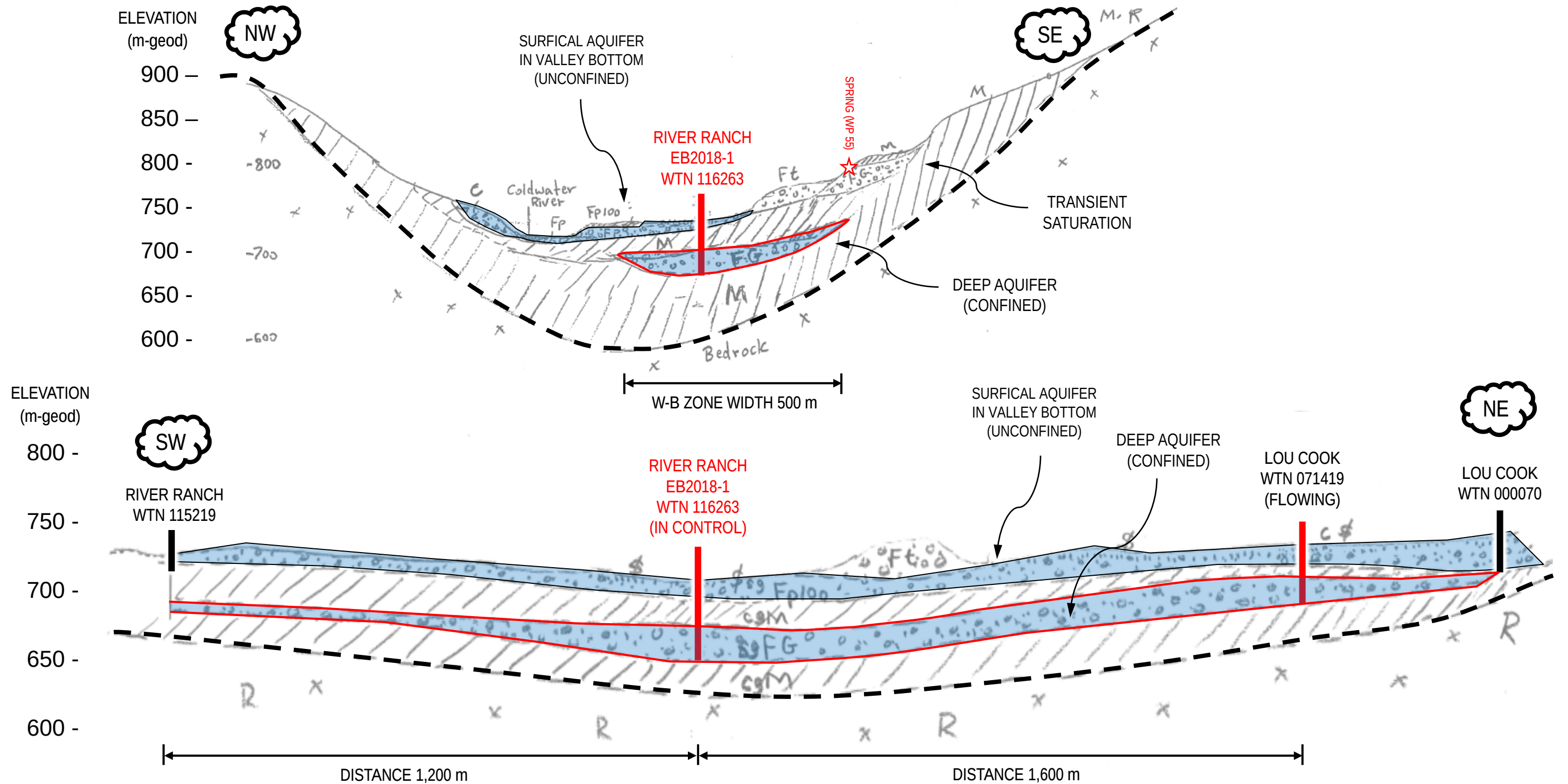
RECONNAISSANCE WAYPOINT (WP) LOCATIONS

GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN  
INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE PUMPING TEST AND  
INTERPRETATION OF CONNECTIVITY WITH THE COLDWATER RIVER

FILE 18007.2

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FIG. 5



### CERTIFICATION

BC GROUNDWATER CONSULTING SERVICES LTD. (BCGW) HAS BEEN RETAINED BY THE CLIENT TO PREPARE THIS GEOLOGIC CROSS-SECTION TO SUPPORT GROUNDWATER-BASED IRRIGATION PLANNING. THIS PLAN HAS ALSO BEEN PREPARED IN SUPPORT OF A SHORT-TERM GROUNDWATER USE AUTHORIZATION APPLICATION, SPECIFICALLY INTENDED TO DETERMINE THE SUSTAINABLE RATE OF UTILIZATION BY PUMPING. BCGW IS OF THE OPINION THAT THESE SECTIONS PROVIDE A REASONABLE REPRESENTATION OF THE AQUIFER CURRENT INTERCEPTED BY THE RIVER RANCH EXPLORATORY BOREHOLE EB2018-1.



MARCH 30<sup>TH</sup> 2020



### CROSS SECTION THROUGH COLDWATER VALLEY AT EB2018-1 (WTN 116263)

GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN  
INCLUDING ANALYSIS OF EXPLORATORY BOREHOLE PUMPING TEST AND  
INTERPRETATION OF CONNECTIVITY WITH THE COLDWATER RIVER

FILE 18007.2

CLIENT RIVER RANCH CATTLE COMPANY

FIG. 6

## ATTACHMENTS

## **APPENDIX A**

### **CORRESPONDENCE**



August 20, 2018

River Ranch Cattle Company  
40975 No. 2 Road  
Abbotsford, BC  
V3G 2R4

Attention: Dave Vanderwal, Landowner

Project: 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

Subject: **WORK PROGRAM AND DAILY REPORT (JULY 06 2018)**

---

Dear Dave,

## 1.0 BACKGROUND

Thank you for providing the opportunity to conduct a site visit on July 6, 2018 for the purpose of staking three (3) potential drilling locations at the River Ranch. BC Groundwater Consulting Services Ltd. ("BCGW") has attached the July 6, 2018 daily report summarizing the tasks completed on that day, which included:

- Documenting the existing surface water intake on the Coldwater River;
- Conducting general geologic reconnaissance of the proposed well drilling area;
- Reviewing available nearby well construction records (provincial database and our archives);
- Inspection of nearby wells to determine if flowing artesian conditions occur nearby;
- Staking three (3) potential well drilling locations; and
- Preparing the daily report.

## 2.0 RECOMMENDATION

BCGW proposes to work alongside River Ranch to successfully develop a new high-capacity groundwater source for the purpose of irrigation. As you know, the licensing of irrigation wells is

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becoming more difficult in the Coldwater Valley due to lower observed flows and increased summer water temperatures in the Coldwater River. This Phase 1 work plan proposes that the ranch explore for groundwater as far from the river as possible in an effort to reduce the potential for hydraulic interaction between the future well and river. This has proven a successful strategy at other parcels within the valley.

With increased setback from the river comes the potential for drilling a well that is flowing artesian. It is important that wellheads are constructed to reduce / eliminate the risk of out-of-control artesian discharge. Note that we have inspected several wells within the valley that are currently out-of-control due to improper wellhead construction. Those wells are a liability for the owner and are not eligible for licensing until such time as they are repaired, which may or may not be feasible (i.e. often the well must be cemented closed and re-drilled). Artesian wells are a great asset if constructed properly, as they can often be operated in a manner which reduces long-term power costs.

BCGW proposes to drill one (1) or two (2) exploratory Ø 6 inch wells at the staked locations, each constructed with a wellhead considered appropriate for that location to keep the well in control if flowing artesian conditions are encountered. There are many benefits with drilling two wells at this time, including: (a) locating the most productive part of the aquifer; and (b) providing the ability to monitor the aquifer in support of a future license application. However, we will look to the River Ranch to ultimately make the decision if one or two of the staked locations will be drilled at this time. We propose to complete each well with temporary 8 foot (2.2 m) screens at the time of drilling to immediately commence monitoring and testing as the next phase of this program.

### **3.0 SCOPE OF SERVICES (PHASE 1)**

BCGW proposes to provide the following services to River Ranch:

1. Identify potential drilling locations, including the potential pros and cons of each site. This has already been completed and is presented in the attached daily report.
2. Sample the current surface water in preparation for comparison to groundwater that will be collected from the exploration wells. This forms the first stage of determining if the groundwater intercepted by the exploratory boreholes is hydraulically connected to the river.
3. Prepare a well drilling and discharge plan outlining specifications for the drilling contractor. The plan will include artesian control wellhead designs tailored for JR Drilling Central.
4. Supervise the well drilling, collect groundwater samples and drill cuttings for analysis. The groundwater samples will further inform us regarding the potential for hydraulic interaction

with the river. The cuttings are used to design the future high-capacity production well screen.

5. Select temporary well screens, in the field, for installation during the program (see above).
6. Document the rate of discharge from the drilling rig and sample water quality from the test wells.
7. Conduct an elevation survey of the surface water, drilled exploratory borehole groundwater levels and install dataloggers into the boreholes. It is important to begin collecting information about the hydraulic connectivity between the river and groundwater as soon as possible.
8. Provide daily reports for all activities directly supervised by BCGW.
9. Provide a brief wrap-up letter outlining your next steps, specifically:
  - What are the likely production zone depths ?
  - Is it likely that groundwater is available in quantities great enough to meet your irrigation demands ?
  - How should the irrigation well(s) be constructed to meet your irrigation demands ?
  - Does the initial information suggest possible hydraulic interaction between the aquifer and river ? If so, might the rate of irrigation influence the amount of interaction ? How might this affect your future groundwater license application ?
  - Is it worthwhile to test the exploratory boreholes now, or should the Ø 6 inch exploratory boreholes be converted into Ø 8 inch production wells using the wellheads constructed during exploratory drilling ?
  - What are the next steps of the project ? Should a high-capacity well be drilled right away, or should an application for a "Short Term Use" groundwater authorization be started with the *Ministry of Forests, Lands and Natural Resource Operations* prior to drilling a large production well ?

#### **4.0 BC GROUNDWATER BUDGET**

The proposed budget for BCGW to conduct this work is \$ 8,000 professional fees plus \$ 3,000 direct costs for lab analysis of the groundwater samples, drill cuttings, mileage and live-out costs. This assumes that both proposed locations are drilled. Taxes will be added.

This professional fee budget includes the following:

- One day site visit for the purpose of staking potential well drilling locations (completed).
- Preparation of a drilling and discharge plan, including artesian wellhead design.
- Collection of a water sample from the river.
- Supervision of the contractor and logging results of the first drilling location.
- Supervision of the contractor and logging results of the second drilling location.
- Selection of a temporary screen in the field (BCGW responsibility).
- Supervision of screen installation and development by the drilling contractor.
- Completion of an elevation survey of the river and wells.
- Preparation of daily reports and a brief wrap-up letter.

Direct costs include the following samples, analysis and supplies:

- One (1) water sample from the river.
- Four (4) water samples from each of the drilling locations.
- Installation of one (1) permanent datalogger in each borehole plus a barometric logger.
- Live out allowance and mileage.

The cost can be reduced to \$ 6,000 professional fees plus \$ 2,000 direct costs (plus taxes) if the River Ranch wishes to drill only one exploratory well. However, in our opinion, we recommend that two locations are drilled given the geologic variability of the area.

## 5.0 CONTRACTOR ESTIMATES

We have requested estimates from JR Drilling Central on your behalf to drill the two locations identified in the attached daily reports as Site B (340 feet or 105 m east of the river) and Site C (1,000 feet or 300 m east of the river). Based on experience within the valley, Site C has the greatest likelihood of being a flowing artesian well. We recommend drilling that location first because it is furthest from the river. We have assumed a maximum depth of 250 feet of exploratory drilling to the bedrock contact at each proposed location. No bedrock exploration is planned due to the lower probability of intercepting adequate groundwater supply in the bedrock as compared to the overburden. The JR Drilling Central estimate (# 1541) follows this daily report.

BCGW recommends that Site C is drilled first using a cemented wellhead to provide as much artesian control as possible. Note that the cemented wellhead will be of appropriate diameter that the planned Ø 6" exploration casing can be withdrawn at a future date and replaced with a production Ø 8" casing without replacing the wellhead. An option also exists to explore with Ø 8" production casing

|                                                                                                                                                                                                                                                  |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Cemented Wellhead (Ø 12" x 10")                                                                                                                                                                                                                  | \$ 24,857                |
| <ul style="list-style-type: none"><li>Ø 16" caisson, Ø 12" (60 ft) outer casing; Ø 10" (60 ft) surface casing; cemented prior to commencing exploratory drilling; suitable for moderate artesian pressures in the range of 5 - 10 psi;</li></ul> |                          |
| Exploratory Drilling (Ø 6 inch casing)                                                                                                                                                                                                           | \$ 10,755                |
| <ul style="list-style-type: none"><li>Includes 250 ft of exploration drilling; supply and installation of a 4 ft screen and development (4 hours).</li></ul>                                                                                     |                          |
| Sub-total                                                                                                                                                                                                                                        | <b>\$ 35,611 + Taxes</b> |

BCGW recommends that Site B is drilled second using an augmented conventional surface seal (to reduce costs) if artesian pressures are expected to be less than 2 - 3 psi based on the Site C results. Note that this wellhead is also of an appropriate diameter that the Ø 6" exploration casing can be withdrawn at a future date and replaced with a production Ø 8" casing if it can be completed with a temporary mechanical seal. An option also exists to explore with Ø 8" production casing.

|                                                                                                                                                              |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Augmented Surface Seal (Ø 10 inches)                                                                                                                         | \$ 8,663                 |
| <ul style="list-style-type: none"><li>Ø 10" (60 ft) surface casing; cemented or grouted <u>after</u> completing exploratory drilling</li></ul>               |                          |
| Exploratory Drilling (Ø 6 inch casing)                                                                                                                       | \$ 10,461                |
| <ul style="list-style-type: none"><li>Includes 250 ft of exploration drilling; supply and installation of a 4 ft screen and development (4 hours).</li></ul> |                          |
| Sub-total                                                                                                                                                    | <b>\$ 19,124 + Taxes</b> |

Should budget limitations restrict drilling to just one location, BCGW recommends drilling Site B using a fully cemented wellhead for artesian control. We are available to coordinate the drilling contractor and prepare contractor agreements on your behalf at 5 % contractor markup.

## **6.0 CLOSURE**

We look forward to assisting you with this assignment. Please contact us should you have any questions or require additional information. BCGW will require signature of our Retainer Agreement and a \$ 5,000 deposit to commence work. The balance will be paid at the completion of exploratory drilling.

Sincerely,

**BC Groundwater Consulting Services Ltd.**

A handwritten signature in blue ink, appearing to read 'T. Carriou', followed by a period.

Thierry M. Carriou, M.Sc., P.Eng  
Hydrogeologist (1993)





## MEMORANDUM

TO: Dave Vanderwal, Landowner (River Ranch Cattle Company)

CC: Kelly Pelletier, QWD, President (JR Drilling Central)

DATE: January 9, 2019

FROM: Thierry M. Carriou, M.Sc., P.Eng

PROJECT: 18007.1 River Ranch Cattle Company  
Professional Well Development Services

SUBJECT: **RECOMMENDED PUMPING TEST OF THE NEW ARTESIAN EXPLORATORY WELL (EB2018-1)**

---

Dave,

BC Groundwater Consulting Services ("BCGW") has discussed licensing requirements for the Coldwater River Valley with the Ministry of Forests, Lands and Natural Resource Operations ("FLNRO"). The artesian conditions at the borehole suggest partial or full disconnection from the Coldwater River. As you know, licensing approvals along the Coldwater River will be very stringent and will require ongoing consultations with FLNRO.

As we discussed, the River Ranch Cattle Company ("RRCC") would like to pursue irrigation well drilling and construction in 2019. There will remain some level of uncertainty regarding licence approvals until aquifer testing is carried out. BCGW recommends that RRCC carry out a pumping test in the next two months to gather adequate information about the aquifer water quality to conduct geochemical analysis to determine if there is a similarity to aquifer water chemistry measured from neighbouring wells. We have also installed a standpipe directly adjacent to your well for the purpose of determining if there is a potential for hydraulic interconnection with a shallow/surficial aquifer present at the site. In discussing the project with JR Drilling Central ("JRDC"), we understand that

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payment for the exploratory well has been completed. BCGW recommends that we proceed with well shut-in bringing pressures up to full if you are prepared to conduct the pumping test as recommended above. The pumping test duration will be 24 – 48 hours depending on the well response and will provide information directly applicable to determining the size of the future production well and casing diameters that will be required for project costing. We are hopeful it will also provide enough information that FLNRO will be amenable to you proceeding with production well construction this year. This memo has been copied to JRDC and they will contact you shortly with regards to carrying out the pumping test.

Pumping tests in British Columbia must be carried out by a certified pump installer for the purpose of licensing and submersible pump installation. For this reason, BCGW will operate under the umbrella of JRDC to carry out this test. We will provide our manpower and crews to JRDC, who will in turn deploy the pump, conduct the step-test with us and then recover the pump after the completion of testing. We trust you find this process acceptable as we wish to ensure that all regulations are closely followed, so as to support a positive licence application.

If you are in agreement with the above, we request that you please forward an email to BCGW and JRDC that you wish to proceed with the testing and specify dates that would be suitable given that calving season is close at hand. At the completion of the pumping test, we will provide daily reports to JRDC for submittal to River Ranch at which time we can make decisions regarding what follow-up analysis and reporting is required in support of a licence application.

Best regards,

**BC Groundwater Consulting Services Ltd.**

A handwritten signature in blue ink, appearing to read 'Thierry M. Carriou'.

Thierry M. Carriou, M.Sc., P. Eng.  
Hydrogeologist (1993)



## **APPENDIX B**

### **BCGW FIELD REPORTS**



JUL 06 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## DAILY PROGRESS REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch")  
Coldwater Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase1)

**DAILY FOCUS:** *Conduct a geologic reconnaissance of the site and stake three (3) potential exploratory borehole drilling locations.*

**CONTRACTORS:** ☒ BC Groundwater (BCGW) ☐ Pump Contractor  
☐ Drilling Contractor ☐ Other

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** D. Vanderwal (Ranch); T. Carriou (BCGW); C. Morrison (BCGW); and R. Ciriani (BCGW)

| COMPANY | NAME                | POSITION               | TIME IN | PPE | TIME OUT | SAFETY COMMENTS OR CONCERNS   |
|---------|---------------------|------------------------|---------|-----|----------|-------------------------------|
| BCGW    | T. Carriou, Q, prof | Qualified Professional | 11:00   | Yes | 12:50    | No immediate safety concerns. |
| BCGW    | C. Morrison.        | Field Technician       | 11:00   | Yes | 12:50    |                               |
|         |                     |                        |         |     |          |                               |
|         |                     |                        |         |     |          |                               |
|         |                     |                        |         |     |          |                               |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

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## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT        | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT) |
|---------|-------------|------------|---------------------------------------|
| BCGW    | Pickup (1)  | Yes        |                                       |
| BCGW    | Trailer (1) | Yes        |                                       |
|         |             |            |                                       |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

T. Carriou and C. Morrison mobilized to site and arrived at 11:00. Authorization was received from the on-site manager (Paul) to access the site, conduct reconnaissance and stake potential drilling locations. BCGW drove to the irrigation intake and pumphouse on the Coldwater River. Results of potential drilling location selection follows.





### **STAKED DRILLING LOCATION “SITE A” (WEST)**

#### **ADJACENT TO THE COLDWATER RIVER**

UTM Zone 10U 5 540 290 mN 649 581 mE 720 mEL  $\pm$  3 m

Site A was staked adjacent to the existing irrigation pumphouse and intake on the Coldwater River. This location is 115 ft (35 m) from the river adjacent to existing 3-phase power service pole.

This location is suitable for the construction of an irrigation well, however, riverbank erosion may encroach on this site over the next 10 - 20 years. The well must be completed above the 1:200 year flood level for registration and licensing.

BCGW first impressions are that an unconfined aquifer likely underlies this location and that it is directly hydraulically connected to the river. It is unknown if a deeper confined aquifer (with less connection to the river) is present. The depth to bedrock is presently unknown.

A potential drilling location was marked with orange paint. Access is very good any no improvements are required for heavy equipment. BCGW considers this a backup location in the event that drilling at Site B or Site C is unsuccessful.



### **STAKED DRILLING LOCATION “SITE B” (CENTRAL)**

#### **MIDWAY BETWEEN THE RIVER AND COLDWATER ROAD**

UTM Zone 10U 5 540 196 mN 649 644 mE 716 mEL  $\pm$  2 m

This location is situated about 340 ft (105 m) east from the existing pumphouse and river. It is located adjacent to a 3-phase power service pole.

This location is ideal for the construction of an irrigation well. Riverbank erosion is not considered a potential concern, but the well must be completed to the 1:200 year floodplain level for registration and licensing.

BCGW impressions are that a shallow unconfined aquifer directly connected to the river is also located at this location. This location is located about one third of the flood plain away from the river. Experience suggests a good probability of intercepting a deeper confined aquifer at this location (with much less connection to the river). The depth to bedrock is presently unknown.

A potential drilling location was marked with orange paint on the power service pole. Access is very good and minimal improvements are required for heavy equipment. BCGW considers this a primary drilling location.



**STAKED DRILLING LOCATION "SITE C" (EAST)**

**BELOW COLDWATER ROAD (EASTERN LOCATION)**

UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL  $\pm$  2 m

This location is situated about 1,000 ft (300 m) east from the existing pumphouse and river. It is located adjacent to a 3-phase power service pole.

This location is ideal for the construction of an irrigation well. Riverbank erosion and flooding are not considered a potential concern.

BCGW is unsure if a shallow unconfined aquifer underlies this site. If it does, it is unlikely to be directly connected to the river. This location is located at the maximum distance from the river. Experience suggests a good probability of intercepting a deeper confined aquifer at this location with little to no river connection. The depth to bedrock is presently unknown.

A potential drilling location was marked with orange paint on the power service pole. Access is very good and minimal improvements are required for heavy equipment. BCGW considers this a primary drilling location

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENT:** ☒ No ☐ Yes





OCT 09 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Meet with JR Drilling Central to review program details for the purpose of developing a drilling and discharge plan.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION                | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|-------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional  | 10:00   | Yes | 12:00    |          |
| JRDC    | K. Pelletier, QWD  | Qualified Well Driller. | 11:00   | Yes | 12:00    |          |
|         |                    |                         |         |     |          |          |
|         |                    |                         |         |     |          |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

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## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT    | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|---------|------------|------------------------------------------------------------------|
| BCGW    | Pickup  | Yes        | Transport                                                        |
| BCGW    | Trailer | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | Pickup  | Yes        | Transport                                                        |
|         |         |            |                                                                  |
|         |         |            |                                                                  |
|         |         |            |                                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW departed from McLure and travelled to Merritt via Hwy 5 arriving at 10:00 with very wet road conditions. T. Carriou (BCGW) accessed the ranch via Coldwater Road and Patchett Road. The two proposed drilling locations were accessed via the former KVR route and travel across the hayfield. K. Pelletier (JRDC) was satisfied with access to both locations.

### EB2018-1 (SITE "C") WELL DRILLING PLAN

Exploratory borehole EB2018-1 will be drilled at Site C located 1,000 ft southeast of the Coldwater River at the base of the hillside below Coldwater Road. RRCC has agreed with BCGW work program recommendations and the JRDC estimate to construct the exploratory borehole with a cemented  $\varnothing$  12" x 10" surface seal to control flowing artesian conditions in the low to moderate shut-in pressure range of 5 - 10 psi, should they occur. The formal drilling plan and cemented surface seal schematics are currently in preparation.

The wellhead will be of an appropriate diameter that the  $\varnothing$  6" exploration casing can be withdrawn at a future date and the borehole enlarged and completed with a  $\varnothing$  8" production casing if conditions are suitable. An 4 ft interim screen will be installed and developed, which is considered to be especially important to retain formation sediments and prevent piping if the well is flowing.

### EB2018-1 (SITE "C") DISCHARGE PLAN

Drill cuttings and groundwater from EB2018-1 will be discharged southeast of the drill site into a shallow swale. BCGW will survey that swale tomorrow and identify where the runoff will likely travel to and terminate. The formal discharge plan showing overland routes is currently in preparation pending topographic survey results tomorrow.

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 09 2018 (Page 3 of 3)

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**ACTION ITEMS**

1. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).
2. Conduct an elevation survey of the swale directly southeast of EB2018-1 (Site C) to confirm and stake the direction that produced water from drilling will likely travel.
3. Confirm and stake the likely point of decant from the swale and determine if or where it enters the existing northeast - southwest KVR ditch located between the hayfields and river.
4. Determine likely locations of ponding or infiltration along the conveyance route if flowing artesian conditions occur during drilling at a nominal 50 USgpm (working assumption).
5. Determine likely locations of ponding or infiltration along the conveyance route if intentional diversion is required for 30 days at a nominal 50 USgpm (working assumption) while the cement seals cure. The total discharge volume is estimated at 2.1 Mgal based on this working assumption.
6. Identify the likely fate of produced water (i.e. infiltration, decant, etc) and its location relative to any environmentally sensitive areas.
7. Issue a working copy of the Drilling and Discharge Plan to JRDC and RRCC.
8. Commence surface seal construction at EB2018-1 (Site C) in preparation for exploratory drilling.

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☒ No ☐ Yes





OCT 10 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Complete a topographic survey of the discharge route.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☐ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 09:30   | Yes | 11:10    |          |
| JRDC    | C. Morrison        | Field Technician       | 09:30   | Yes | 10:30    |          |
|         |                    |                        |         |     |          |          |
|         |                    |                        |         |     |          |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

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**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
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## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT    | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|---------|------------|------------------------------------------------------------------|
| BCGW    | Pickup  | Yes        | Transport                                                        |
| BCGW    | Trailer | Yes        | First aid station, fire protection, equipment and sampling gear. |
|         |         |            |                                                                  |
|         |         |            |                                                                  |
|         |         |            |                                                                  |
|         |         |            |                                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW departed from Merritt via Hwy 5 arriving at 09:30 with dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") DISCHARGE PLAN

Exploratory borehole EB2018-1 will be drilled at Site C located 1,000 ft southeast of the Coldwater River at the base of the hillside below Coldwater Road. Drill cuttings and groundwater will be discharged southeast of the drill site into a shallow swale at Waypoint # 6 (WPT 06) as shown in the attached map.

BCGW completed a topographic survey of that swale today. Results suggest that ponding at WPT 06 may occur prior to decanting towards the north following the route WPT 07-08-09-10-13, eventually discharging into the established wetland complex northeast of WPT 13. Please note that standing water is already present at WPT 13.

In the event of a flowing artesian condition, the discharge will be conveyed to WPT 06 and allowed to freely flow northwards to the established wetland for a period of 30 days while the cement seal fully cures. A nominal volume of 72,000 USgal per day will be discharged if artesian overflow is in the order of 50 USgpm totaling 2,100,000 USgal. That rate is similar to a known artesian well located within 2 km of this site on the same side of the valley. Temporary westward trenching from the outlet of the swale (WPT 13) to the existing east KVR ditch may be required if flows are in excess of 50 USgpm to provide an opportunity for infiltration and disposal.

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 10 2018 (Page 3 of 3)

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**ACTION ITEMS**

1. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).
2. Issue a working copy of the *Drilling and Discharge Plan* to JRDC and RRCC.
3. Commence surface seal construction at EB2018-1 (Site C) tomorrow in preparation for cementing on Friday and exploratory drilling starting on Monday.

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:**    ☐ No    ☒ Yes    Well locations and discharge route.

# RIVER RANCH CATTLE CO.

BCGW FILE 18007.1

Well Locations and Discharge Route  
October 9, 2018

## Legend

 WPT

 RRCC (Site A)

 WPT 13

Kettle Valley Rail Trail

 WPT 10

 RRCC (Site B)

 WPT 09

 WPT 08

 WPT 07

RRCC (Site C)   WPT 06

Coldwater Rd  


Google Earth

Image © 2018 DigitalGlobe

© 2018 Google

800 ft





OCT 11 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Complete the surface seal design and water management plan, mobilize to site, complete artesian well pre-construction and drill the surface casing.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 13:00   | Yes | 16:30    |          |
| JRDC    | K. Pelletier       | Qualified Well Driller | 14:00   | Yes | 16:30    |          |
| JRDC    | J. Opper           | Qualified Well Driller | 12:30   | Yes | 16:30    |          |
| JRDC    | Shawn              | Helper                 | 12:30   | Yes | 16:30    |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 11 2018 (Page 2 of 3)

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | Yes        | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW departed from Merritt via Hwy 5 arriving at 13:00 with dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") WATER MANAGEMENT PLAN

Exploratory borehole EB2018-1 will be drilled at Site C located 1,000 ft southeast of the Coldwater River at the base of the hillside below Coldwater Road. Discharge from drilling activities will be conveyed north to a low-point as shown (Fig. 1). Please note that standing water is already present at that location. Short-term artesian discharge will be conveyed for up to 30 days in the same manner, if required, providing adequate time for the cement surface seal to cure prior to commencing shut-in procedures. All drill cuttings and groundwater discharge will be directed southeast into a shallow swale (Fig 2).

### EB2018-1 (SITE "C") SURFACE SEAL CONSTRUCTION PLAN

Flowing artesian wells are common in the Coldwater Valley. The nearest artesian wells are WTN 90076 (1.6 km north) and WTN 71419 (1.8 km south). WTN 90076 encountered flowing conditions at a depth of 40 ft-bgl below a clayey silt confining layer, whereas WTN 71419 encountered flowing conditions at a depth of 62 ft-bgl below cemented till and boulders. Please note the later well is currently uncontrolled and flows outside of the casing at a considerable rate.

T. Carriou (BCGW) has specified a circulated  $\emptyset$  12" x  $\emptyset$  10" cement surface seal for EB2018-1 to reliably control artesian pressures. We have successfully used this seal to control artesian pressures in the range of 5 - 10 psi and believe this to be adequate for this location. Designs have been issued to JRDC (Figs. 3 and 4).

## **SURFACE SEAL CONSTRUCTION**

Construction of the shallow Ø 16" steel caisson, Ø 2" standpipe and engineered backfill commenced at 13:00 and was completed by 15:00. The Ø 12" steel casing was overlapped to the base of the caisson and drilled to a depth of 16 ft-bgl. The drill tender was filled with water in preparation for drilling and cementing tomorrow.

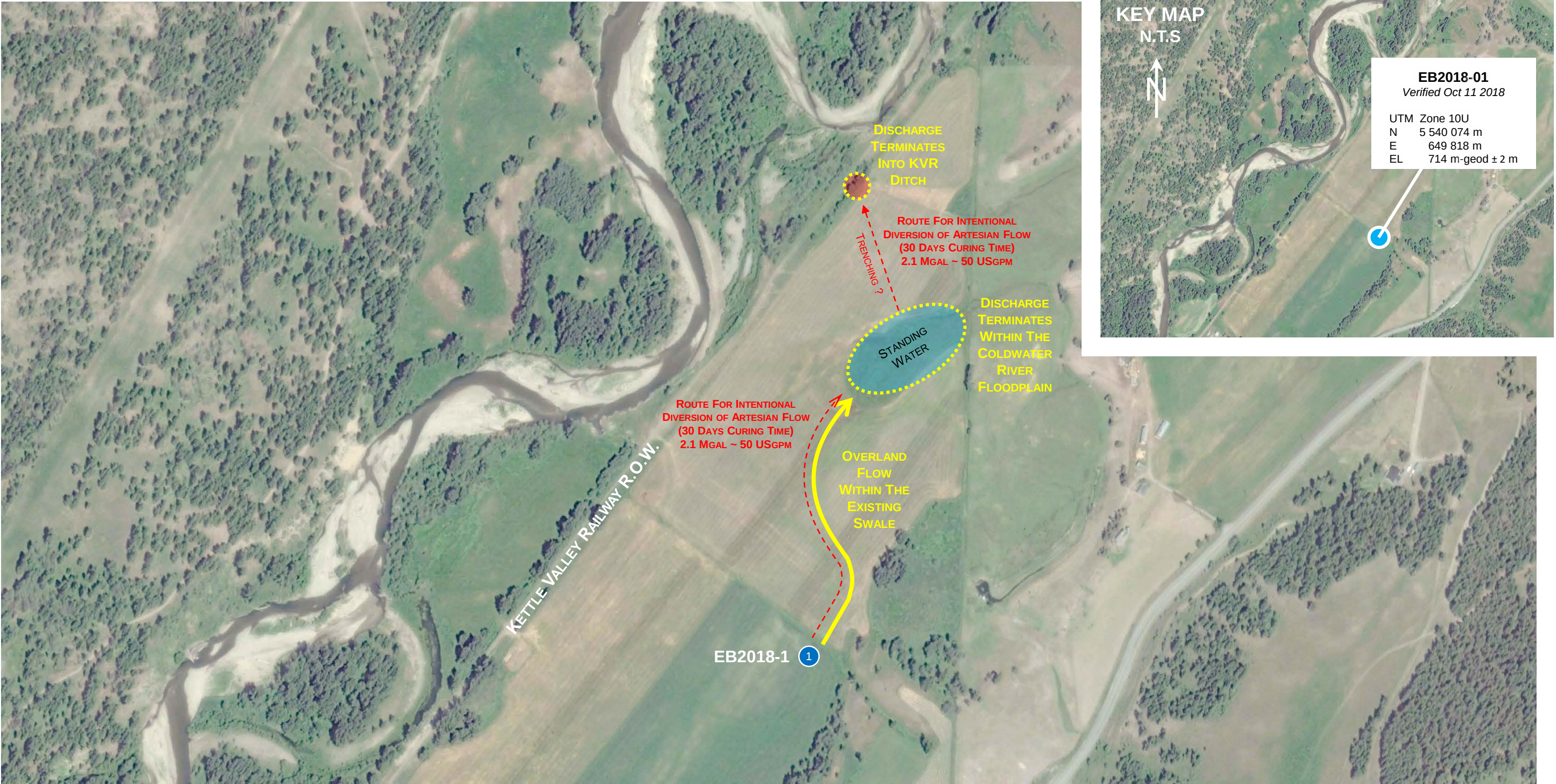
## **ACTION ITEMS**

1. Flush the EB2018-1 Ø 12" steel casing with water to clear debris from air drilling today.
2. Continue drilling the surface casing and proceed with construction of the EB2018-1 surface seal.
3. Provide the weekend for the cement to soft-set.
4. Drill exploratory Ø 6" casing to the budget depth of 250 ft.
5. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☐ No ☒ Yes

Fig. 1 Water Management Outline Plan  
Fig. 2 Drill Site Layout and Discharge Plan  
Fig. 3 Artesian Well Pre-Construction Detail  
Fig. 4 Artesian Surface Seal Construction (Cement)



**OBJECTIVE AND LIMITATION**

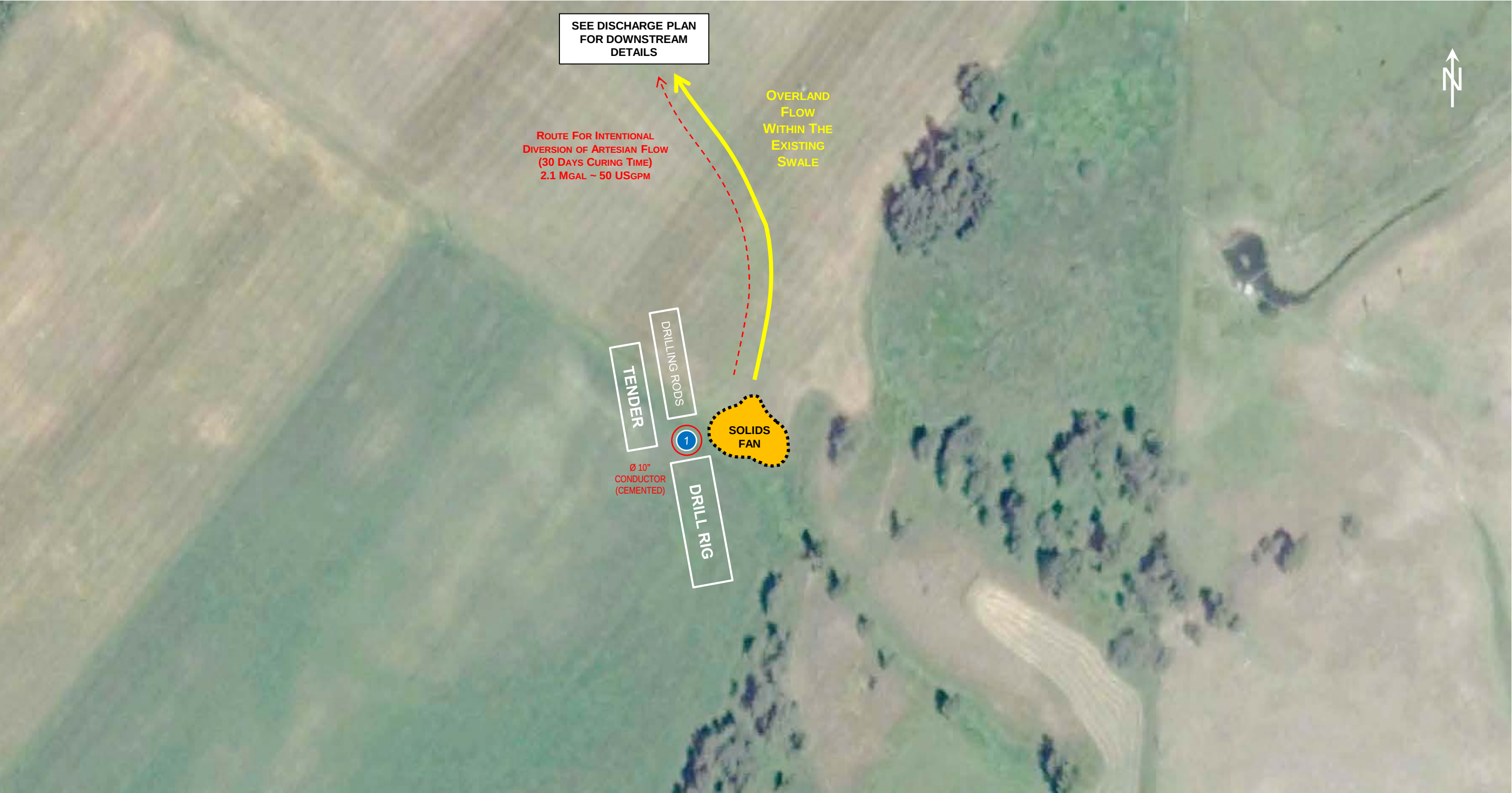
BC GROUNDWATER CONSULTING SERVICES LTD. (BCGW) HAS BEEN RETAINED BY THE LANDOWNER TO PREPARE THIS OUTLINE PLAN ON THEIR BEHALF. A DETAILED WRITTEN PLAN CAN BE PREPARED UPON REQUEST.

ALL DRILLING AND ARTESIAN DISCHARGE CONTROL MUST PLACE UNDER THE DIRECT SUPERVISION OF BCGW..

October 11, 2018



|                                                                                                                                         |             |                                                                                 |        |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------|--------|----------------------------|
| <br><b>BC Groundwater Consulting Services Ltd.</b> | DESCRIPTION | <b>EXPLORATORY BOREHOLE EB2018-1 (SITE C)<br/>WATER MANAGEMENT OUTLINE PLAN</b> |        |                            |
|                                                                                                                                         | PROJECT     | IRRIGATION WELL CONSTRUCTION: GROUNDWATER EXPLORATION                           |        |                            |
|                                                                                                                                         | FILE NO.    | 18007.1                                                                         | CLIENT | RIVER RANCH CATTLE COMPANY |
|                                                                                                                                         |             |                                                                                 |        | <b>FIG. 1</b>              |



**OBJECTIVE AND LIMITATION**

BC GROUNDWATER CONSULTING SERVICES LTD. (BCGW) HAS BEEN RETAINED BY THE LANDOWNER TO PREPARE THIS PLAN ON THEIR BEHALF. A DETAILED WRITTEN PLAN CAN BE PREPARED UPON REQUEST.

ALL DRILLING AND ARTESIAN DISCHARGE CONTROL MUST PLACE UNDER THE DIRECT SUPERVISION OF BCGW..

October 11, 2018



|                                                                                                                                            |             |                                                                                              |                            |               |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------|----------------------------|---------------|
| <br><b>BC Groundwater</b><br>Consulting Services Ltd. | DESCRIPTION | <b>EXPLORATORY BOREHOLE EB2018-1 (SITE C)</b><br><b>DRILL SITE LAYOUT AND DISCHARGE PLAN</b> |                            |               |
|                                                                                                                                            | PROJECT     | IRRIGATION WELL CONSTRUCTION: GROUNDWATER EXPLORATION                                        |                            |               |
| FILE NO.                                                                                                                                   | 18007.1     | CLIENT                                                                                       | RIVER RANCH CATTLE COMPANY | <b>FIG. 2</b> |

## ASSUMPTIONS

*The water table is deeper than 6 ft below grade.  
Adequate drainage exists to convey discharge  
away from the site and to a suitable area.*

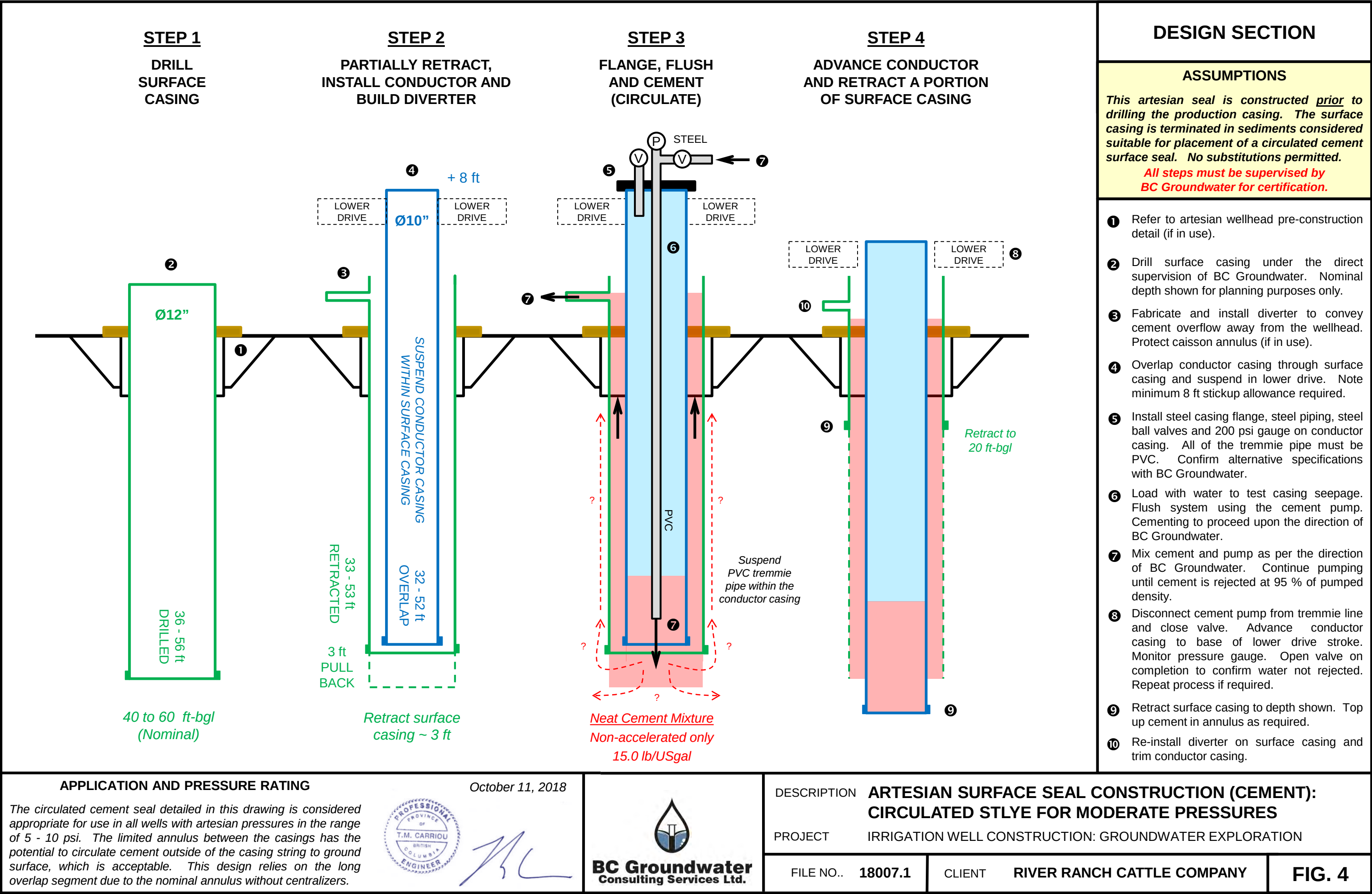
*Alternative specifications will be prepared if  
these assumptions are not valid.*

- 
- The diagram illustrates a cross-section of a cofferdam construction. On the left, a vertical axis labeled 'DEPTH' ranges from 0 ft to 7 ft. The top of the cofferdam is at 'EXISTING GRADE'. The interior of the cofferdam is filled with 'STRUCTURAL FILL' from the top down to approximately 3 ft depth. Below this is a layer of 'BENTONITE CHIPS OR CRUMBLE' (shaded gray) from 3 ft to 5 ft depth. At the bottom is a layer of 'GRAVEL' (yellow) from 5 ft to 6 ft depth. The cofferdam is lined with 'LOCKED PLYWOOD COVER (2 PIECE)' (yellow) on the top and sides. A 'FUTURE SURFACE CASING' is shown as a gray vertical line. A 'CAISSON' is indicated by a red vertical line. A 'STANDPIPE' is shown as a vertical pipe with a float valve at the bottom. The standpipe has a '5' at the top and a '4' at the bottom. The cofferdam is labeled '1' and '3'. A 'FUTURE DIVERTER' is shown at the top. A red arrow points left with the text 'See site layout for discharge plan'. The diagram also shows 'FREE-DRAINING STRUCTURAL FILL SUITABLE FOR OUTRIGGERS' and 'Compact' areas. A note 'Hydrate During Placement' points to the bentonite layer.

AL



**FIG. 3**







OCT 12 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Drill the surface casing and construct the surface seal (cement).*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 07:30   | Yes | 17:30    |          |
| JRDC    | K. Pelletier       | Qualified Well Driller | 07:00   | Yes | 17:00    |          |
| JRDC    | J. Opper           | Qualified Well Driller | 07:00   | Yes | 17:00    |          |
| JRDC    | Shawn              | Helper                 | 07:00   | Yes | 17:00    |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | Yes        | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW departed from Merritt via Hwy 5 arriving with dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") SURFACE SEAL CONSTRUCTION

T. Carriou (BCGW) has specified the  $\varnothing$  12" x  $\varnothing$  10" circulated cement surface seal for EB2018-1 developed by BCGW to reliably control moderate artesian pressures in the range of 5 - 10 psi. Construction of the shallow  $\varnothing$  16" steel caisson,  $\varnothing$  2" standpipe and engineered backfill was completed yesterday. The  $\varnothing$  12" surface casing



$\varnothing$  16" CAISSON,  $\varnothing$  2" STANDPIPE  
AND ENGINEERED FILL



COMPLETED CAISSON.  
DRILLING  $\varnothing$  12" SURFACE CASING

drilled to a depth of 16 ft-bgl yesterday was flushed with water to clean the casing this morning. The surface casing was advanced through cemented gravel and very dense cobbly till to a depth of 34 ft-bgl. Those sediments cannot be relied upon to form an effective surface seal and will lead to bypass around the casing if artesian pressures are encountered at depth. The last 2 ft of the casing section (34 - 36 ft-bgl) was drilled through sandy clay till. Review of the nearby well record WTN 90076 suggests that this fine-textured glacial till may be quite thin.

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
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Based on information from local well records, and observation made at EB2018-1, T. Carriou (BCGW) instructed JRDC to land the surface casing at 36 ft-bgl rather than risk penetrating the confining layer with the surface casing. This will provide an opportunity to cement the coarse till and found the  $\varnothing$  10" conductor casing in the fine clay-rich till at 34 - 36 ft-bgl. The  $\varnothing$  12" casing was flushed with water to remove all debris and drill cuttings which will otherwise interfere with placing the cement surface seal.



A  $\varnothing$  10" steel conductor casing was overlapped to the base of the  $\varnothing$  12" surface casing and suspended at a depth of 34 ft-bgl, about 2 ft above the base of the surface casing drive shoe. A temporary  $\varnothing$  10" flanged wellhead was welded to the conductor casing, outfitted with the necessary cementing tools, lifted 2 ft to expose the formation and flushed with clean water to confirm circulation. Cementing commenced at 12:30 using 15 lb/USgal super-plasticized GU cement and ended at 15:00 when grout was rejected from the surface casing at the same density. The 10" conductor casing was driven through the seal and landed at 38 ft-bgl.



Twenty (20) 40 kg bags of cement were required to construct the seal totaling 800 kg (1,800 lb). the cement over-break is estimated at 100 - 140% based on a total yield of 100 - 120 USgal (5.3 - 6.0 USgal per bag). In other words, the sediments around the casings consumed about as much, or more, cement than the standing volume between the casings. This very high over-break demonstrates how much void was present that required sealing. Part of the  $\varnothing$  12" surface casing was left in place (to a depth of 16 ft-bgl) as per design. T. Carriou (BCGW) noted that cement had moved up and around the surface casing to a depth of 7 ft-bgl when removing the upper-most surface casing. We interpret that the cemented surface seal extends from the base of the  $\varnothing$  16" caisson, though the dense cobbly till into the fine clay-rich glacial till. Figure 1 presents the as-built drawing of the surface seal.

## ACTION ITEMS

1. Provide the weekend for the cement to soft-set.
2. Drill exploratory  $\varnothing$  6" casing to the budget depth of 250 ft.
3. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 12 2018 (Page 4 of 4)

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**PREPARED BY:** Thierry Carriou, P.Eng.

**CERTIFICATION:**



A handwritten signature in blue ink, appearing to be "T.M. Carriou", written over a light blue grid background.

**ATTACHMENTS:** ☐ No ☒ Yes

Fig. 1 Artesian Surface Seal Construction (As-Built)

# AS-BUILT DRAWING

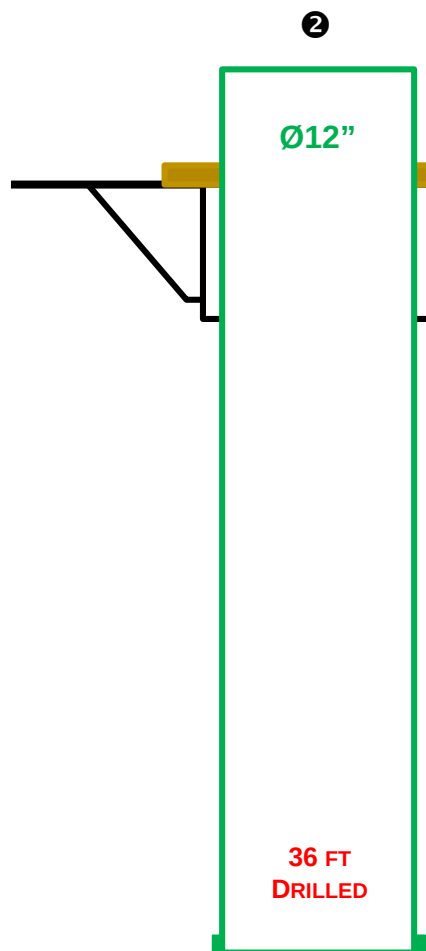
## ASSUMPTIONS

This artesian seal is constructed prior to drilling the production casing. The surface casing is terminated in sediments considered suitable for placement of a circulated cement surface seal. No substitutions permitted.

- 1 Refer to artesian wellhead pre-construction detail (if in use).
- 2 Drill surface casing under the direct supervision of BC Groundwater. Nominal depth shown for planning purposes only.
- 3 Fabricate and install diverter to convey cement overflow away from the wellhead. Protect caisson annulus (if in use).
- 4 Overlap conductor casing through surface casing and suspend in lower drive. Note minimum 8 ft stickup allowance required.
- 5 Install steel casing flange, steel piping, steel ball valves and 200 psi gauge on conductor casing. All of the tremmie pipe must be PVC. Confirm alternative specifications with BC Groundwater.
- 6 Load with water to test casing seepage. Flush system using the cement pump. Cementing to proceed upon the direction of BC Groundwater.
- 7 Mix cement and pump as per the direction of BC Groundwater. Continue pumping until cement is rejected at 95 % of pumped density.
- 8 Disconnect cement pump from tremmie line and close valve. Advance conductor casing to base of lower drive stroke. Monitor pressure gauge. Open valve on completion to confirm water not rejected. Repeat process if required.
- 9 Retract surface casing to depth shown. Top up cement in annulus as required.
- 10 Re-install diverter on surface casing and trim conductor casing.

## STEP 1

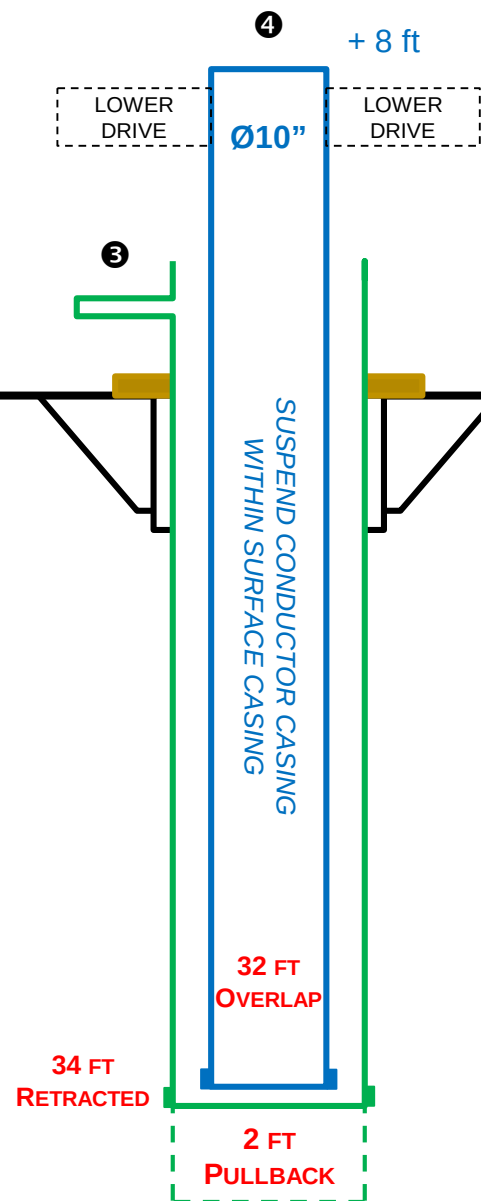
DRILL  
SURFACE  
CASING



40 to 60 ft-bgl  
(Nominal)

## STEP 2

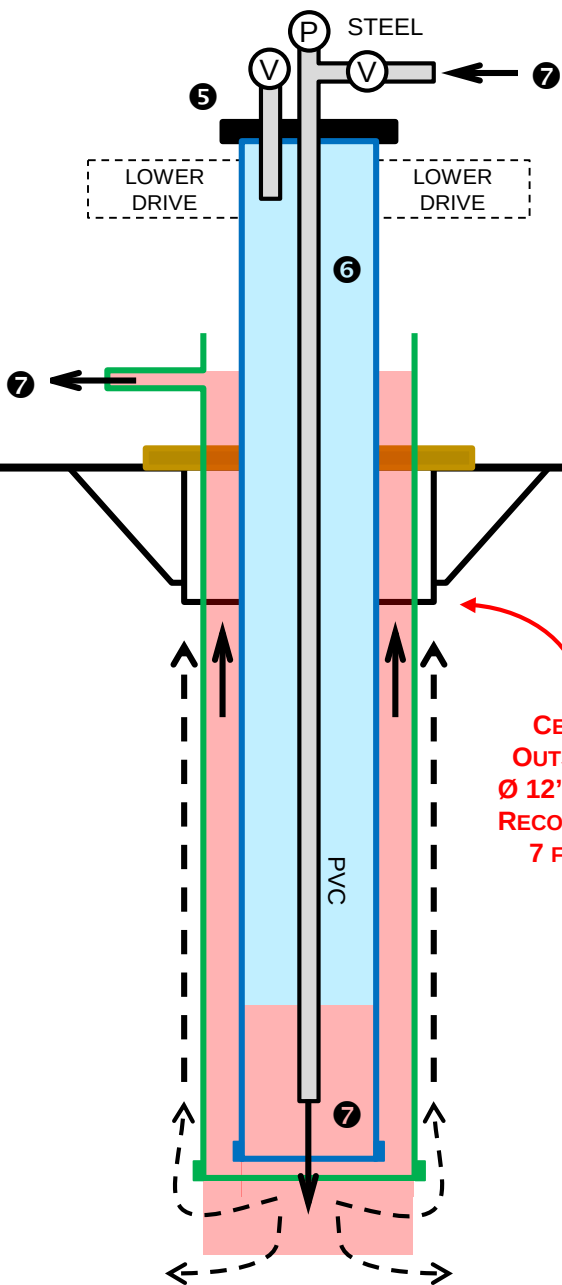
PARTIALLY RETRACT,  
INSTALL CONDUCTOR AND  
BUILD DIVERTER



Retract surface  
casing ~ 3 ft

## STEP 3

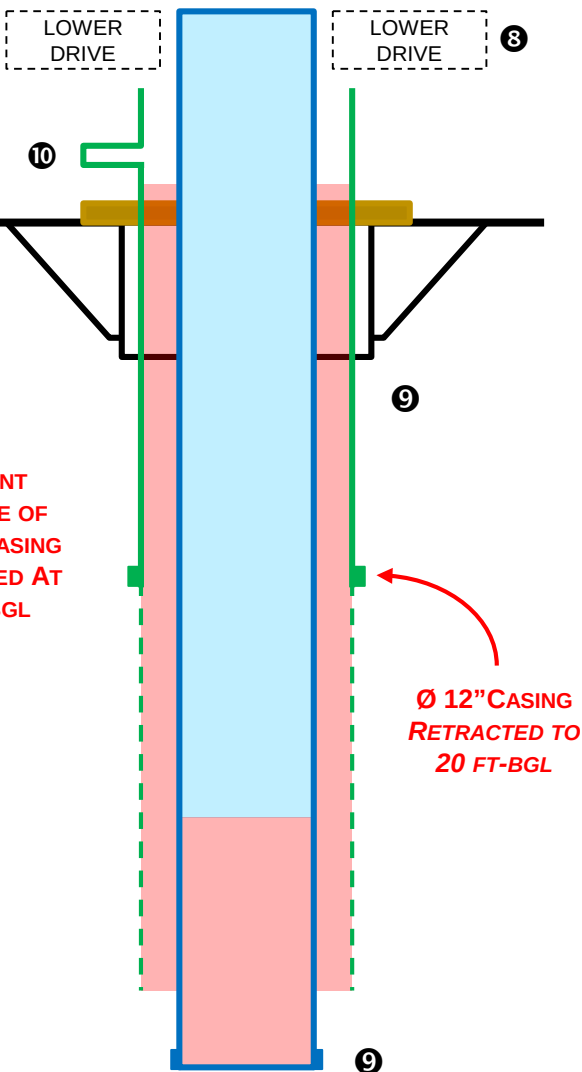
FLANGE, FLUSH  
AND CEMENT  
(CIRCULATE)



Neat Cement Mixture  
Non-accelerated only  
14 - 16 lb/Ugal Mixed

## STEP 4

ADVANCE CONDUCTOR  
AND RETRACT A PORTION  
OF SURFACE CASING



Ø 12\"/>

## APPLICATION AND PRESSURE RATING

The circulated cement seal detailed in this drawing is considered appropriate for use in all wells with artesian pressures in the range of 5 - 10 psi. The limited annulus between the casings has the potential to circulate cement outside of the casing string to ground surface, which is acceptable. This design relies on the long overlap segment due to the nominal annulus without centralizers.



October 12, 2018

*[Signature]*



## DESCRIPTION

ARTESIAN SURFACE SEAL CONSTRUCTION (CEMENT):  
CIRCULATED STLYE FOR MODERATE PRESSURES

## PROJECT

IRRIGATION WELL CONSTRUCTION: GROUNDWATER EXPLORATION

FILE NO.. 18007.1

CLIENT

RIVER RANCH CATTLE COMPANY

FIG. 1





OCT 13 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Provide time for the cement surface seal to soft-set.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☐ BCGW ☐ Client ☐ Client Representative ☐ Other ☒ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME | POSITION | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|------|----------|---------|-----|----------|----------|
| BCGW    | None |          |         |     |          |          |
| JRDC    | None |          |         |     |          |          |
|         |      |          |         |     |          |          |
|         |      |          |         |     |          |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | No         | Transport                                                        |
| BCGW    | Trailer  | No         | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | No         | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | No         | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

Not applicable.

### EB2018-1 (SITE "C") SURFACE SEAL CURING

The Ø 12" x Ø 10" cemented surface seal completed on Oct 12 2018 was provided time to soft-set today and begin the curing process prior to commencing exploratory drilling with Ø 6" production casing.

### ACTION ITEMS

1. Design the diversion wellhead for use in the event that flowing artesian conditions are encountered.
2. Provide the weekend for the cement to soft-set and begin curing.
3. Drill exploratory Ø 6" casing to the budget depth of 250 ft.
4. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☒ No ☐ Yes





OCT 14 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Provide time for the cement surface seal to soft-set and begin curing. Issue the diversion wellhead design to JRDC to be installed if flowing conditions occur.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☐ BCGW ☐ Client ☐ Client Representative ☐ Other ☒ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME | POSITION | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|------|----------|---------|-----|----------|----------|
| BCGW    | None |          |         |     |          |          |
| JRDC    | None |          |         |     |          |          |
|         |      |          |         |     |          |          |
|         |      |          |         |     |          |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

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**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 14 2018 (Page 2 of 3)

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | No         | Transport                                                        |
| BCGW    | Trailer  | No         | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | No         | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | No         | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

Not applicable.

### EB2018-1 (SITE "C") SURFACE SEAL CURING

The Ø 12" x Ø 10" cemented surface seal completed on Oct 12 2018 was provided time to soft-set today and begin the curing process prior to commencing exploratory drilling with Ø 6" production casing.

### EB2018-1 (SITE "C") FLOWING ARTESIAN DIVERSION WELLHEAD

T. Carriou (BCGW) will specify a conventional aluminum well cap at EB2018-1 if the water level is found to be greater than 5 ft-bgl after overnight recovery following drilling completion. T. Carriou will specify installation of an artesian diversion wellhead if water levels are shallower than 5 ft-bgl, or exhibit a rising trend, due to the potential for flowing conditions to occur in the spring.

T. Carriou (BCGW) has prepared a wellhead design to safely divert flowing artesian discharge to the swale located east of the drill site and shut-in the well. The design is based on a fabricated Ø 6" spool mated to a Ø 6" production casing flange. BCGW is of the opinion that this design will prove adequate to divert flows between 50 - 100 USgpm via the two Ø 3" lateral ports on the spool at flowing pressures in the 1 - 2 psi range when Ø 3" layflat hose is used. Flowing wells to the north and south of the site have been measured at 50 - 80 USgpm. The single Ø 2" vertical port installed into the top of the blind flange will be used to measure pressures, track sand concentrations and gradually shut-in the well using a valve assembly. Note that the remaining Ø 12" surface casing has been omitted from the drawing to prevent confusion.

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
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Please ensure that all of the male cam-lock fittings are threaded onto a nipple of the same diameter. BCGW will supply all other fittings and temporary hose. We propose to use conventional cam-lock caps at shut-in given that the cemented wellhead has been designed for moderate pressures in the 5 - 10 psi range. The design will be modified to suit actual conditions.

**ACTION ITEMS**

1. Provide the weekend for the cement to soft-set and begin curing.
2. Drill exploratory Ø 6" casing to the budget depth of 250 ft.
3. Fabricate and install the flowing artesian diversion wellhead if required by BCGW.
4. Collect a baseline water sample from the Coldwater River (field parameters and a lab sample).

**PREPARED BY:** Thierry Carriou, P.Eng.

**CERTIFICATION:**



A handwritten signature in blue ink, appearing to be "T.M. Carriou", written over the seal.

**ATTACHMENTS:** ☐ No ☒ Yes

Flowing Artesian Diversion Wellhead (EB2018-1)

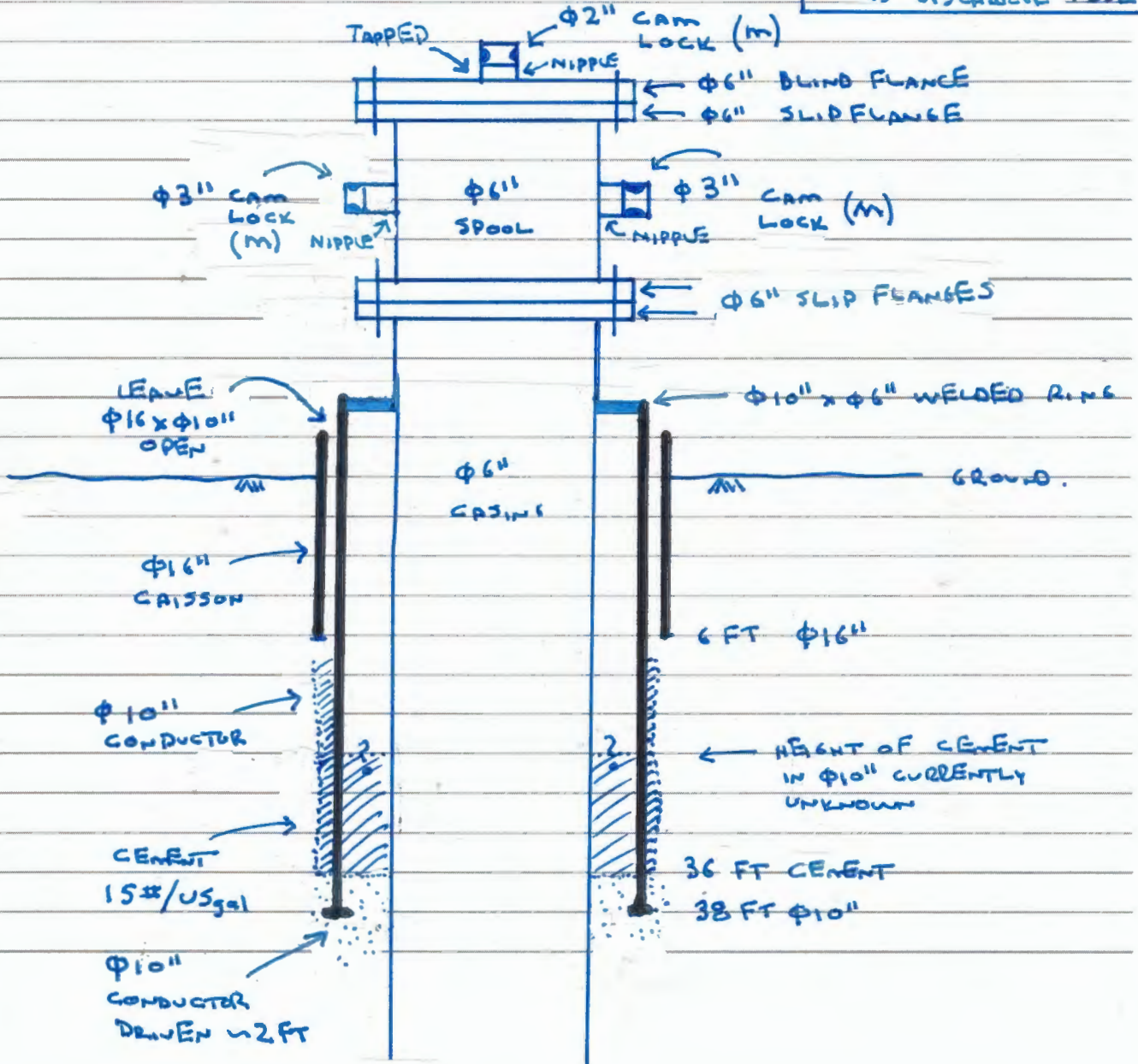


**BC Groundwater  
Consulting Services Ltd.**  
Professional Well Development and Consulting Services

|                 |                                         |
|-----------------|-----------------------------------------|
| DATE            | OCT 14 / 2018                           |
| PROJECT         | 18007.1 RIVER RANCH                     |
| PARTICIPANTS    | TC                                      |
| NATURE OF NOTES | DIVERSION WELLHEAD FOR EB298-1 (SITE C) |

IF FLOWING ARTESIAN  
CONDITIONS OCCUR:

BCGW TO SUPPLY  
ALL FITTINGS OTHER  
THAN THOSE SHOWN  
AND DISCHARGE HOSE







OCT 15 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Inspect the surface seal and drill the exploration casing.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 07:30   | Yes | 19:00    |          |
| JRDC    | J. Oppen           | Qualified Well Driller | 07:00   | Yes | 17:00    |          |
| JRDC    | Shawn              | Helper                 | 07:00   | Yes | 17:00    |          |
|         |                    |                        |         |     |          |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
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## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | Yes        | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW travelled from McLure to Merritt via Hwy 5 on dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") SURFACE SEAL INSPECTION



T. Carriou (BCGW) has specified a  $\varnothing 12'' \times \varnothing 10''$  circulated cement surface seal for EB2018-1 developed by BCGW to reliably control moderate artesian pressures in the range of 5 - 10 psi. Construction was completed on October 12<sup>th</sup> and the cement seal was provided 48 hours to soft-set and begin curing. Inspection prior to commencing drilling today identified nominal  $\frac{1}{2}$  USgpm discharge from the  $\varnothing 12'' \times 10''$  annulus. BCGW suspects that this discharge originates from the very shallow native cemented gravels intercepted at 20 - 30 ft-bgl, which are above the cemented seal placed at 36 - 38 ft-bgl. The discharge conductivity was measured at 358  $\mu\text{S}/\text{cm}$  and a water sample collected. No flow was observed within the cemented  $\varnothing 10''$  conductor casing or outside of the  $\varnothing 12''$  surface casing. No water was present within the independent  $\varnothing 2''$  shallow standpipe.

### EB2018-1 EXPLORATION DRILLING

The  $\varnothing 6''$  steel exploration casing was overlapped within the  $\varnothing 10''$  conductor casing until landing on firm cement at 16 ft-bgl. The  $\varnothing 6''$  casing was drilled through the cement plug using air only until it was fully penetrated at 39 ft-bgl which agrees with our construction records. The  $\varnothing 12'' \times 10''$  annulus discharge rate remained steady

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and the electrical conductivity increased to 3,190  $\mu\text{S}/\text{cm}$ , which is typical of rejected water from cement. Neither bubbles or discoloration of the seepage was observed.

Brown plastic silty sand and clay was intercepted to a depth of 52 ft-bgl. Sediments transitioned to brown silty sand and remained consistent to 70 ft-bgl. Dense brown silt, clay and stones were encountered to 78 ft-bgl. BCGW is of the opinion that a hydraulic connection exists between these deeper sediments and those at 20 - 30 ft-bgl located above the cement seal based on the observation that minor bubbles in the  $\varnothing$  12" x 10" annulus seepage were briefly observed when drilling at 65 ft-bgl. In other words, we suspect that a connection exists via the geology rather than the annulus. A direct connection via the annular space would have presented itself continuously during drilling as vigorous air bypass and increased flow and colour. This was not observed.

Dirty sand and gravel began at 79 ft-bgl with bright red - brown discharge commencing at 84 ft-bgl. These sediments were observed at a depth of 66 feet in the nearby well (WTN 71419) as noted by Nor-West Water Well Drilling in 1980. The rate of air-lift discharge was 50+ USgpm (420  $\mu\text{S}/\text{cm}$  10.2 °C) at 95 ft-bgl and was observed to clean very quickly. Electrical conductivity declined to 280  $\mu\text{S}/\text{cm}$  within a few minutes as development proceeded. A water sample was collected. The productive (50+ USgpm) dirty sand and gravel with red - brown wash continued until 107 ft-bgl when it transitioned to a very clean sand and gravel with clear discharge from the cyclone during drilling. This was also observed at WTN 71419 at about the same depth, which suggests this aquifer exhibits lateral continuity towards the south. Continuity to the north is presently unknown. Air-lift discharge was 100+ USgpm (506  $\mu\text{S}/\text{cm}$  8.8 °C) at 115 ft-bgl. A water sample was collected.



These productive sediments continued to a depth of 145 ft-bgl with the rate of air-lift discharge reaching 100 - 150+ USgpm (448  $\mu\text{S}/\text{cm}$  9.5 °C). Drilling was briefly stopped at 135 ft-bgl as flowing artesian conditions were suspected. Artesian overflow was measured at 50 - 100 USgpm and water was observed to discharge from the top of the drill mast, suggesting that pressures may be in the range of 6 psi, or possibly higher. A water sample was collected. Neither bubbles, discoloration or increased flow was observed in the  $\varnothing$  12" x 10" annulus as seepage continued at ½ USgpm. The stratigraphy changed abruptly at 145 ft-bgl with a transition to silty clay (some sand and gravel), which coincided with intermittent discharge and air-lift rates of only 20 USgpm. Drilling was terminated at 155 ft-bgl with the field chemistry recorded at 380  $\mu\text{S}/\text{cm}$  and 12.8 °C. The drilling rods were tripped out and the water level recorded at 90 ft-bgl in the  $\varnothing$  6" casing. The DR12 diverter was installed for overnight discharge.



## **EB2018-1 SURFACE SEAL INSPECTION (POST-DRILLING)**

Further investigation of the  $\varnothing$  12" x 10" annulus seepage was performed after the completion of exploratory drilling. A hose was placed within the annulus at 16:25 to measure the rate of discharge and collect a water sample for Piper Analysis and comparison to the other water-bearing zones. This information will be important to design the future production well surface seal.

Discharge at  $\frac{1}{2}$  USgpm was confirmed using a graduated container. Electrical conductivity was recorded at 180  $\mu$ S when first measured, which is similar to the 170  $\mu$ S/cm makeup water used to drill the dense plastic clay at 65 - 75 ft-bgl. Purging was continued until 17:15. Measurements confirmed steady discharge with electrical conductivity increasing to 227  $\mu$ S/cm. Purging was continued until 18:05. Measurements confirmed steady discharge with electrical conductivity increasing to 260  $\mu$ S/cm. The annulus will be allowed to decant overnight and sampled in the morning to determine if it returns to the 358  $\mu$ S/cm observed at the start of drilling today. The rate of discharge is such that the annular space is expected to flush completely for representative sampling at that time.

## **EB2018-1 COMPLETION PLAN**

T. Carriou (BCGW) confirmed supplies with JRDC required to construct and install the diversion wellhead presented in our October 14<sup>th</sup> field report. The  $\varnothing$  6" casing will be flanged and mated to a flanged diversion spool c/w two (2)  $\varnothing$  3" male cam-lock laterals and topped with a blind flange c/w one (1)  $\varnothing$  2" male cam-lock vertical. This is expected to provide adequate diversion capacity. We will instruct JRDC to complete EB2018-1 as follows:

1. Pull back the  $\varnothing$  6" casing until connection with the target aquifer is re-established (nom. 145 ft-bgl or higher), ideally into the artesian portion of the aquifer. The rate of overflow will be noted and used to inform screen selection. This procedure will also provide an opportunity to determine the maximum depth of the regional aquifer at this location to maximum future production wells yields.
2. Install a grouting nipple onto the side of the  $\varnothing$  12" casing (c/w a ball valve) and weld a plate steel ring between the  $\varnothing$  12" and  $\varnothing$  10" casings after they have been centralized. Please leave the valve open and flowing for pressure cementing tomorrow. Pressure cementing instructions will follow.
3. Set two (2) sections of temporary 4 ft wire-wound screen into the well for the purpose of sand control during free-discharge and aquifer testing. An attempt will be made to set 0.040" (40-slot) or larger aperture screens as these will provide a nominal transmitting capacity of 160 USgpm and are not expected to restrict artesian free-discharge. The screen will be briefly developed using compressed air. If artesian, groundwater will be purposefully diverted from EB2018-1 to temporarily relieve local pressures prior to cementing the  $\varnothing$  12" x 10" annulus tomorrow. This will improve the efficiency of cementing.
4. Weld a plate steel ring between the  $\varnothing$  10" and  $\varnothing$  6" casings and allow the well to free-discharge overnight from the diversion wellhead if it remains artesian.

## RECOMMENDATIONS

Exploration results at EB2018-1 are positive and confirm that the water-bearing zone thickness is adequate to support an irrigation well if aquifer recharge is consistent for the proposed use. Water samples will be submitted for analysis / aquifer correlation as described in our work program. We are proceeding under the working assumption that 400 USgpm is the desired rate of groundwater-based irrigation with an upper limit set at 800 USgpm. BCGW will request authorization from the client to submit drill cuttings from the 85 - 105 ft-bgl interval for analysis and future production well design.

T. Carriou (BCGW) provides the following recommendations:

1. A pumping test of EB2018-1 is recommended to confirm that aquifer productivity (specific capacity), recharge and recovery are adequate for irrigation well construction. BCGW recommends the following testing program: 4 hour step-test, 24 hour constant-discharge test and 8 hour recovery test. This can be arranged directly between JR Drilling and BCGW at a reasonable cost.
2. Consider whether drilling a second exploratory borehole (Site B) prior to testing is warranted at this time. BCGW recommends that you consider this carefully given that licensing approval will require the construction of a dedicated observation well. Positioning the observation well between EB2018-1 and the Coldwater River (i.e. Site B) is in your best interest. We will respect your decision in this matter.
3. With your authorization, we propose to have a brief discussion with Ted Moore (FLNRO) regarding licensing and timing of production well drilling.

## ACTION ITEMS

1. Implement the EB2018-1 completion plan.
2. Confirm client authorization to contact FLNRO in preparation for next steps.
3. Cure the cement under free-discharge conditions and gradually shut-in EB2018-1.

**PREPARED BY:** Thierry Carriou, P.Eng.

## CERTIFICATION:



A handwritten signature in blue ink, appearing to be "T.M. Carriou", written over a light blue grid background.

**ATTACHMENTS:** ☒ No ☐ Yes





OCT 16 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Further delineate the water-bearing zone and prepare for screen installation.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 09:30   | Yes | 18:00    |          |
| JRDC    | K. Pelletier       | Qualified Well Driller | 07:00   | Yes | 16:30    |          |
| JRDC    | J. Opper           | Qualified Well Driller | 07:00   | Yes | 16:30    |          |
| JRDC    | Shawn              | Helper                 | 07:00   | Yes | 16:30    |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

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**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
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## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | Yes        | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW travelled from Merritt via Hwy 5 on dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") SURFACE SEAL INSPECTION

Inspection of the wellhead was carried out prior to commencing work. The nominal ½ USgpm discharge continued from the Ø 12" x 10" annulus overnight. The discharge was clear and electrical conductivity was 317 µS/cm. A water sample was collected for Piper Analysis. No flow was observed within the cemented Ø 10" conductor casing or outside of the Ø 12" surface casing.

### EB2018-1 FURTHER DELINEATION OF THE WATER-BEARING ZONE



The water level in the Ø 6" steel exploration casing was measured at 40 ft-bgl (08:00) after overnight recovery at its current total depth (155 ft-bgl). This confirms the base of the casing string is located below the target aquifer. The Ø 6" casing was gradually withdrawn to 145 ft-bgl and the plug (heave) was cleared by drilling with air. Air-lift discharge of 20 USgpm was observed with no artesian overflow apparent. The casing was further withdrawn to 140 ft-bgl with the same results. Artesian discharge was re-established at 135 ft-bgl. The rate of overflow was visually estimated at 30 - 50 USgpm overtopping the casing at 15 ft above grade. This observation suggests the shut-in pressure will likely exceed 5 psi.

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These results confirm the base of the target production zone is 135 ft-bgl. Produced water commenced at 84 ft-bgl during exploratory drilling yesterday, which suggests the water-bearing sand and gravel target is about 50 ft thick at this location. T. Carriou (BCGW) is of the opinion that the water-bearing zone is comprised of interbedded sand, gravel and silt, with clay stringers. Experience in similar formations suggests that a long production screen will be required in a future irrigation production well for the following reasons: (1) the full thickness of the zone is required to maximize pumping rates; and (2) a long screen is required to break up the aquifer structure during air development to improve the recharge efficiency of the well screen.

#### **EB2018-1 PREPARATION FOR WELL SCREEN INSTALLATION**

T. Carriou (BCGW) examined the drill cuttings collected within the interval 127 - 135 ft-bgl that are proposed for screen placement. Visual inspection of the cuttings suggests that water-bearing sediments are fine to coarse sand with some gravel. T. Carriou instructed JRDC to install two 4 ft sections of 0.040" (40 slot) aperture screen at the specified interval.

The interval was worked to develop a pack that will bridge reliably for landing the well screen. The pack and surrounding formation were repeatedly developed using compressed air and flooding techniques to stabilize the flowing zone for screen placement. This was achieved by the end of day and the well was allowed to free-discharge overnight. The water level is expected to continue rising in the swale and may begin to decant as per the discharge plan.

#### **ACTION ITEMS**

1. Continue implementing the EB2018-1 completion plan.
2. Confirm client authorization to contact FLNRO in preparation for next steps.
3. Cure the cement under free-discharge conditions and gradually shut-in EB2018-1.

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☒ No ☐ Yes





OCT 17 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Install the EB2018-1screen and diversion wellhead.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 08:15   | Yes | 18:30    |          |
| JRDC    | K. Pelletier       | Qualified Well Driller | 15:00   | Yes | 17:30    |          |
| JRDC    | J. Opper           | Qualified Well Driller | 07:00   | Yes | 17:30    |          |
| JRDC    | Shawn              | Helper                 | 07:00   | Yes | 17:30    |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | No         | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | No         | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW travelled from Merritt via Hwy 5 on dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") SURFACE SEAL INSPECTION

Inspection of the wellhead was carried out prior to commencing work. The nominal ½ USgpm discharge continued from the Ø 12" x 10" annulus overnight. The discharge was clear. No flow was observed within the cemented Ø 10" conductor casing or outside of the Ø 12" surface casing.

### EB2018-1 INSTALLATION OF THE SCREEN



The Ø 6" steel exploration casing was overflowing upon inspection (07:00) prior to commencing work. The rate of overflow was visually estimated at 30 - 50 USgpm from the drilling rig diverter. T. Carriou instructed JRDC to install the two (2) 4 ft sections of 0.040" (40 slot) aperture screen within the 127 - 135 ft-bgl interval. Flowing artesian conditions complicate screen installation and this well was no exception. The screen was successfully placed by 10:00. About 2" of screen settlement occurred, which indicates sensitive conditions. JRDC was instructed to allow the screen to self-develop for about 2 hours to settle and firm the underlying sediments.

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Once settled, the well screen was developed using compressed for 4 hours and cleared very quickly indicating the future production well can likely support a more aggressive screen aperture. Air-development produced discharge at around 100 USgpm, which is approaching to the maximum theoretical capacity of the well screen (160 USgpm). The discharge field chemistry was recorded at 408  $\mu\text{S}/\text{cm}$ . These are excellent results.

### **EB2018-1 INSTALLATION OF THE DIVERSION WELLHEAD AND MEASUREMENTS**



Fabrication of the nominal  $\varnothing$  6" diversion wellhead specified by BCGW commenced at 14:45 and was completed by 17:00. T. Carriou (BCGW) completed an inspection and confirmed that it was properly constructed and fully functional. The wellhead was outfitted with a BCGW sign, in the event of inspection by FLNRO, providing notice that purposeful diversion of the artesian discharge is currently in progress. Discharge from the  $\varnothing$  6" casing via the laterals totaled 30 USgpm at 18:00 with field chemistry measurements of 7.9 °C / DO 8.9 mg/L / pH 7.2 / 405  $\mu\text{S}$  / ORP +11 mV as influenced by air-development. Water level measurement confirmed that the wellhead is operating at atmospheric conditions (zero back-pressure) as designed.

### **EB2018-1 INSPECTION OF THE $\varnothing$ 12" x 10" ANNULUS PRIOR TO CEMENTING**



Seepage from the  $\varnothing$  12" x 10" annulus was measured for the last time at 18:30 prior to cementing tomorrow. The rate of discharge remained unchanged at  $\frac{1}{2}$  USgpm with the following field chemistry measurements: 8.1 °C / DO 1.9 mg/L / pH 7.9 / 293  $\mu\text{S}$  / ORP - 166 mV. The electrical conductivity parameters are very different than those recorded in the  $\varnothing$  6" overflow. The rate of seepage was not observed to change during well screen development, which suggest that is not directly connected to the artesian aquifer at depth. The annulus was welded with a ring and a grouting nipple was welded for cementing tomorrow. The  $\varnothing$  2" standpipe remains dry.

BCGW has considered different approaches and mixtures for cementing the annulus. JRDC will be instructed to proceed as follows:

1. Ensure free-discharge continues from the  $\varnothing$  6" casing during cementing.
2. Connect the grouting plant to the nipple. Install the high-pressure grouting gauge (i.e. 200 psi).
3. Pump two batches of water with dye into the nipple using the grouter. Observe for a return to surface.

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4. Mix the same super-plasticized 15 lb/USgal cement used to construct the surface seal. Accelerant will not be added to encourage penetration.
5. Carefully monitor the pressure gauge and avoid spiking pressures, which can lead to hydrofracturing. A slow pressure buildup is desired. BCGW will identify when to cease grouting.
6. Immediately close the grouting nipple valve and wire it shut.

**ACTION ITEMS**

1. Continue implementing the EB2018-1 completion plan.
2. Confirm client authorization to submit six (6) water samples and ten (10) drill cuttings for analysis.
3. Prepare a memo for T. Moore (FLNRO) for review by the client.
4. Request a cost-estimate from JRDC to conduct a pumping test of EB2018-1.
5. Cure the cement under free-discharge conditions and gradually shut-in EB2018-1.

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☒ No ☐ Yes





OCT 18 2018

# BC Groundwater Consulting Services Ltd.

Professional Well Development and Consulting Services

## FIELD REPORT AND CONTRACTOR SUMMARY

**CLIENT:** RIVER RANCH CATTLE COMPANY (the "Ranch" or "RRCC")  
Coldwater River Valley near Merritt, BC

**PROJECT:** 18007.1 Professional Well Development Services:  
Irrigation Well Construction: Groundwater Exploration (Phase 1)

**DAILY FOCUS:** *Place an additional (shallow) cement surface seal at EB2018-1.*

**CONTRACTORS:** ☒ BC Groundwater ("BCGW") ☐ Pump Contractor  
☒ JR Drilling Central ("JRDC") ☐ Other Contractor

**SUPERVISION:** ☒ BCGW ☐ Client ☐ Client Representative ☐ Other ☐ None

**DISTRIBUTION:** Dave Vanderwal (Landowner); K. Pelletier (JRDC); R. Cronin (BCGW); R. Ciriani (BCGW)

| COMPANY | NAME               | POSITION               | TIME IN | PPE | TIME OUT | COMMENTS |
|---------|--------------------|------------------------|---------|-----|----------|----------|
| BCGW    | T. Carriou, P.Eng. | Qualified Professional | 08:15   | Yes | 14:00    |          |
| JRDC    | K. Pelletier       | Qualified Well Driller | 07:00   | Yes | 10:30    |          |
| JRDC    | J. Opper           | Qualified Well Driller | 07:00   | Yes | 10:30    |          |
| JRDC    | Shawn              | Helper                 | 07:00   | Yes | 10:30    |          |

Please note the times listed above provide a record of on-site activity for BCGW purposes and in compliance with WorkSafe requirements. It does not include travel, office and other off-site activities. It shall not be used for invoice review purposes.

" Focusing on sustainable development, protection and management of our groundwater resources "

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
Oct 18 2018 (Page 2 of 4)

## CONTRACTOR EQUIPMENT TRACKING

| COMPANY | UNIT     | USED TODAY | COMMENTS (USE / SAFETY / ENVIRONMENT)                            |
|---------|----------|------------|------------------------------------------------------------------|
| BCGW    | Pickup   | Yes        | Transport                                                        |
| BCGW    | Trailer  | Yes        | First aid station, fire protection, equipment and sampling gear. |
| JRDC    | DR12     | Yes        | Drilling rig.                                                    |
| JRDC    | Tender   | Yes        | Drilling rig tender and support truck.                           |
| JRDC    | Tender   | No         | Cyclone and collection tank.                                     |
| JRDC    | Geo-Loop | Yes        | Grouting plant.                                                  |

*Please note the above list provides a record of equipment used on-site. It may not include equipment on stand-by. It does not constitute a complete list of contractor equipment used on the project nor shall it be used for contractor invoice review purposes.*

## PROGRESS REPORT

### ACCESS, SITE CONDITIONS, WEATHER AND SAFETY

BCGW travelled from Merritt via Hwy 5 on dry road conditions. The Ranch was accessed via Coldwater Road, Patchett Road, the former KVR route and travel across the hayfield.

### EB2018-1 (SITE "C") WELLHEAD INSPECTION



Inspection of the wellhead and was carried out upon arrival. Artesian overflow from the  $\varnothing$  6" x 3" diversion wellhead was observed to continue overnight at 30 USgpm with field chemistry of pH 7.2 408  $\mu$ S/cm recorded. Nominal  $\frac{1}{2}$  USgpm discharge from the  $\varnothing$  12" x 10" annulus continued overnight with field chemistry of pH 7.4 323  $\mu$ S/cm. All discharge was clear with no sand production. No flow was observed outside of the  $\varnothing$  12" surface casing. The  $\varnothing$  2" independent standpipe remained dry. T. Carriou (BCGW) observed pea gravel at the base of standpipe using a flashlight confirming that it is free of cement.

## **EB2018-1 CEMENTING OF THE Ø 12" x 10" ANNULUS**



T. Carriou (BCGW) instructed JRDC to proceed with cementing the Ø 12" x 10" annulus from the base of the remaining Ø 12" casing (20 ft-bgl) to the top of the existing cement seal (36 ft-bgl) as outlined in our October 19<sup>th</sup> daily report. Layflat hose was connected to the Ø 3" wellhead laterals to convey water away from the site and BCGW ensured that free-discharge continued from the well. The plant was connected to the grouting nipple welded to the outside of the Ø 12" x 10" annulus. A pressure gauge was installed at the grouting plant which registered 0 psi(g) on the 60 psi gauge during static conditions increasing to 15 psi(g) during pumping, which indicates the delivery pressure. One batch of dyed water was successfully pumped into the annulus to confirm circulation in the Ø 12" x 10" annulus. No dye, circulation or discharge was observed within the open Ø 16" x 12" annulus during flushing.

JRDC proceeded to place five (5) batches of super-plasticized neat cement as per T. Carriou direction. Refusal cementing was not proposed given that the deep cemented seal (36 to 38 ft-bgl) was curing. The static pressure gradually rose with each batch reaching 27 psi(g) prior to pumping the final batch. The static pressure remained at 45 psi(g) at the completion of cementing. The total volume of cement grout pumped into the annulus was 66 USgal which represents a 300 % over-break as compared to the Ø 12" x 10" annulus volume. This very high volume was expected due to the nature of the shallow flowing sediments. T. Carriou instructed JRDC to close the cementing nipple and wire it shut. BCGW monitored the wellhead for 3 hours after cementing and confirmed that no dye, circulation or discharge was observed within the open Ø 16" x 12" annulus and the Ø 2" independent standpipe continued to remain dry and free of cement.

## **INTENTIONAL DIVERSION FOR 30 DAYS**

EB2018-1 will be intentionally free-discharged for 28 days allowing the cement surface seals to fully cure. Shut-in procedures are scheduled to commence on November 22<sup>nd</sup>. BCGW has no objection to conducting a pumping test of the well in the interim so long as free-discharge conditions continue and the grouting nipple is not opened.

## **ACTION ITEMS**

1. Confirm client authorization to submit six (6) water samples and ten (10) drill cuttings from EB2018-1 for analysis to define site hydrogeology and prepare production well screen designs.
2. Prepare a draft memo to T. Moore (FLNRO) regarding next steps proposed by the RRCC and request advice regarding licensing. This memo will be reviewed by the RRCC prior to submittal.
3. Request a cost-estimate from JRDC to conduct a pumping test of EB2018-1.
4. Conduct the pumping test to evaluate the specific capacity of the water-bearing zone currently screened.

**18007.1 RIVER RANCH CATTLE COMPANY**  
**PROFESSIONAL WELL DEVELOPMENT SERVICES**  
IRRIGATION WELL CONSTRUCTION - GROUNDWATER EXPLORATION (PHASE 1)  
Daily Field Report and Contractor Summary  
**Oct 18 2018 (Page 4 of 4)**

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5. Cure the cement under free-discharge conditions and gradually shut-in EB2018-1 commencing no earlier than November 22<sup>nd</sup>.

**PREPARED BY:** Thierry Carriou, P.Eng.

**ATTACHMENTS:** ☒ No ☐ Yes



## Rebecca Ciriani

---

**From:** Thierry Carriou <tc.backwoodsman@gmail.com>  
**Sent:** November 16, 2018 1:08 PM  
**To:** Rebecca Ciriani  
**Subject:** 18007.1 River Ranch Photos Nov 16 2018  
**Attachments:** IMG\_2294001.jpg; IMG\_2292001.jpg; IMG\_2295001.jpg; IMG\_2293001.jpg; IMG\_2296001.jpg

Hi Rebecca,

Filing please.

Photos from today by Paul Buker @ River Ranch.

Thx

Thierry Carriou, P.Eng.  
BC Groundwater Consulting &  
Four Point Ranch (McLure, BC)  
Cell 250 377 5758





W. Environmental  
Consulting  
This is a Safety  
Warning Sign  
Warning: Do Not  
Touch This Area  
WARNING: DO NOT  
RE-ENTER THE  
AREA UNTIL THE  
AREA IS SAFE  
DO NOT ENTER  
DO NOT ENTER  
DO NOT ENTER







## **APPENDIX C**

### **WATER QUALITY REPORTS**

## CERTIFICATE OF ANALYSIS

**REPORTED TO** BC Groundwater Consulting Services Ltd.  
835 Nicola Street  
Kamloops, BC V2C 2R6

**ATTENTION** Thierry Carriou

**PO NUMBER**

**PROJECT** Well Drilling Groundwater Characterization  
**PROJECT INFO** 18007.1

**WORK ORDER** 8102060

**RECEIVED / TEMP** 2018-10-23 08:30 / 12°C  
**REPORTED** 2018-10-30 15:09  
**COC NUMBER** B74269

### Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

#### *Big Picture Sidekicks*



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

#### *We've Got Chemistry*



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

#### *Ahead of the Curve*



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at [estclair@caro.ca](mailto:estclair@caro.ca)

#### Authorized By:

Eilish St.Clair, B.Sc., C.I.T.  
Client Service Representative

1-888-311-8846 | [www.caro.ca](http://www.caro.ca)

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                                                    | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|----------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>WIDN 46314 (8102060-01)   Matrix: Water   Sampled: 2018-10-17 14:30</b> |            |           |          |       |            | F2, PRES  |
| <b>Anions</b>                                                              |            |           |          |       |            |           |
| Chloride                                                                   | 1.14       | N/A       | 0.10     | mg/L  | 2018-10-26 |           |
| Fluoride                                                                   | < 0.10     | N/A       | 0.10     | mg/L  | 2018-10-26 |           |
| Nitrate (as N)                                                             | 0.148      | N/A       | 0.010    | mg/L  | 2018-10-26 | HT1       |
| Nitrite (as N)                                                             | < 0.010    | N/A       | 0.010    | mg/L  | 2018-10-26 | HT1       |
| Sulfate                                                                    | 38.3       | N/A       | 1.0      | mg/L  | 2018-10-26 |           |
| <b>Calculated Parameters</b>                                               |            |           |          |       |            |           |
| Hardness, Total (as CaCO3)                                                 | 167        | N/A       | 0.500    | mg/L  | N/A        |           |
| <b>Dissolved Metals</b>                                                    |            |           |          |       |            |           |
| Aluminum, dissolved                                                        | < 0.0050   | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Antimony, dissolved                                                        | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Arsenic, dissolved                                                         | 0.00075    | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Barium, dissolved                                                          | 0.0443     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Beryllium, dissolved                                                       | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Bismuth, dissolved                                                         | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Boron, dissolved                                                           | 0.0557     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Cadmium, dissolved                                                         | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-28 |           |
| Calcium, dissolved                                                         | 46.2       | N/A       | 0.20     | mg/L  | 2018-10-28 |           |
| Chromium, dissolved                                                        | 0.0149     | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Cobalt, dissolved                                                          | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Copper, dissolved                                                          | < 0.00040  | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Iron, dissolved                                                            | 0.112      | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Lead, dissolved                                                            | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Lithium, dissolved                                                         | 0.00154    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Magnesium, dissolved                                                       | 12.6       | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Manganese, dissolved                                                       | 0.00292    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Mercury, dissolved                                                         | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-26 |           |
| Molybdenum, dissolved                                                      | 0.00092    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Nickel, dissolved                                                          | < 0.00040  | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Phosphorus, dissolved                                                      | < 0.050    | N/A       | 0.050    | mg/L  | 2018-10-28 |           |
| Potassium, dissolved                                                       | 1.33       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Selenium, dissolved                                                        | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Silicon, dissolved                                                         | 9.7        | N/A       | 1.0      | mg/L  | 2018-10-28 |           |
| Silver, dissolved                                                          | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-28 |           |
| Sodium, dissolved                                                          | 21.3       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Strontium, dissolved                                                       | 0.297      | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Sulfur, dissolved                                                          | 10.7       | N/A       | 3.0      | mg/L  | 2018-10-28 |           |
| Tellurium, dissolved                                                       | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Thallium, dissolved                                                        | < 0.000020 | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |
| Thorium, dissolved                                                         | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Tin, dissolved                                                             | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Titanium, dissolved                                                        | < 0.0050   | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                                                               | Result | Guideline | RL | Units | Analyzed | Qualifier |
|---------------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>WIDN 46314 (8102060-01)   Matrix: Water   Sampled: 2018-10-17 14:30, Continued</b> |        |           |    |       |          | F2, PRES  |

### Dissolved Metals, Continued

|                      |                |     |          |      |            |  |
|----------------------|----------------|-----|----------|------|------------|--|
| Tungsten, dissolved  | < 0.0010       | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Uranium, dissolved   | <b>0.00273</b> | N/A | 0.000020 | mg/L | 2018-10-28 |  |
| Vanadium, dissolved  | <b>0.0033</b>  | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Zinc, dissolved      | < 0.0040       | N/A | 0.0040   | mg/L | 2018-10-28 |  |
| Zirconium, dissolved | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |

### General Parameters

|                                                     |             |     |       |          |            |     |
|-----------------------------------------------------|-------------|-----|-------|----------|------------|-----|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | <b>199</b>  | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0       | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | <b>199</b>  | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0       | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0       | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Ammonia, Total (as N)                               | < 0.020     | N/A | 0.020 | mg/L     | 2018-10-28 |     |
| Colour, True                                        | < 5.0       | N/A | 5.0   | CU       | 2018-10-24 | HT1 |
| Conductivity (EC)                                   | <b>433</b>  | N/A | 2.0   | µS/cm    | 2018-10-24 |     |
| pH                                                  | <b>8.17</b> | N/A | 0.10  | pH units | 2018-10-24 | HT2 |
| Solids, Total Dissolved                             | <b>261</b>  | N/A | 15    | mg/L     | 2018-10-22 | HT1 |
| Sulfide, Total                                      | < 0.020     | N/A | 0.020 | mg/L     | 2018-10-25 | HT1 |
| Turbidity                                           | <b>1.75</b> | N/A | 0.10  | NTU      | 2018-10-24 | HT1 |

### Total Metals

|                   |                |     |          |      |            |     |
|-------------------|----------------|-----|----------|------|------------|-----|
| Aluminum, total   | <b>0.0516</b>  | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Antimony, total   | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Arsenic, total    | <b>0.00087</b> | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Barium, total     | <b>0.0478</b>  | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Beryllium, total  | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Bismuth, total    | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Boron, total      | <b>0.0595</b>  | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Cadmium, total    | < 0.000010     | N/A | 0.000010 | mg/L | 2018-10-29 |     |
| Calcium, total    | <b>52.3</b>    | N/A | 0.20     | mg/L | 2018-10-29 |     |
| Chromium, total   | <b>0.0193</b>  | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Cobalt, total     | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Copper, total     | < 0.00040      | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Iron, total       | <b>0.226</b>   | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Lead, total       | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Lithium, total    | <b>0.00158</b> | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Magnesium, total  | <b>13.4</b>    | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Manganese, total  | <b>0.00597</b> | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Mercury, total    | < 0.000040     | N/A | 0.000040 | mg/L | 2018-10-29 | CT5 |
| Molybdenum, total | <b>0.00091</b> | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Nickel, total     | < 0.00040      | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Phosphorus, total | < 0.050        | N/A | 0.050    | mg/L | 2018-10-29 |     |
| Potassium, total  | <b>1.60</b>    | N/A | 0.10     | mg/L | 2018-10-29 |     |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                                                        | Result         | Guideline | RL       | Units | Analyzed   | Qualifier |
|--------------------------------------------------------------------------------|----------------|-----------|----------|-------|------------|-----------|
| WIDN 46314 (8102060-01)   Matrix: Water   Sampled: 2018-10-17 14:30, Continued |                |           |          |       |            | F2, PRES  |
| <i>Total Metals, Continued</i>                                                 |                |           |          |       |            |           |
| Selenium, total                                                                | < 0.00050      | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Silicon, total                                                                 | <b>10.4</b>    | N/A       | 1.0      | mg/L  | 2018-10-29 |           |
| Silver, total                                                                  | < 0.000050     | N/A       | 0.000050 | mg/L  | 2018-10-29 |           |
| Sodium, total                                                                  | <b>22.7</b>    | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Strontium, total                                                               | <b>0.341</b>   | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Sulfur, total                                                                  | <b>13.4</b>    | N/A       | 3.0      | mg/L  | 2018-10-29 |           |
| Tellurium, total                                                               | < 0.00050      | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Thallium, total                                                                | < 0.000020     | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Thorium, total                                                                 | < 0.00010      | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Tin, total                                                                     | < 0.00020      | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Titanium, total                                                                | < 0.0050       | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Tungsten, total                                                                | < 0.0010       | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Uranium, total                                                                 | <b>0.00272</b> | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Vanadium, total                                                                | <b>0.0041</b>  | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Zinc, total                                                                    | < 0.0040       | N/A       | 0.0040   | mg/L  | 2018-10-29 |           |
| Zirconium, total                                                               | < 0.00010      | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |

### Sample Qualifiers:

|      |                                                                                                                                                               |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CT5  | This sample has been incorrectly preserved for Mercury analysis                                                                                               |
| F2   | The sample was not field-preserved with HNO3 and was therefore preserved in the laboratory and held for at least 16 hours prior to analysis for total metals. |
| HT1  | The sample was prepared and/or analyzed past the recommended holding time.                                                                                    |
| HT2  | The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.                                         |
| PRES | Sample has been preserved for NH3 in the laboratory and the holding time has been extended.                                                                   |

## APPENDIX 1: SUPPORTING INFORMATION

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analysis Description             | Method Ref.                       | Technique                                                                                         | Location |
|----------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|----------|
| Alkalinity in Water              | SM 2320 B* (2011)                 | Titration with H <sub>2</sub> SO <sub>4</sub>                                                     | Kelowna  |
| Ammonia, Total in Water          | SM 4500-NH <sub>3</sub> G* (2011) | Automated Colorimetry (Phenate)                                                                   | Kelowna  |
| Anions in Water                  | SM 4110 B (2011)                  | Ion Chromatography                                                                                | Kelowna  |
| Colour, True in Water            | SM 2120 C (2011)                  | Spectrophotometry (456 nm)                                                                        | Kelowna  |
| Conductivity in Water            | SM 2510 B (2011)                  | Conductivity Meter                                                                                | Kelowna  |
| Dissolved Metals in Water        | EPA 200.8 / EPA 6020B             | 0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)                        | Richmond |
| Hardness in Water                | SM 2340 B (2011)                  | Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]                                                    | N/A      |
| Mercury, dissolved in Water      | EPA 245.7*                        | BrCl <sub>2</sub> Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)                 | Richmond |
| pH in Water                      | SM 4500-H+ B (2011)               | Electrometry                                                                                      | Kelowna  |
| Solids, Total Dissolved in Water | SM 2540 C* (2011)                 | Gravimetry (Dried at 103-105C)                                                                    | Kelowna  |
| Sulfide, Total in Water          | SM 4500-S <sub>2</sub> D* (2011)  | Colorimetry (Methylene Blue)                                                                      | Edmonton |
| Total Metals in Water            | EPA 200.2* / EPA 6020B            | HNO <sub>3</sub> +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) | Richmond |
| Turbidity in Water               | SM 2130 B (2011)                  | Nephelometry                                                                                      | Kelowna  |

*Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method*

### Glossary of Terms:

|          |                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------|
| RL       | Reporting Limit (default)                                                                                             |
| <        | Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors |
| CU       | Colour Units (referenced against a platinum cobalt standard)                                                          |
| mg/L     | Milligrams per litre                                                                                                  |
| NTU      | Nephelometric Turbidity Units                                                                                         |
| pH units | pH < 7 = acidic, pH > 7 = basic                                                                                       |
| µS/cm    | Microsiemens per centimetre                                                                                           |
| EPA      | United States Environmental Protection Agency Test Methods                                                            |
| SM       | Standard Methods for the Examination of Water and Wastewater, American Public Health Association                      |

### General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

## APPENDIX 2: QUALITY CONTROL RESULTS

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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (BLK):** A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup):** An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS):** A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS):** A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM):** A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

| Analyte                      | Result  | RL Units   | Spike Level | Source Result | % REC                                      | REC Limit | % RPD | RPD Limit | Qualifier |
|------------------------------|---------|------------|-------------|---------------|--------------------------------------------|-----------|-------|-----------|-----------|
| <b>Anions, Batch B8J1876</b> |         |            |             |               |                                            |           |       |           |           |
| <b>Blank (B8J1876-BLK1)</b>  |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Fluoride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Nitrate (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Nitrite (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Sulfate                      | < 1.0   | 1.0 mg/L   |             |               |                                            |           |       |           |           |
| <b>Blank (B8J1876-BLK2)</b>  |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Fluoride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Nitrate (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Nitrite (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Sulfate                      | < 1.0   | 1.0 mg/L   |             |               |                                            |           |       |           |           |
| <b>Blank (B8J1876-BLK3)</b>  |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Fluoride                     | < 0.10  | 0.10 mg/L  |             |               |                                            |           |       |           |           |
| Nitrate (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Nitrite (as N)               | < 0.010 | 0.010 mg/L |             |               |                                            |           |       |           |           |
| Sulfate                      | < 1.0   | 1.0 mg/L   |             |               |                                            |           |       |           |           |
| <b>LCS (B8J1876-BS1)</b>     |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | 16.2    | 0.10 mg/L  | 16.0        |               | 101                                        | 90-110    |       |           |           |
| Fluoride                     | 4.11    | 0.10 mg/L  | 4.00        |               | 103                                        | 88-108    |       |           |           |
| Nitrate (as N)               | 4.21    | 0.010 mg/L | 4.00        |               | 105                                        | 93-108    |       |           |           |
| Nitrite (as N)               | 1.87    | 0.010 mg/L | 2.00        |               | 93                                         | 85-114    |       |           |           |
| Sulfate                      | 15.9    | 1.0 mg/L   | 16.0        |               | 100                                        | 91-109    |       |           |           |
| <b>LCS (B8J1876-BS2)</b>     |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | 16.2    | 0.10 mg/L  | 16.0        |               | 101                                        | 90-110    |       |           |           |
| Fluoride                     | 4.14    | 0.10 mg/L  | 4.00        |               | 103                                        | 88-108    |       |           |           |
| Nitrate (as N)               | 4.27    | 0.010 mg/L | 4.00        |               | 107                                        | 93-108    |       |           |           |
| Nitrite (as N)               | 1.88    | 0.010 mg/L | 2.00        |               | 94                                         | 85-114    |       |           |           |
| Sulfate                      | 16.0    | 1.0 mg/L   | 16.0        |               | 100                                        | 91-109    |       |           |           |
| <b>LCS (B8J1876-BS3)</b>     |         |            |             |               | Prepared: 2018-10-26, Analyzed: 2018-10-26 |           |       |           |           |
| Chloride                     | 16.2    | 0.10 mg/L  | 16.0        |               | 101                                        | 90-110    |       |           |           |

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| Analyte                                 | Result | RL Units   | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------|--------|------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Anions, Batch B8J1876, Continued</b> |        |            |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1876-BS3), Continued</b>     |        |            |             | Prepared: 2018-10-26, Analyzed: 2018-10-26 |       |           |       |           |           |
| Fluoride                                | 4.07   | 0.10 mg/L  | 4.00        |                                            | 102   | 88-108    |       |           |           |
| Nitrate (as N)                          | 4.25   | 0.010 mg/L | 4.00        |                                            | 106   | 93-108    |       |           |           |
| Nitrite (as N)                          | 1.87   | 0.010 mg/L | 2.00        |                                            | 93    | 85-114    |       |           |           |
| Sulfate                                 | 15.9   | 1.0 mg/L   | 16.0        |                                            | 99    | 91-109    |       |           |           |

### Dissolved Metals, Batch B8J2028

|                                 |            |               |         |                                            |    |        |  |  |  |
|---------------------------------|------------|---------------|---------|--------------------------------------------|----|--------|--|--|--|
| <b>Blank (B8J2028-BLK1)</b>     |            |               |         | Prepared: 2018-10-25, Analyzed: 2018-10-26 |    |        |  |  |  |
| Mercury, dissolved              | < 0.000010 | 0.000010 mg/L |         |                                            |    |        |  |  |  |
| <b>Blank (B8J2028-BLK2)</b>     |            |               |         | Prepared: 2018-10-25, Analyzed: 2018-10-26 |    |        |  |  |  |
| Mercury, dissolved              | < 0.000010 | 0.000010 mg/L |         |                                            |    |        |  |  |  |
| <b>Reference (B8J2028-SRM1)</b> |            |               |         | Prepared: 2018-10-25, Analyzed: 2018-10-26 |    |        |  |  |  |
| Mercury, dissolved              | 0.00459    | 0.000010 mg/L | 0.00489 |                                            | 94 | 80-120 |  |  |  |
| <b>Reference (B8J2028-SRM2)</b> |            |               |         | Prepared: 2018-10-25, Analyzed: 2018-10-26 |    |        |  |  |  |
| Mercury, dissolved              | 0.00457    | 0.000010 mg/L | 0.00489 |                                            | 93 | 80-120 |  |  |  |

### Dissolved Metals, Batch B8J2169

|                             |            |               |  |                                            |  |  |  |  |  |
|-----------------------------|------------|---------------|--|--------------------------------------------|--|--|--|--|--|
| <b>Blank (B8J2169-BLK1)</b> |            |               |  | Prepared: 2018-10-28, Analyzed: 2018-10-28 |  |  |  |  |  |
| Aluminum, dissolved         | < 0.0050   | 0.0050 mg/L   |  |                                            |  |  |  |  |  |
| Antimony, dissolved         | < 0.00020  | 0.00020 mg/L  |  |                                            |  |  |  |  |  |
| Arsenic, dissolved          | < 0.00050  | 0.00050 mg/L  |  |                                            |  |  |  |  |  |
| Barium, dissolved           | < 0.0050   | 0.0050 mg/L   |  |                                            |  |  |  |  |  |
| Beryllium, dissolved        | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Bismuth, dissolved          | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Boron, dissolved            | < 0.0050   | 0.0050 mg/L   |  |                                            |  |  |  |  |  |
| Cadmium, dissolved          | < 0.000010 | 0.000010 mg/L |  |                                            |  |  |  |  |  |
| Calcium, dissolved          | < 0.20     | 0.20 mg/L     |  |                                            |  |  |  |  |  |
| Chromium, dissolved         | < 0.00050  | 0.00050 mg/L  |  |                                            |  |  |  |  |  |
| Cobalt, dissolved           | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Copper, dissolved           | < 0.00040  | 0.00040 mg/L  |  |                                            |  |  |  |  |  |
| Iron, dissolved             | < 0.010    | 0.010 mg/L    |  |                                            |  |  |  |  |  |
| Lead, dissolved             | < 0.00020  | 0.00020 mg/L  |  |                                            |  |  |  |  |  |
| Lithium, dissolved          | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Magnesium, dissolved        | < 0.010    | 0.010 mg/L    |  |                                            |  |  |  |  |  |
| Manganese, dissolved        | < 0.00020  | 0.00020 mg/L  |  |                                            |  |  |  |  |  |
| Molybdenum, dissolved       | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Nickel, dissolved           | < 0.00040  | 0.00040 mg/L  |  |                                            |  |  |  |  |  |
| Phosphorus, dissolved       | < 0.050    | 0.050 mg/L    |  |                                            |  |  |  |  |  |
| Potassium, dissolved        | < 0.10     | 0.10 mg/L     |  |                                            |  |  |  |  |  |
| Selenium, dissolved         | < 0.00050  | 0.00050 mg/L  |  |                                            |  |  |  |  |  |
| Silicon, dissolved          | < 1.0      | 1.0 mg/L      |  |                                            |  |  |  |  |  |
| Silver, dissolved           | < 0.000050 | 0.000050 mg/L |  |                                            |  |  |  |  |  |
| Sodium, dissolved           | < 0.10     | 0.10 mg/L     |  |                                            |  |  |  |  |  |
| Strontium, dissolved        | < 0.0010   | 0.0010 mg/L   |  |                                            |  |  |  |  |  |
| Sulfur, dissolved           | < 3.0      | 3.0 mg/L      |  |                                            |  |  |  |  |  |
| Tellurium, dissolved        | < 0.00050  | 0.00050 mg/L  |  |                                            |  |  |  |  |  |
| Thallium, dissolved         | < 0.000020 | 0.000020 mg/L |  |                                            |  |  |  |  |  |
| Thorium, dissolved          | < 0.00010  | 0.00010 mg/L  |  |                                            |  |  |  |  |  |
| Tin, dissolved              | < 0.00020  | 0.00020 mg/L  |  |                                            |  |  |  |  |  |
| Titanium, dissolved         | < 0.0050   | 0.0050 mg/L   |  |                                            |  |  |  |  |  |
| Tungsten, dissolved         | < 0.0010   | 0.0010 mg/L   |  |                                            |  |  |  |  |  |

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| Analyte                                           | Result     | RL       | Units | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|---------------------------------------------------|------------|----------|-------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Dissolved Metals, Batch B8J2169, Continued</b> |            |          |       |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2169-BLK1), Continued</b>            |            |          |       |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Uranium, dissolved                                | < 0.000020 | 0.000020 | mg/L  |             |                                            |       |           |       |           |           |
| Vanadium, dissolved                               | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Zinc, dissolved                                   | < 0.0040   | 0.0040   | mg/L  |             |                                            |       |           |       |           |           |
| Zirconium, dissolved                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2169-BLK2)</b>                       |            |          |       |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Aluminum, dissolved                               | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Antimony, dissolved                               | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Arsenic, dissolved                                | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Barium, dissolved                                 | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Beryllium, dissolved                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Bismuth, dissolved                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Boron, dissolved                                  | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Cadmium, dissolved                                | < 0.000010 | 0.000010 | mg/L  |             |                                            |       |           |       |           |           |
| Calcium, dissolved                                | < 0.20     | 0.20     | mg/L  |             |                                            |       |           |       |           |           |
| Chromium, dissolved                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Cobalt, dissolved                                 | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Copper, dissolved                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Iron, dissolved                                   | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Lead, dissolved                                   | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Lithium, dissolved                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Magnesium, dissolved                              | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Manganese, dissolved                              | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Molybdenum, dissolved                             | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Nickel, dissolved                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Phosphorus, dissolved                             | < 0.050    | 0.050    | mg/L  |             |                                            |       |           |       |           |           |
| Potassium, dissolved                              | < 0.10     | 0.10     | mg/L  |             |                                            |       |           |       |           |           |
| Selenium, dissolved                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Silicon, dissolved                                | < 1.0      | 1.0      | mg/L  |             |                                            |       |           |       |           |           |
| Silver, dissolved                                 | < 0.000050 | 0.000050 | mg/L  |             |                                            |       |           |       |           |           |
| Sodium, dissolved                                 | < 0.10     | 0.10     | mg/L  |             |                                            |       |           |       |           |           |
| Strontium, dissolved                              | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Sulfur, dissolved                                 | < 3.0      | 3.0      | mg/L  |             |                                            |       |           |       |           |           |
| Tellurium, dissolved                              | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Thallium, dissolved                               | < 0.000020 | 0.000020 | mg/L  |             |                                            |       |           |       |           |           |
| Thorium, dissolved                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Tin, dissolved                                    | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Titanium, dissolved                               | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Tungsten, dissolved                               | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Uranium, dissolved                                | < 0.000020 | 0.000020 | mg/L  |             |                                            |       |           |       |           |           |
| Vanadium, dissolved                               | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Zinc, dissolved                                   | < 0.0040   | 0.0040   | mg/L  |             |                                            |       |           |       |           |           |
| Zirconium, dissolved                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2169-BLK3)</b>                       |            |          |       |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, dissolved                               | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Antimony, dissolved                               | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Arsenic, dissolved                                | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Barium, dissolved                                 | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Beryllium, dissolved                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Bismuth, dissolved                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Boron, dissolved                                  | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Cadmium, dissolved                                | < 0.000010 | 0.000010 | mg/L  |             |                                            |       |           |       |           |           |
| Calcium, dissolved                                | < 0.20     | 0.20     | mg/L  |             |                                            |       |           |       |           |           |
| Chromium, dissolved                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Cobalt, dissolved                                 | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |

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| Analyte                                           | Result     | RL Units      | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|---------------------------------------------------|------------|---------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Dissolved Metals, Batch B8J2169, Continued</b> |            |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2169-BLK3), Continued</b>            |            |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Copper, dissolved                                 | < 0.00040  | 0.00040 mg/L  |             |                                            |       |           |       |           |           |
| Iron, dissolved                                   | < 0.010    | 0.010 mg/L    |             |                                            |       |           |       |           |           |
| Lead, dissolved                                   | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Lithium, dissolved                                | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Magnesium, dissolved                              | < 0.010    | 0.010 mg/L    |             |                                            |       |           |       |           |           |
| Manganese, dissolved                              | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Molybdenum, dissolved                             | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Nickel, dissolved                                 | < 0.00040  | 0.00040 mg/L  |             |                                            |       |           |       |           |           |
| Phosphorus, dissolved                             | < 0.050    | 0.050 mg/L    |             |                                            |       |           |       |           |           |
| Potassium, dissolved                              | < 0.10     | 0.10 mg/L     |             |                                            |       |           |       |           |           |
| Selenium, dissolved                               | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Silicon, dissolved                                | < 1.0      | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Silver, dissolved                                 | < 0.000050 | 0.000050 mg/L |             |                                            |       |           |       |           |           |
| Sodium, dissolved                                 | < 0.10     | 0.10 mg/L     |             |                                            |       |           |       |           |           |
| Strontium, dissolved                              | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Sulfur, dissolved                                 | < 3.0      | 3.0 mg/L      |             |                                            |       |           |       |           |           |
| Tellurium, dissolved                              | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Thallium, dissolved                               | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Thorium, dissolved                                | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Tin, dissolved                                    | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Titanium, dissolved                               | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Tungsten, dissolved                               | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Uranium, dissolved                                | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Vanadium, dissolved                               | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Zinc, dissolved                                   | < 0.0040   | 0.0040 mg/L   |             |                                            |       |           |       |           |           |
| Zirconium, dissolved                              | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| <b>LCS (B8J2169-BS1)</b>                          |            |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Aluminum, dissolved                               | 0.0207     | 0.0050 mg/L   | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Antimony, dissolved                               | 0.0201     | 0.00020 mg/L  | 0.0200      |                                            | 101   | 80-120    |       |           |           |
| Arsenic, dissolved                                | 0.0185     | 0.00050 mg/L  | 0.0200      |                                            | 93    | 80-120    |       |           |           |
| Barium, dissolved                                 | 0.0201     | 0.0050 mg/L   | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Beryllium, dissolved                              | 0.0223     | 0.00010 mg/L  | 0.0200      |                                            | 112   | 80-120    |       |           |           |
| Bismuth, dissolved                                | 0.0202     | 0.00010 mg/L  | 0.0200      |                                            | 101   | 80-120    |       |           |           |
| Boron, dissolved                                  | 0.0204     | 0.0050 mg/L   | 0.0200      |                                            | 102   | 80-120    |       |           |           |
| Cadmium, dissolved                                | 0.0199     | 0.000010 mg/L | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Calcium, dissolved                                | 1.81       | 0.20 mg/L     | 2.00        |                                            | 91    | 80-120    |       |           |           |
| Chromium, dissolved                               | 0.0181     | 0.00050 mg/L  | 0.0200      |                                            | 91    | 80-120    |       |           |           |
| Cobalt, dissolved                                 | 0.0188     | 0.00010 mg/L  | 0.0200      |                                            | 94    | 80-120    |       |           |           |
| Copper, dissolved                                 | 0.0193     | 0.00040 mg/L  | 0.0200      |                                            | 96    | 80-120    |       |           |           |
| Iron, dissolved                                   | 1.77       | 0.010 mg/L    | 2.00        |                                            | 89    | 80-120    |       |           |           |
| Lead, dissolved                                   | 0.0203     | 0.00020 mg/L  | 0.0200      |                                            | 101   | 80-120    |       |           |           |
| Lithium, dissolved                                | 0.0208     | 0.00010 mg/L  | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Magnesium, dissolved                              | 1.90       | 0.010 mg/L    | 2.00        |                                            | 95    | 80-120    |       |           |           |
| Manganese, dissolved                              | 0.0184     | 0.00020 mg/L  | 0.0200      |                                            | 92    | 80-120    |       |           |           |
| Molybdenum, dissolved                             | 0.0188     | 0.00010 mg/L  | 0.0200      |                                            | 94    | 80-120    |       |           |           |
| Nickel, dissolved                                 | 0.0187     | 0.00040 mg/L  | 0.0200      |                                            | 94    | 80-120    |       |           |           |
| Phosphorus, dissolved                             | 1.72       | 0.050 mg/L    | 2.00        |                                            | 86    | 80-120    |       |           |           |
| Potassium, dissolved                              | 1.70       | 0.10 mg/L     | 2.00        |                                            | 85    | 80-120    |       |           |           |
| Selenium, dissolved                               | 0.0202     | 0.00050 mg/L  | 0.0200      |                                            | 101   | 80-120    |       |           |           |
| Silicon, dissolved                                | 2.1        | 1.0 mg/L      | 2.00        |                                            | 103   | 80-120    |       |           |           |
| Silver, dissolved                                 | 0.0183     | 0.000050 mg/L | 0.0200      |                                            | 91    | 80-120    |       |           |           |
| Sodium, dissolved                                 | 1.88       | 0.10 mg/L     | 2.00        |                                            | 94    | 80-120    |       |           |           |
| Strontium, dissolved                              | 0.0178     | 0.0010 mg/L   | 0.0200      |                                            | 89    | 80-120    |       |           |           |
| Sulfur, dissolved                                 | 4.2        | 3.0 mg/L      | 5.00        |                                            | 85    | 80-120    |       |           |           |
| Tellurium, dissolved                              | 0.0202     | 0.00050 mg/L  | 0.0200      |                                            | 101   | 80-120    |       |           |           |

## APPENDIX 2: QUALITY CONTROL RESULTS

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Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
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| Analyte                                           | Result | RL Units      | Spike Level | Source Result | % REC                                      | REC Limit | % RPD | RPD Limit | Qualifier |
|---------------------------------------------------|--------|---------------|-------------|---------------|--------------------------------------------|-----------|-------|-----------|-----------|
| <b>Dissolved Metals, Batch B8J2169, Continued</b> |        |               |             |               |                                            |           |       |           |           |
| <b>LCS (B8J2169-BS1), Continued</b>               |        |               |             |               | Prepared: 2018-10-28, Analyzed: 2018-10-28 |           |       |           |           |
| Thallium, dissolved                               | 0.0206 | 0.000020 mg/L | 0.0200      |               | 103                                        | 80-120    |       |           |           |
| Thorium, dissolved                                | 0.0197 | 0.00010 mg/L  | 0.0200      |               | 98                                         | 80-120    |       |           |           |
| Tin, dissolved                                    | 0.0204 | 0.00020 mg/L  | 0.0200      |               | 102                                        | 80-120    |       |           |           |
| Titanium, dissolved                               | 0.0181 | 0.0050 mg/L   | 0.0200      |               | 90                                         | 80-120    |       |           |           |
| Tungsten, dissolved                               | 0.0170 | 0.0010 mg/L   | 0.0200      |               | 85                                         | 80-120    |       |           |           |
| Uranium, dissolved                                | 0.0199 | 0.000020 mg/L | 0.0200      |               | 100                                        | 80-120    |       |           |           |
| Vanadium, dissolved                               | 0.0180 | 0.0010 mg/L   | 0.0200      |               | 90                                         | 80-120    |       |           |           |
| Zinc, dissolved                                   | 0.0202 | 0.0040 mg/L   | 0.0200      |               | 101                                        | 80-120    |       |           |           |
| Zirconium, dissolved                              | 0.0195 | 0.00010 mg/L  | 0.0200      |               | 97                                         | 80-120    |       |           |           |
| <b>Reference (B8J2169-SRM1)</b>                   |        |               |             |               | Prepared: 2018-10-28, Analyzed: 2018-10-28 |           |       |           |           |
| Aluminum, dissolved                               | 0.223  | 0.0050 mg/L   | 0.233       |               | 96                                         | 79-114    |       |           |           |
| Antimony, dissolved                               | 0.0460 | 0.00020 mg/L  | 0.0430      |               | 107                                        | 89-123    |       |           |           |
| Arsenic, dissolved                                | 0.421  | 0.00050 mg/L  | 0.438       |               | 96                                         | 87-113    |       |           |           |
| Barium, dissolved                                 | 3.27   | 0.0050 mg/L   | 3.35        |               | 98                                         | 85-114    |       |           |           |
| Beryllium, dissolved                              | 0.238  | 0.00010 mg/L  | 0.213       |               | 112                                        | 79-122    |       |           |           |
| Boron, dissolved                                  | 1.73   | 0.0050 mg/L   | 1.74        |               | 99                                         | 79-117    |       |           |           |
| Cadmium, dissolved                                | 0.226  | 0.000010 mg/L | 0.224       |               | 101                                        | 89-112    |       |           |           |
| Calcium, dissolved                                | 7.00   | 0.20 mg/L     | 7.69        |               | 91                                         | 85-120    |       |           |           |
| Chromium, dissolved                               | 0.410  | 0.00050 mg/L  | 0.437       |               | 94                                         | 87-113    |       |           |           |
| Cobalt, dissolved                                 | 0.120  | 0.00010 mg/L  | 0.128       |               | 94                                         | 90-117    |       |           |           |
| Copper, dissolved                                 | 0.807  | 0.00040 mg/L  | 0.844       |               | 96                                         | 90-115    |       |           |           |
| Iron, dissolved                                   | 1.16   | 0.010 mg/L    | 1.29        |               | 90                                         | 86-112    |       |           |           |
| Lead, dissolved                                   | 0.113  | 0.00020 mg/L  | 0.112       |               | 101                                        | 90-113    |       |           |           |
| Lithium, dissolved                                | 0.103  | 0.00010 mg/L  | 0.104       |               | 99                                         | 77-127    |       |           |           |
| Magnesium, dissolved                              | 6.38   | 0.010 mg/L    | 6.92        |               | 92                                         | 84-116    |       |           |           |
| Manganese, dissolved                              | 0.320  | 0.00020 mg/L  | 0.345       |               | 93                                         | 85-113    |       |           |           |
| Molybdenum, dissolved                             | 0.407  | 0.00010 mg/L  | 0.426       |               | 95                                         | 87-112    |       |           |           |
| Nickel, dissolved                                 | 0.813  | 0.00040 mg/L  | 0.840       |               | 97                                         | 90-114    |       |           |           |
| Phosphorus, dissolved                             | 0.390  | 0.050 mg/L    | 0.495       |               | 79                                         | 74-119    |       |           |           |
| Potassium, dissolved                              | 2.60   | 0.10 mg/L     | 3.19        |               | 82                                         | 78-119    |       |           |           |
| Selenium, dissolved                               | 0.0352 | 0.00050 mg/L  | 0.0331      |               | 106                                        | 89-123    |       |           |           |
| Sodium, dissolved                                 | 17.3   | 0.10 mg/L     | 19.1        |               | 90                                         | 81-117    |       |           |           |
| Strontium, dissolved                              | 0.850  | 0.0010 mg/L   | 0.916       |               | 93                                         | 82-111    |       |           |           |
| Thallium, dissolved                               | 0.0403 | 0.000020 mg/L | 0.0393      |               | 102                                        | 90-113    |       |           |           |
| Uranium, dissolved                                | 0.251  | 0.000020 mg/L | 0.266       |               | 95                                         | 87-113    |       |           |           |
| Vanadium, dissolved                               | 0.802  | 0.0010 mg/L   | 0.869       |               | 92                                         | 85-110    |       |           |           |
| Zinc, dissolved                                   | 0.858  | 0.0040 mg/L   | 0.881       |               | 97                                         | 88-114    |       |           |           |

### General Parameters, Batch B8J1760

|                             |        |          |      |  |                                            |        |  |  |  |
|-----------------------------|--------|----------|------|--|--------------------------------------------|--------|--|--|--|
| <b>Blank (B8J1760-BLK1)</b> |        |          |      |  | Prepared: 2018-10-24, Analyzed: 2018-10-24 |        |  |  |  |
| Turbidity                   | < 0.10 | 0.10 NTU |      |  |                                            |        |  |  |  |
| <b>Blank (B8J1760-BLK2)</b> |        |          |      |  | Prepared: 2018-10-24, Analyzed: 2018-10-24 |        |  |  |  |
| Turbidity                   | < 0.10 | 0.10 NTU |      |  |                                            |        |  |  |  |
| <b>LCS (B8J1760-BS1)</b>    |        |          |      |  | Prepared: 2018-10-24, Analyzed: 2018-10-24 |        |  |  |  |
| Turbidity                   | 39.1   | 0.10 NTU | 40.0 |  | 98                                         | 90-110 |  |  |  |
| <b>LCS (B8J1760-BS2)</b>    |        |          |      |  | Prepared: 2018-10-24, Analyzed: 2018-10-24 |        |  |  |  |
| Turbidity                   | 38.6   | 0.10 NTU | 40.0 |  | 96                                         | 90-110 |  |  |  |

### General Parameters, Batch B8J1819

## APPENDIX 2: QUALITY CONTROL RESULTS

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| Analyte                                             | Result  | RL Units      | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------------------|---------|---------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>General Parameters, Batch B8J1819, Continued</b> |         |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1819-BLK1)</b>                         |         |               |             | Prepared: 2018-10-22, Analyzed: 2018-10-22 |       |           |       |           |           |
| Solids, Total Dissolved                             | < 15    | 15 mg/L       |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1819-BS1)</b>                            |         |               |             | Prepared: 2018-10-22, Analyzed: 2018-10-22 |       |           |       |           |           |
| Solids, Total Dissolved                             | 238     | 15 mg/L       | 240         |                                            | 99    | 85-115    |       |           |           |
| <b>General Parameters, Batch B8J1821</b>            |         |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1821-BLK1)</b>                         |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| Alkalinity, Total (as CaCO <sub>3</sub> )           | < 1.0   | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0   | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | < 1.0   | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0   | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0   | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Conductivity (EC)                                   | < 2.0   | 2.0 µS/cm     |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1821-BS1)</b>                            |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| Alkalinity, Total (as CaCO <sub>3</sub> )           | 104     | 1.0 mg/L      | 100         |                                            | 104   | 92-106    |       |           |           |
| <b>LCS (B8J1821-BS2)</b>                            |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| Conductivity (EC)                                   | 1400    | 2.0 µS/cm     | 1410        |                                            | 99    | 95-104    |       |           |           |
| <b>Reference (B8J1821-SRM1)</b>                     |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| pH                                                  | 7.00    | 0.10 pH units | 7.00        |                                            | 100   | 90-110    |       |           |           |
| <b>General Parameters, Batch B8J1871</b>            |         |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1871-BLK1)</b>                         |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| Colour, True                                        | < 5.0   | 5.0 CU        |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1871-BS1)</b>                            |         |               |             | Prepared: 2018-10-24, Analyzed: 2018-10-24 |       |           |       |           |           |
| Colour, True                                        | 10      | 5.0 CU        | 10.0        |                                            | 101   | 85-115    |       |           |           |
| <b>General Parameters, Batch B8J1977</b>            |         |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1977-BLK1)</b>                         |         |               |             | Prepared: 2018-10-25, Analyzed: 2018-10-25 |       |           |       |           |           |
| Sulfide, Total                                      | < 0.020 | 0.020 mg/L    |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1977-BS1)</b>                            |         |               |             | Prepared: 2018-10-25, Analyzed: 2018-10-25 |       |           |       |           |           |
| Sulfide, Total                                      | 0.456   | 0.020 mg/L    | 0.500       |                                            | 91    | 82-116    |       |           |           |
| <b>General Parameters, Batch B8J1982</b>            |         |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1982-BLK1)</b>                         |         |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | < 0.020 | 0.020 mg/L    |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1982-BLK2)</b>                         |         |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | < 0.020 | 0.020 mg/L    |             |                                            |       |           |       |           |           |
| <b>Blank (B8J1982-BLK3)</b>                         |         |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | < 0.020 | 0.020 mg/L    |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1982-BS1)</b>                            |         |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | 0.994   | 0.020 mg/L    | 1.00        |                                            | 99    | 90-115    |       |           |           |

## APPENDIX 2: QUALITY CONTROL RESULTS

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| Analyte                                             | Result     | RL Units      | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------------------|------------|---------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>General Parameters, Batch B8J1982, Continued</b> |            |               |             |                                            |       |           |       |           |           |
| <b>LCS (B8J1982-BS2)</b>                            |            |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | 1.04       | 0.020 mg/L    | 1.00        |                                            | 104   | 90-115    |       |           |           |
| <b>LCS (B8J1982-BS3)</b>                            |            |               |             | Prepared: 2018-10-28, Analyzed: 2018-10-28 |       |           |       |           |           |
| Ammonia, Total (as N)                               | 1.02       | 0.020 mg/L    | 1.00        |                                            | 102   | 90-115    |       |           |           |
| <b>Total Metals, Batch B8J2197</b>                  |            |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2197-BLK1)</b>                         |            |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, total                                     | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Antimony, total                                     | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Arsenic, total                                      | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Barium, total                                       | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Beryllium, total                                    | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Bismuth, total                                      | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Boron, total                                        | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Cadmium, total                                      | < 0.000010 | 0.000010 mg/L |             |                                            |       |           |       |           |           |
| Calcium, total                                      | < 0.20     | 0.20 mg/L     |             |                                            |       |           |       |           |           |
| Chromium, total                                     | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Cobalt, total                                       | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Copper, total                                       | < 0.00040  | 0.00040 mg/L  |             |                                            |       |           |       |           |           |
| Iron, total                                         | < 0.010    | 0.010 mg/L    |             |                                            |       |           |       |           |           |
| Lead, total                                         | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Lithium, total                                      | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Magnesium, total                                    | < 0.010    | 0.010 mg/L    |             |                                            |       |           |       |           |           |
| Manganese, total                                    | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Mercury, total                                      | < 0.000040 | 0.000040 mg/L |             |                                            |       |           |       |           |           |
| Molybdenum, total                                   | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Nickel, total                                       | < 0.00040  | 0.00040 mg/L  |             |                                            |       |           |       |           |           |
| Phosphorus, total                                   | < 0.050    | 0.050 mg/L    |             |                                            |       |           |       |           |           |
| Potassium, total                                    | < 0.10     | 0.10 mg/L     |             |                                            |       |           |       |           |           |
| Selenium, total                                     | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Silicon, total                                      | < 1.0      | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Silver, total                                       | < 0.000050 | 0.000050 mg/L |             |                                            |       |           |       |           |           |
| Sodium, total                                       | < 0.10     | 0.10 mg/L     |             |                                            |       |           |       |           |           |
| Strontium, total                                    | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Sulfur, total                                       | < 3.0      | 3.0 mg/L      |             |                                            |       |           |       |           |           |
| Tellurium, total                                    | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Thallium, total                                     | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Thorium, total                                      | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Tin, total                                          | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Titanium, total                                     | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Tungsten, total                                     | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Uranium, total                                      | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Vanadium, total                                     | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Zinc, total                                         | < 0.0040   | 0.0040 mg/L   |             |                                            |       |           |       |           |           |
| Zirconium, total                                    | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2197-BLK2)</b>                         |            |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, total                                     | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Antimony, total                                     | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Arsenic, total                                      | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Barium, total                                       | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Beryllium, total                                    | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Bismuth, total                                      | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Boron, total                                        | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |

## APPENDIX 2: QUALITY CONTROL RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                       | Result     | RL       | Units | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------------|------------|----------|-------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Total Metals, Batch B8J2197, Continued</b> |            |          |       |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2197-BLK2), Continued</b>        |            |          |       |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Cadmium, total                                | < 0.000010 | 0.000010 | mg/L  |             |                                            |       |           |       |           |           |
| Calcium, total                                | < 0.20     | 0.20     | mg/L  |             |                                            |       |           |       |           |           |
| Chromium, total                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Cobalt, total                                 | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Copper, total                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Iron, total                                   | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Lead, total                                   | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Lithium, total                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Magnesium, total                              | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Manganese, total                              | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Mercury, total                                | < 0.000040 | 0.000040 | mg/L  |             |                                            |       |           |       |           |           |
| Molybdenum, total                             | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Nickel, total                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Phosphorus, total                             | < 0.050    | 0.050    | mg/L  |             |                                            |       |           |       |           |           |
| Potassium, total                              | < 0.10     | 0.10     | mg/L  |             |                                            |       |           |       |           |           |
| Selenium, total                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Silicon, total                                | < 1.0      | 1.0      | mg/L  |             |                                            |       |           |       |           |           |
| Silver, total                                 | < 0.000050 | 0.000050 | mg/L  |             |                                            |       |           |       |           |           |
| Sodium, total                                 | < 0.10     | 0.10     | mg/L  |             |                                            |       |           |       |           |           |
| Strontium, total                              | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Sulfur, total                                 | < 3.0      | 3.0      | mg/L  |             |                                            |       |           |       |           |           |
| Tellurium, total                              | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Thallium, total                               | < 0.000020 | 0.000020 | mg/L  |             |                                            |       |           |       |           |           |
| Thorium, total                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Tin, total                                    | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Titanium, total                               | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Tungsten, total                               | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Uranium, total                                | < 0.000020 | 0.000020 | mg/L  |             |                                            |       |           |       |           |           |
| Vanadium, total                               | < 0.0010   | 0.0010   | mg/L  |             |                                            |       |           |       |           |           |
| Zinc, total                                   | < 0.0040   | 0.0040   | mg/L  |             |                                            |       |           |       |           |           |
| Zirconium, total                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2197-BLK3)</b>                   |            |          |       |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, total                               | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Antimony, total                               | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Arsenic, total                                | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Barium, total                                 | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Beryllium, total                              | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Bismuth, total                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Boron, total                                  | < 0.0050   | 0.0050   | mg/L  |             |                                            |       |           |       |           |           |
| Cadmium, total                                | < 0.000010 | 0.000010 | mg/L  |             |                                            |       |           |       |           |           |
| Calcium, total                                | < 0.20     | 0.20     | mg/L  |             |                                            |       |           |       |           |           |
| Chromium, total                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |
| Cobalt, total                                 | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Copper, total                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Iron, total                                   | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Lead, total                                   | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Lithium, total                                | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Magnesium, total                              | < 0.010    | 0.010    | mg/L  |             |                                            |       |           |       |           |           |
| Manganese, total                              | < 0.00020  | 0.00020  | mg/L  |             |                                            |       |           |       |           |           |
| Mercury, total                                | < 0.000040 | 0.000040 | mg/L  |             |                                            |       |           |       |           |           |
| Molybdenum, total                             | < 0.00010  | 0.00010  | mg/L  |             |                                            |       |           |       |           |           |
| Nickel, total                                 | < 0.00040  | 0.00040  | mg/L  |             |                                            |       |           |       |           |           |
| Phosphorus, total                             | < 0.050    | 0.050    | mg/L  |             |                                            |       |           |       |           |           |
| Potassium, total                              | < 0.10     | 0.10     | mg/L  |             |                                            |       |           |       |           |           |
| Selenium, total                               | < 0.00050  | 0.00050  | mg/L  |             |                                            |       |           |       |           |           |

## APPENDIX 2: QUALITY CONTROL RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                       | Result     | RL Units      | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------------|------------|---------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Total Metals, Batch B8J2197, Continued</b> |            |               |             |                                            |       |           |       |           |           |
| <b>Blank (B8J2197-BLK3), Continued</b>        |            |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Silicon, total                                | < 1.0      | 1.0 mg/L      |             |                                            |       |           |       |           |           |
| Silver, total                                 | < 0.000050 | 0.000050 mg/L |             |                                            |       |           |       |           |           |
| Sodium, total                                 | < 0.10     | 0.10 mg/L     |             |                                            |       |           |       |           |           |
| Strontium, total                              | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Sulfur, total                                 | < 3.0      | 3.0 mg/L      |             |                                            |       |           |       |           |           |
| Tellurium, total                              | < 0.00050  | 0.00050 mg/L  |             |                                            |       |           |       |           |           |
| Thallium, total                               | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Thorium, total                                | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| Tin, total                                    | < 0.00020  | 0.00020 mg/L  |             |                                            |       |           |       |           |           |
| Titanium, total                               | < 0.0050   | 0.0050 mg/L   |             |                                            |       |           |       |           |           |
| Tungsten, total                               | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Uranium, total                                | < 0.000020 | 0.000020 mg/L |             |                                            |       |           |       |           |           |
| Vanadium, total                               | < 0.0010   | 0.0010 mg/L   |             |                                            |       |           |       |           |           |
| Zinc, total                                   | < 0.0040   | 0.0040 mg/L   |             |                                            |       |           |       |           |           |
| Zirconium, total                              | < 0.00010  | 0.00010 mg/L  |             |                                            |       |           |       |           |           |
| <b>LCS (B8J2197-BS1)</b>                      |            |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, total                               | 0.0216     | 0.0050 mg/L   | 0.0200      |                                            | 108   | 80-120    |       |           |           |
| Antimony, total                               | 0.0210     | 0.00020 mg/L  | 0.0200      |                                            | 105   | 80-120    |       |           |           |
| Arsenic, total                                | 0.0209     | 0.00050 mg/L  | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Barium, total                                 | 0.0209     | 0.0050 mg/L   | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Beryllium, total                              | 0.0188     | 0.00010 mg/L  | 0.0200      |                                            | 94    | 80-120    |       |           |           |
| Bismuth, total                                | 0.0206     | 0.00010 mg/L  | 0.0200      |                                            | 103   | 80-120    |       |           |           |
| Boron, total                                  | 0.0194     | 0.0050 mg/L   | 0.0200      |                                            | 97    | 80-120    |       |           |           |
| Cadmium, total                                | 0.0199     | 0.000010 mg/L | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Calcium, total                                | 2.03       | 0.20 mg/L     | 2.00        |                                            | 102   | 80-120    |       |           |           |
| Chromium, total                               | 0.0207     | 0.00050 mg/L  | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Cobalt, total                                 | 0.0209     | 0.00010 mg/L  | 0.0200      |                                            | 105   | 80-120    |       |           |           |
| Copper, total                                 | 0.0213     | 0.00040 mg/L  | 0.0200      |                                            | 107   | 80-120    |       |           |           |
| Iron, total                                   | 1.98       | 0.010 mg/L    | 2.00        |                                            | 99    | 80-120    |       |           |           |
| Lead, total                                   | 0.0206     | 0.00020 mg/L  | 0.0200      |                                            | 103   | 80-120    |       |           |           |
| Lithium, total                                | 0.0207     | 0.00010 mg/L  | 0.0200      |                                            | 104   | 80-120    |       |           |           |
| Magnesium, total                              | 2.01       | 0.010 mg/L    | 2.00        |                                            | 100   | 80-120    |       |           |           |
| Manganese, total                              | 0.0197     | 0.00020 mg/L  | 0.0200      |                                            | 99    | 80-120    |       |           |           |
| Mercury, total                                | 0.000877   | 0.000040 mg/L | 0.00100     |                                            | 88    | 80-120    |       |           |           |
| Molybdenum, total                             | 0.0197     | 0.00010 mg/L  | 0.0200      |                                            | 99    | 80-120    |       |           |           |
| Nickel, total                                 | 0.0210     | 0.00040 mg/L  | 0.0200      |                                            | 105   | 80-120    |       |           |           |
| Phosphorus, total                             | 2.01       | 0.050 mg/L    | 2.00        |                                            | 100   | 80-120    |       |           |           |
| Potassium, total                              | 1.97       | 0.10 mg/L     | 2.00        |                                            | 99    | 80-120    |       |           |           |
| Selenium, total                               | 0.0195     | 0.00050 mg/L  | 0.0200      |                                            | 98    | 80-120    |       |           |           |
| Silicon, total                                | 2.1        | 1.0 mg/L      | 2.00        |                                            | 103   | 80-120    |       |           |           |
| Silver, total                                 | 0.0173     | 0.000050 mg/L | 0.0200      |                                            | 86    | 80-120    |       |           |           |
| Sodium, total                                 | 2.03       | 0.10 mg/L     | 2.00        |                                            | 102   | 80-120    |       |           |           |
| Strontium, total                              | 0.0201     | 0.0010 mg/L   | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Sulfur, total                                 | 5.9        | 3.0 mg/L      | 5.00        |                                            | 118   | 80-120    |       |           |           |
| Tellurium, total                              | 0.0199     | 0.00050 mg/L  | 0.0200      |                                            | 99    | 80-120    |       |           |           |
| Thallium, total                               | 0.0206     | 0.000020 mg/L | 0.0200      |                                            | 103   | 80-120    |       |           |           |
| Thorium, total                                | 0.0199     | 0.00010 mg/L  | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Tin, total                                    | 0.0207     | 0.00020 mg/L  | 0.0200      |                                            | 103   | 80-120    |       |           |           |
| Titanium, total                               | 0.0217     | 0.0050 mg/L   | 0.0200      |                                            | 109   | 80-120    |       |           |           |
| Tungsten, total                               | 0.0161     | 0.0010 mg/L   | 0.0200      |                                            | 80    | 80-120    |       |           |           |
| Uranium, total                                | 0.0201     | 0.000020 mg/L | 0.0200      |                                            | 100   | 80-120    |       |           |           |
| Vanadium, total                               | 0.0207     | 0.0010 mg/L   | 0.0200      |                                            | 103   | 80-120    |       |           |           |
| Zinc, total                                   | 0.0219     | 0.0040 mg/L   | 0.0200      |                                            | 110   | 80-120    |       |           |           |
| Zirconium, total                              | 0.0214     | 0.00010 mg/L  | 0.0200      |                                            | 107   | 80-120    |       |           |           |

## APPENDIX 2: QUALITY CONTROL RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102060  
2018-10-30 15:09

| Analyte                                       | Result  | RL Units      | Spike Level | Source Result                              | % REC | REC Limit | % RPD | RPD Limit | Qualifier |
|-----------------------------------------------|---------|---------------|-------------|--------------------------------------------|-------|-----------|-------|-----------|-----------|
| <b>Total Metals, Batch B8J2197, Continued</b> |         |               |             |                                            |       |           |       |           |           |
| <b>Reference (B8J2197-SRM1)</b>               |         |               |             | Prepared: 2018-10-29, Analyzed: 2018-10-29 |       |           |       |           |           |
| Aluminum, total                               | 0.301   | 0.0050 mg/L   | 0.303       |                                            | 99    | 82-114    |       |           |           |
| Antimony, total                               | 0.0537  | 0.00020 mg/L  | 0.0511      |                                            | 105   | 88-115    |       |           |           |
| Arsenic, total                                | 0.128   | 0.00050 mg/L  | 0.118       |                                            | 109   | 88-111    |       |           |           |
| Barium, total                                 | 0.829   | 0.0050 mg/L   | 0.823       |                                            | 101   | 83-110    |       |           |           |
| Beryllium, total                              | 0.0468  | 0.00010 mg/L  | 0.0496      |                                            | 94    | 80-119    |       |           |           |
| Boron, total                                  | 3.47    | 0.0050 mg/L   | 3.45        |                                            | 100   | 80-118    |       |           |           |
| Cadmium, total                                | 0.0502  | 0.000010 mg/L | 0.0495      |                                            | 101   | 90-110    |       |           |           |
| Calcium, total                                | 11.7    | 0.20 mg/L     | 11.6        |                                            | 101   | 85-113    |       |           |           |
| Chromium, total                               | 0.267   | 0.00050 mg/L  | 0.250       |                                            | 107   | 88-111    |       |           |           |
| Cobalt, total                                 | 0.0414  | 0.00010 mg/L  | 0.0377      |                                            | 110   | 90-114    |       |           |           |
| Copper, total                                 | 0.539   | 0.00040 mg/L  | 0.486       |                                            | 111   | 90-117    |       |           |           |
| Iron, total                                   | 0.514   | 0.010 mg/L    | 0.488       |                                            | 105   | 90-116    |       |           |           |
| Lead, total                                   | 0.207   | 0.00020 mg/L  | 0.204       |                                            | 102   | 90-110    |       |           |           |
| Lithium, total                                | 0.413   | 0.00010 mg/L  | 0.403       |                                            | 102   | 79-118    |       |           |           |
| Magnesium, total                              | 3.91    | 0.010 mg/L    | 3.79        |                                            | 103   | 88-116    |       |           |           |
| Manganese, total                              | 0.108   | 0.00020 mg/L  | 0.109       |                                            | 99    | 88-108    |       |           |           |
| Mercury, total                                | 0.00401 | 0.000040 mg/L | 0.00489     |                                            | 82    | 80-120    |       |           |           |
| Molybdenum, total                             | 0.202   | 0.00010 mg/L  | 0.198       |                                            | 102   | 88-110    |       |           |           |
| Nickel, total                                 | 0.265   | 0.00040 mg/L  | 0.249       |                                            | 106   | 90-112    |       |           |           |
| Phosphorus, total                             | 0.227   | 0.050 mg/L    | 0.227       |                                            | 100   | 72-118    |       |           |           |
| Potassium, total                              | 7.50    | 0.10 mg/L     | 7.21        |                                            | 104   | 87-116    |       |           |           |
| Selenium, total                               | 0.119   | 0.00050 mg/L  | 0.121       |                                            | 98    | 90-122    |       |           |           |
| Sodium, total                                 | 7.68    | 0.10 mg/L     | 7.54        |                                            | 102   | 86-118    |       |           |           |
| Strontium, total                              | 0.388   | 0.0010 mg/L   | 0.375       |                                            | 104   | 86-110    |       |           |           |
| Thallium, total                               | 0.0824  | 0.000020 mg/L | 0.0805      |                                            | 102   | 90-113    |       |           |           |
| Uranium, total                                | 0.0300  | 0.000020 mg/L | 0.0306      |                                            | 98    | 88-112    |       |           |           |
| Vanadium, total                               | 0.411   | 0.0010 mg/L   | 0.386       |                                            | 106   | 87-110    |       |           |           |
| Zinc, total                                   | 2.63    | 0.0040 mg/L   | 2.49        |                                            | 106   | 90-113    |       |           |           |

## CERTIFICATE OF ANALYSIS

**REPORTED TO** BC Groundwater Consulting Services Ltd.  
835 Nicola Street  
Kamloops, BC V2C 2R6

**ATTENTION** Thierry Carriou

**PO NUMBER**

**PROJECT** Well Drilling Groundwater Characterization

**PROJECT INFO** 18007.1

**WORK ORDER** 8102061

**RECEIVED / TEMP** 2018-10-23 08:30 / 16°C

**REPORTED** 2018-10-30 15:10

**COC NUMBER** B65767

### Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

#### *Big Picture Sidekicks*



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

#### *We've Got Chemistry*



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

#### *Ahead of the Curve*



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at [estclair@caro.ca](mailto:estclair@caro.ca)

#### Authorized By:

Eilish St.Clair, B.Sc., C.I.T.  
Client Service Representative

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#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>12 Inch / 10 Inch (8102061-01)   Matrix: Water   Sampled: 2018-10-15 16:25</b> |            |           |          |       |            | F2, PRES  |
| <b>Anions</b>                                                                     |            |           |          |       |            |           |
| Chloride                                                                          | 0.59       | N/A       | 0.10     | mg/L  | 2018-10-26 |           |
| Fluoride                                                                          | 0.16       | N/A       | 0.10     | mg/L  | 2018-10-26 |           |
| Nitrate (as N)                                                                    | < 0.010    | N/A       | 0.010    | mg/L  | 2018-10-26 | HT1       |
| Nitrite (as N)                                                                    | < 0.010    | N/A       | 0.010    | mg/L  | 2018-10-26 | HT1       |
| Sulfate                                                                           | 19.2       | N/A       | 1.0      | mg/L  | 2018-10-26 |           |
| <b>Calculated Parameters</b>                                                      |            |           |          |       |            |           |
| Hardness, Total (as CaCO3)                                                        | 47.2       | N/A       | 0.500    | mg/L  | N/A        |           |
| <b>Dissolved Metals</b>                                                           |            |           |          |       |            |           |
| Aluminum, dissolved                                                               | 0.0800     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Antimony, dissolved                                                               | 0.00034    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Arsenic, dissolved                                                                | 0.00167    | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Barium, dissolved                                                                 | 0.0191     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Beryllium, dissolved                                                              | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Bismuth, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Boron, dissolved                                                                  | 0.0301     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Cadmium, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-28 |           |
| Calcium, dissolved                                                                | 11.1       | N/A       | 0.20     | mg/L  | 2018-10-28 |           |
| Chromium, dissolved                                                               | 0.00940    | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Cobalt, dissolved                                                                 | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Copper, dissolved                                                                 | 0.00094    | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Iron, dissolved                                                                   | 0.062      | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Lead, dissolved                                                                   | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Lithium, dissolved                                                                | 0.00314    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Magnesium, dissolved                                                              | 4.72       | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Manganese, dissolved                                                              | 0.00421    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Mercury, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-26 |           |
| Molybdenum, dissolved                                                             | 0.00587    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Nickel, dissolved                                                                 | < 0.00040  | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Phosphorus, dissolved                                                             | < 0.050    | N/A       | 0.050    | mg/L  | 2018-10-28 |           |
| Potassium, dissolved                                                              | 3.50       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Selenium, dissolved                                                               | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Silicon, dissolved                                                                | 12.5       | N/A       | 1.0      | mg/L  | 2018-10-28 |           |
| Silver, dissolved                                                                 | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-28 |           |
| Sodium, dissolved                                                                 | 13.2       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Strontium, dissolved                                                              | 0.110      | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Sulfur, dissolved                                                                 | 5.6        | N/A       | 3.0      | mg/L  | 2018-10-28 |           |
| Tellurium, dissolved                                                              | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Thallium, dissolved                                                               | < 0.000020 | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |
| Thorium, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Tin, dissolved                                                                    | 0.00177    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Titanium, dissolved                                                               | < 0.0050   | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                                      | Result    | Guideline | RL       | Units    | Analyzed   | Qualifier |
|----------------------------------------------------------------------------------------------|-----------|-----------|----------|----------|------------|-----------|
| <b>12 Inch / 10 Inch (8102061-01)   Matrix: Water   Sampled: 2018-10-15 16:25, Continued</b> |           |           |          |          |            | F2, PRES  |
| <b>Dissolved Metals, Continued</b>                                                           |           |           |          |          |            |           |
| Tungsten, dissolved                                                                          | < 0.0010  | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Uranium, dissolved                                                                           | 0.000473  | N/A       | 0.000020 | mg/L     | 2018-10-28 |           |
| Vanadium, dissolved                                                                          | 0.0101    | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Zinc, dissolved                                                                              | < 0.0040  | N/A       | 0.0040   | mg/L     | 2018-10-28 |           |
| Zirconium, dissolved                                                                         | < 0.00010 | N/A       | 0.00010  | mg/L     | 2018-10-28 |           |
| <b>General Parameters</b>                                                                    |           |           |          |          |            |           |
| Alkalinity, Total (as CaCO <sub>3</sub> )                                                    | 218       | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> )                                          | 18.2      | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )                                              | 181       | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )                                                | 36.5      | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )                                                | < 1.0     | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Ammonia, Total (as N)                                                                        | 0.093     | N/A       | 0.020    | mg/L     | 2018-10-28 |           |
| Colour, True                                                                                 | 5.1       | N/A       | 5.0      | CU       | 2018-10-24 | HT1       |
| Conductivity (EC)                                                                            | 160       | N/A       | 2.0      | µS/cm    | 2018-10-24 |           |
| pH                                                                                           | 9.26      | N/A       | 0.10     | pH units | 2018-10-24 | HT2       |
| Solids, Total Dissolved                                                                      | 126       | N/A       | 15       | mg/L     | 2018-10-22 | HT1       |
| Sulfide, Total                                                                               | < 0.200   | N/A       | 0.020    | mg/L     | 2018-10-27 | HT1       |
| Turbidity                                                                                    | 1510      | N/A       | 0.10     | NTU      | 2018-10-24 | HT1       |
| <b>Total Metals</b>                                                                          |           |           |          |          |            |           |
| Aluminum, total                                                                              | 30.5      | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Antimony, total                                                                              | 0.00041   | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Arsenic, total                                                                               | 0.0136    | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Barium, total                                                                                | 0.447     | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Beryllium, total                                                                             | 0.00063   | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Bismuth, total                                                                               | 0.00011   | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Boron, total                                                                                 | 0.0315    | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Cadmium, total                                                                               | 0.000745  | N/A       | 0.000010 | mg/L     | 2018-10-29 |           |
| Calcium, total                                                                               | 132       | N/A       | 0.20     | mg/L     | 2018-10-29 |           |
| Chromium, total                                                                              | 0.0438    | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Cobalt, total                                                                                | 0.0285    | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Copper, total                                                                                | 0.0850    | N/A       | 0.00040  | mg/L     | 2018-10-29 |           |
| Iron, total                                                                                  | 39.5      | N/A       | 0.010    | mg/L     | 2018-10-29 |           |
| Lead, total                                                                                  | 0.0122    | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Lithium, total                                                                               | 0.0165    | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Magnesium, total                                                                             | 29.4      | N/A       | 0.010    | mg/L     | 2018-10-29 |           |
| Manganese, total                                                                             | 2.03      | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Mercury, total                                                                               | 0.000042  | N/A       | 0.000040 | mg/L     | 2018-10-29 | CT5       |
| Molybdenum, total                                                                            | 0.00370   | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Nickel, total                                                                                | 0.0374    | N/A       | 0.00040  | mg/L     | 2018-10-29 |           |
| Phosphorus, total                                                                            | 1.14      | N/A       | 0.050    | mg/L     | 2018-10-29 |           |
| Potassium, total                                                                             | 6.21      | N/A       | 0.10     | mg/L     | 2018-10-29 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                                      | Result | Guideline | RL | Units | Analyzed | Qualifier |
|----------------------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>12 Inch / 10 Inch (8102061-01)   Matrix: Water   Sampled: 2018-10-15 16:25, Continued</b> |        |           |    |       |          | F2, PRES  |

### Total Metals, Continued

|                  |                 |     |          |      |            |  |
|------------------|-----------------|-----|----------|------|------------|--|
| Selenium, total  | < 0.00050       | N/A | 0.00050  | mg/L | 2018-10-29 |  |
| Silicon, total   | <b>70.9</b>     | N/A | 1.0      | mg/L | 2018-10-29 |  |
| Silver, total    | <b>0.000082</b> | N/A | 0.000050 | mg/L | 2018-10-29 |  |
| Sodium, total    | <b>15.7</b>     | N/A | 0.10     | mg/L | 2018-10-29 |  |
| Strontium, total | <b>0.466</b>    | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Sulfur, total    | <b>6.5</b>      | N/A | 3.0      | mg/L | 2018-10-29 |  |
| Tellurium, total | < 0.00050       | N/A | 0.00050  | mg/L | 2018-10-29 |  |
| Thallium, total  | <b>0.000161</b> | N/A | 0.000020 | mg/L | 2018-10-29 |  |
| Thorium, total   | <b>0.00271</b>  | N/A | 0.00010  | mg/L | 2018-10-29 |  |
| Tin, total       | <b>0.00101</b>  | N/A | 0.00020  | mg/L | 2018-10-29 |  |
| Titanium, total  | <b>0.819</b>    | N/A | 0.0050   | mg/L | 2018-10-29 |  |
| Tungsten, total  | < 0.0010        | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Uranium, total   | <b>0.00221</b>  | N/A | 0.000020 | mg/L | 2018-10-29 |  |
| Vanadium, total  | <b>0.0913</b>   | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Zinc, total      | <b>0.139</b>    | N/A | 0.0040   | mg/L | 2018-10-29 |  |
| Zirconium, total | <b>0.00381</b>  | N/A | 0.00010  | mg/L | 2018-10-29 |  |

### 095 FT (8102061-02) | Matrix: Water | Sampled: 2018-10-15 12:50

F2, PRES

### Anions

|                |              |     |       |      |            |     |
|----------------|--------------|-----|-------|------|------------|-----|
| Chloride       | <b>1.12</b>  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Fluoride       | <b>0.11</b>  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Nitrate (as N) | <b>0.190</b> | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Nitrite (as N) | < 0.010      | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Sulfate        | <b>22.3</b>  | N/A | 1.0   | mg/L | 2018-10-27 |     |

### Calculated Parameters

|                            |             |     |       |      |     |  |
|----------------------------|-------------|-----|-------|------|-----|--|
| Hardness, Total (as CaCO3) | <b>67.9</b> | N/A | 0.500 | mg/L | N/A |  |
|----------------------------|-------------|-----|-------|------|-----|--|

### Dissolved Metals

|                      |                |     |          |      |            |  |
|----------------------|----------------|-----|----------|------|------------|--|
| Aluminum, dissolved  | <b>0.0393</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Antimony, dissolved  | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Arsenic, dissolved   | <b>0.00100</b> | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Barium, dissolved    | <b>0.0066</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Beryllium, dissolved | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Bismuth, dissolved   | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Boron, dissolved     | <b>0.0483</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Cadmium, dissolved   | < 0.000010     | N/A | 0.000010 | mg/L | 2018-10-28 |  |
| Calcium, dissolved   | <b>7.44</b>    | N/A | 0.20     | mg/L | 2018-10-28 |  |
| Chromium, dissolved  | <b>0.0131</b>  | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Cobalt, dissolved    | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Copper, dissolved    | <b>0.00083</b> | N/A | 0.00040  | mg/L | 2018-10-28 |  |
| Iron, dissolved      | < 0.010        | N/A | 0.010    | mg/L | 2018-10-28 |  |

## TEST RESULTS

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Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result | Guideline | RL | Units | Analyzed | Qualifier |
|-----------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>095 FT (8102061-02)   Matrix: Water   Sampled: 2018-10-15 12:50, Continued</b> |        |           |    |       |          | F2, PRES  |

### Dissolved Metals, Continued

|                       |                |     |          |      |            |  |
|-----------------------|----------------|-----|----------|------|------------|--|
| Lead, dissolved       | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Lithium, dissolved    | <b>0.00219</b> | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Magnesium, dissolved  | <b>12.0</b>    | N/A | 0.010    | mg/L | 2018-10-28 |  |
| Manganese, dissolved  | <b>0.00051</b> | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Mercury, dissolved    | < 0.000010     | N/A | 0.000010 | mg/L | 2018-10-26 |  |
| Molybdenum, dissolved | <b>0.00387</b> | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Nickel, dissolved     | < 0.00040      | N/A | 0.00040  | mg/L | 2018-10-28 |  |
| Phosphorus, dissolved | < 0.050        | N/A | 0.050    | mg/L | 2018-10-28 |  |
| Potassium, dissolved  | <b>4.48</b>    | N/A | 0.10     | mg/L | 2018-10-28 |  |
| Selenium, dissolved   | < 0.00050      | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Silicon, dissolved    | <b>20.8</b>    | N/A | 1.0      | mg/L | 2018-10-28 |  |
| Silver, dissolved     | < 0.000050     | N/A | 0.000050 | mg/L | 2018-10-28 |  |
| Sodium, dissolved     | <b>18.5</b>    | N/A | 0.10     | mg/L | 2018-10-28 |  |
| Strontium, dissolved  | <b>0.0926</b>  | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Sulfur, dissolved     | <b>6.1</b>     | N/A | 3.0      | mg/L | 2018-10-28 |  |
| Tellurium, dissolved  | < 0.00050      | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Thallium, dissolved   | < 0.000020     | N/A | 0.000020 | mg/L | 2018-10-28 |  |
| Thorium, dissolved    | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Tin, dissolved        | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Titanium, dissolved   | < 0.0050       | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Tungsten, dissolved   | < 0.0010       | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Uranium, dissolved    | <b>0.00155</b> | N/A | 0.000020 | mg/L | 2018-10-28 |  |
| Vanadium, dissolved   | <b>0.0099</b>  | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Zinc, dissolved       | < 0.0040       | N/A | 0.0040   | mg/L | 2018-10-28 |  |
| Zirconium, dissolved  | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |

### General Parameters

|                                                     |              |     |       |          |            |     |
|-----------------------------------------------------|--------------|-----|-------|----------|------------|-----|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | <b>110</b>   | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | <b>27.7</b>  | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | <b>54.4</b>  | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | <b>55.3</b>  | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0        | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Ammonia, Total (as N)                               | <b>0.029</b> | N/A | 0.020 | mg/L     | 2018-10-28 |     |
| Colour, True                                        | < 5.0        | N/A | 5.0   | CU       | 2018-10-24 | HT1 |
| Conductivity (EC)                                   | <b>210</b>   | N/A | 2.0   | µS/cm    | 2018-10-24 |     |
| pH                                                  | <b>9.44</b>  | N/A | 0.10  | pH units | 2018-10-24 | HT2 |
| Solids, Total Dissolved                             | <b>161</b>   | N/A | 15    | mg/L     | 2018-10-22 | HT1 |
| Sulfide, Total                                      | < 0.020      | N/A | 0.020 | mg/L     | 2018-10-25 | HT1 |
| Turbidity                                           | <b>219</b>   | N/A | 0.10  | NTU      | 2018-10-24 | HT1 |

### Total Metals

|                 |                |     |         |      |            |  |
|-----------------|----------------|-----|---------|------|------------|--|
| Aluminum, total | <b>2.04</b>    | N/A | 0.0050  | mg/L | 2018-10-29 |  |
| Antimony, total | <b>0.00028</b> | N/A | 0.00020 | mg/L | 2018-10-29 |  |

## TEST RESULTS

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**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result | Guideline | RL | Units | Analyzed | Qualifier |
|-----------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>095 FT (8102061-02)   Matrix: Water   Sampled: 2018-10-15 12:50, Continued</b> |        |           |    |       |          | F2, PRES  |

### Total Metals, Continued

|                   |            |     |          |      |            |     |
|-------------------|------------|-----|----------|------|------------|-----|
| Arsenic, total    | 0.00176    | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Barium, total     | 0.0472     | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Beryllium, total  | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Bismuth, total    | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Boron, total      | 0.0509     | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Cadmium, total    | 0.000017   | N/A | 0.000010 | mg/L | 2018-10-29 |     |
| Calcium, total    | 39.8       | N/A | 0.20     | mg/L | 2018-10-29 |     |
| Chromium, total   | 0.0182     | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Cobalt, total     | 0.00146    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Copper, total     | 0.00645    | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Iron, total       | 2.27       | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Lead, total       | 0.00052    | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Lithium, total    | 0.00306    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Magnesium, total  | 14.4       | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Manganese, total  | 0.0566     | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Mercury, total    | < 0.000040 | N/A | 0.000040 | mg/L | 2018-10-29 | CT5 |
| Molybdenum, total | 0.00359    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Nickel, total     | 0.00231    | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Phosphorus, total | < 0.050    | N/A | 0.050    | mg/L | 2018-10-29 |     |
| Potassium, total  | 5.33       | N/A | 0.10     | mg/L | 2018-10-29 |     |
| Selenium, total   | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Silicon, total    | 27.3       | N/A | 1.0      | mg/L | 2018-10-29 |     |
| Silver, total     | < 0.000050 | N/A | 0.000050 | mg/L | 2018-10-29 |     |
| Sodium, total     | 18.1       | N/A | 0.10     | mg/L | 2018-10-29 |     |
| Strontium, total  | 0.198      | N/A | 0.0010   | mg/L | 2018-10-29 |     |
| Sulfur, total     | 7.9        | N/A | 3.0      | mg/L | 2018-10-29 |     |
| Tellurium, total  | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Thallium, total   | < 0.000020 | N/A | 0.000020 | mg/L | 2018-10-29 |     |
| Thorium, total    | 0.00017    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Tin, total        | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Titanium, total   | 0.105      | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Tungsten, total   | < 0.0010   | N/A | 0.0010   | mg/L | 2018-10-29 |     |
| Uranium, total    | 0.00178    | N/A | 0.000020 | mg/L | 2018-10-29 |     |
| Vanadium, total   | 0.0162     | N/A | 0.0010   | mg/L | 2018-10-29 |     |
| Zinc, total       | 0.0176     | N/A | 0.0040   | mg/L | 2018-10-29 |     |
| Zirconium, total  | 0.00208    | N/A | 0.00010  | mg/L | 2018-10-29 |     |

### 115 FT (8102061-03) | Matrix: Water | Sampled: 2018-10-15 13:05

F2, PRES

### Anions

|          |      |     |      |      |            |  |
|----------|------|-----|------|------|------------|--|
| Chloride | 1.37 | N/A | 0.10 | mg/L | 2018-10-27 |  |
| Fluoride | 0.12 | N/A | 0.10 | mg/L | 2018-10-27 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>115 FT (8102061-03)   Matrix: Water   Sampled: 2018-10-15 13:05, Continued</b> |            |           |          |       |            | F2, PRES  |
| <b>Anions, Continued</b>                                                          |            |           |          |       |            |           |
| Nitrate (as N)                                                                    | 0.230      | N/A       | 0.010    | mg/L  | 2018-10-27 | HT1       |
| Nitrite (as N)                                                                    | < 0.010    | N/A       | 0.010    | mg/L  | 2018-10-27 | HT1       |
| Sulfate                                                                           | 18.1       | N/A       | 1.0      | mg/L  | 2018-10-27 |           |
| <b>Calculated Parameters</b>                                                      |            |           |          |       |            |           |
| Hardness, Total (as CaCO <sub>3</sub> )                                           | 198        | N/A       | 0.500    | mg/L  | N/A        |           |
| <b>Dissolved Metals</b>                                                           |            |           |          |       |            |           |
| Aluminum, dissolved                                                               | 0.0356     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Antimony, dissolved                                                               | 0.00044    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Arsenic, dissolved                                                                | 0.00063    | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Barium, dissolved                                                                 | 0.0435     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Beryllium, dissolved                                                              | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Bismuth, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Boron, dissolved                                                                  | 0.0724     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Cadmium, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-28 |           |
| Calcium, dissolved                                                                | 52.5       | N/A       | 0.20     | mg/L  | 2018-10-28 |           |
| Chromium, dissolved                                                               | 0.00481    | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Cobalt, dissolved                                                                 | 0.00017    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Copper, dissolved                                                                 | 0.00054    | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Iron, dissolved                                                                   | 0.015      | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Lead, dissolved                                                                   | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Lithium, dissolved                                                                | 0.00182    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Magnesium, dissolved                                                              | 16.3       | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Manganese, dissolved                                                              | 0.00514    | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Mercury, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-26 |           |
| Molybdenum, dissolved                                                             | 0.00109    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Nickel, dissolved                                                                 | < 0.00040  | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Phosphorus, dissolved                                                             | < 0.050    | N/A       | 0.050    | mg/L  | 2018-10-28 |           |
| Potassium, dissolved                                                              | 1.75       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Selenium, dissolved                                                               | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Silicon, dissolved                                                                | 9.8        | N/A       | 1.0      | mg/L  | 2018-10-28 |           |
| Silver, dissolved                                                                 | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-28 |           |
| Sodium, dissolved                                                                 | 21.5       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Strontium, dissolved                                                              | 0.314      | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Sulfur, dissolved                                                                 | 5.0        | N/A       | 3.0      | mg/L  | 2018-10-28 |           |
| Tellurium, dissolved                                                              | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Thallium, dissolved                                                               | < 0.000020 | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |
| Thorium, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Tin, dissolved                                                                    | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Titanium, dissolved                                                               | < 0.0050   | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Tungsten, dissolved                                                               | < 0.0010   | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Uranium, dissolved                                                                | 0.00251    | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result     | Guideline | RL       | Units    | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|------------|-----------|----------|----------|------------|-----------|
| <b>115 FT (8102061-03)   Matrix: Water   Sampled: 2018-10-15 13:05, Continued</b> |            |           |          |          |            | F2, PRES  |
| <b>Dissolved Metals, Continued</b>                                                |            |           |          |          |            |           |
| Vanadium, dissolved                                                               | 0.0025     | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Zinc, dissolved                                                                   | < 0.0040   | N/A       | 0.0040   | mg/L     | 2018-10-28 |           |
| Zirconium, dissolved                                                              | < 0.00010  | N/A       | 0.00010  | mg/L     | 2018-10-28 |           |
| <b>General Parameters</b>                                                         |            |           |          |          |            |           |
| Alkalinity, Total (as CaCO <sub>3</sub> )                                         | 236        | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> )                               | < 1.0      | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )                                   | 236        | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )                                     | < 1.0      | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )                                     | < 1.0      | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Ammonia, Total (as N)                                                             | 0.023      | N/A       | 0.020    | mg/L     | 2018-10-28 |           |
| Colour, True                                                                      | < 5.0      | N/A       | 5.0      | CU       | 2018-10-24 | HT1       |
| Conductivity (EC)                                                                 | 460        | N/A       | 2.0      | µS/cm    | 2018-10-24 |           |
| pH                                                                                | 8.18       | N/A       | 0.10     | pH units | 2018-10-24 | HT2       |
| Solids, Total Dissolved                                                           | 266        | N/A       | 15       | mg/L     | 2018-10-22 | HT1       |
| Sulfide, Total                                                                    | < 0.020    | N/A       | 0.020    | mg/L     | 2018-10-25 | HT1       |
| Turbidity                                                                         | 25.4       | N/A       | 0.10     | NTU      | 2018-10-24 | HT1       |
| <b>Total Metals</b>                                                               |            |           |          |          |            |           |
| Aluminum, total                                                                   | 0.700      | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Antimony, total                                                                   | < 0.00020  | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Arsenic, total                                                                    | 0.00105    | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Barium, total                                                                     | 0.0572     | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Beryllium, total                                                                  | < 0.00010  | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Bismuth, total                                                                    | < 0.00010  | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Boron, total                                                                      | 0.0762     | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Cadmium, total                                                                    | 0.000012   | N/A       | 0.000010 | mg/L     | 2018-10-29 |           |
| Calcium, total                                                                    | 64.2       | N/A       | 0.20     | mg/L     | 2018-10-29 |           |
| Chromium, total                                                                   | 0.00795    | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Cobalt, total                                                                     | 0.00074    | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Copper, total                                                                     | 0.00272    | N/A       | 0.00040  | mg/L     | 2018-10-29 |           |
| Iron, total                                                                       | 0.985      | N/A       | 0.010    | mg/L     | 2018-10-29 |           |
| Lead, total                                                                       | 0.00024    | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Lithium, total                                                                    | 0.00228    | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Magnesium, total                                                                  | 18.9       | N/A       | 0.010    | mg/L     | 2018-10-29 |           |
| Manganese, total                                                                  | 0.0407     | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Mercury, total                                                                    | < 0.000040 | N/A       | 0.000040 | mg/L     | 2018-10-29 | CT5       |
| Molybdenum, total                                                                 | 0.00117    | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Nickel, total                                                                     | 0.00120    | N/A       | 0.00040  | mg/L     | 2018-10-29 |           |
| Phosphorus, total                                                                 | < 0.050    | N/A       | 0.050    | mg/L     | 2018-10-29 |           |
| Potassium, total                                                                  | 2.15       | N/A       | 0.10     | mg/L     | 2018-10-29 |           |
| Selenium, total                                                                   | < 0.00050  | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Silicon, total                                                                    | 12.4       | N/A       | 1.0      | mg/L     | 2018-10-29 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result         | Guideline | RL       | Units | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|----------------|-----------|----------|-------|------------|-----------|
| <b>115 FT (8102061-03)   Matrix: Water   Sampled: 2018-10-15 13:05, Continued</b> |                |           |          |       |            | F2, PRES  |
| <b>Total Metals, Continued</b>                                                    |                |           |          |       |            |           |
| Silver, total                                                                     | < 0.000050     | N/A       | 0.000050 | mg/L  | 2018-10-29 |           |
| Sodium, total                                                                     | <b>24.2</b>    | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Strontium, total                                                                  | <b>0.382</b>   | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Sulfur, total                                                                     | <b>7.0</b>     | N/A       | 3.0      | mg/L  | 2018-10-29 |           |
| Tellurium, total                                                                  | < 0.00050      | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Thallium, total                                                                   | < 0.000020     | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Thorium, total                                                                    | < 0.00010      | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Tin, total                                                                        | < 0.00020      | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Titanium, total                                                                   | <b>0.0341</b>  | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Tungsten, total                                                                   | < 0.0010       | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Uranium, total                                                                    | <b>0.00275</b> | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Vanadium, total                                                                   | <b>0.0051</b>  | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Zinc, total                                                                       | <b>0.0052</b>  | N/A       | 0.0040   | mg/L  | 2018-10-29 |           |
| Zirconium, total                                                                  | <b>0.00200</b> | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |

**135 FT (8102061-04) | Matrix: Water | Sampled: 2018-10-15 14:00**

F2, PRES

### Anions

|                |              |     |       |      |            |     |
|----------------|--------------|-----|-------|------|------------|-----|
| Chloride       | <b>1.46</b>  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Fluoride       | <b>0.11</b>  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Nitrate (as N) | <b>0.155</b> | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Nitrite (as N) | < 0.010      | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Sulfate        | <b>33.7</b>  | N/A | 1.0   | mg/L | 2018-10-27 |     |

### Calculated Parameters

|                            |            |     |       |      |     |  |
|----------------------------|------------|-----|-------|------|-----|--|
| Hardness, Total (as CaCO3) | <b>159</b> | N/A | 0.500 | mg/L | N/A |  |
|----------------------------|------------|-----|-------|------|-----|--|

### Dissolved Metals

|                      |                |     |          |      |            |  |
|----------------------|----------------|-----|----------|------|------------|--|
| Aluminum, dissolved  | <b>0.0153</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Antimony, dissolved  | <b>0.00026</b> | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Arsenic, dissolved   | <b>0.00113</b> | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Barium, dissolved    | <b>0.0387</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Beryllium, dissolved | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Bismuth, dissolved   | < 0.00010      | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Boron, dissolved     | <b>0.0575</b>  | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Cadmium, dissolved   | < 0.000010     | N/A | 0.000010 | mg/L | 2018-10-28 |  |
| Calcium, dissolved   | <b>44.1</b>    | N/A | 0.20     | mg/L | 2018-10-28 |  |
| Chromium, dissolved  | <b>0.00139</b> | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Cobalt, dissolved    | <b>0.00011</b> | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Copper, dissolved    | <b>0.00087</b> | N/A | 0.00040  | mg/L | 2018-10-28 |  |
| Iron, dissolved      | < 0.010        | N/A | 0.010    | mg/L | 2018-10-28 |  |
| Lead, dissolved      | < 0.00020      | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Lithium, dissolved   | <b>0.00218</b> | N/A | 0.00010  | mg/L | 2018-10-28 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result | Guideline | RL | Units | Analyzed | Qualifier |
|-----------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>135 FT (8102061-04)   Matrix: Water   Sampled: 2018-10-15 14:00, Continued</b> |        |           |    |       |          | F2, PRES  |

### Dissolved Metals, Continued

|                       |            |     |          |      |            |  |
|-----------------------|------------|-----|----------|------|------------|--|
| Magnesium, dissolved  | 11.7       | N/A | 0.010    | mg/L | 2018-10-28 |  |
| Manganese, dissolved  | 0.00438    | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Mercury, dissolved    | < 0.000010 | N/A | 0.000010 | mg/L | 2018-10-26 |  |
| Molybdenum, dissolved | 0.00330    | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Nickel, dissolved     | < 0.00040  | N/A | 0.00040  | mg/L | 2018-10-28 |  |
| Phosphorus, dissolved | < 0.050    | N/A | 0.050    | mg/L | 2018-10-28 |  |
| Potassium, dissolved  | 1.55       | N/A | 0.10     | mg/L | 2018-10-28 |  |
| Selenium, dissolved   | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Silicon, dissolved    | 10.4       | N/A | 1.0      | mg/L | 2018-10-28 |  |
| Silver, dissolved     | < 0.000050 | N/A | 0.000050 | mg/L | 2018-10-28 |  |
| Sodium, dissolved     | 21.5       | N/A | 0.10     | mg/L | 2018-10-28 |  |
| Strontium, dissolved  | 0.282      | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Sulfur, dissolved     | 9.6        | N/A | 3.0      | mg/L | 2018-10-28 |  |
| Tellurium, dissolved  | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Thallium, dissolved   | < 0.000020 | N/A | 0.000020 | mg/L | 2018-10-28 |  |
| Thorium, dissolved    | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Tin, dissolved        | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Titanium, dissolved   | < 0.0050   | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Tungsten, dissolved   | < 0.0010   | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Uranium, dissolved    | 0.00190    | N/A | 0.000020 | mg/L | 2018-10-28 |  |
| Vanadium, dissolved   | 0.0036     | N/A | 0.0010   | mg/L | 2018-10-28 |  |
| Zinc, dissolved       | < 0.0040   | N/A | 0.0040   | mg/L | 2018-10-28 |  |
| Zirconium, dissolved  | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-28 |  |

### General Parameters

|                                                     |               |     |       |          |            |           |
|-----------------------------------------------------|---------------|-----|-------|----------|------------|-----------|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | 185           | N/A | 1.0   | mg/L     | 2018-10-24 |           |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0         | N/A | 1.0   | mg/L     | 2018-10-24 |           |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | 185           | N/A | 1.0   | mg/L     | 2018-10-24 |           |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0         | N/A | 1.0   | mg/L     | 2018-10-24 |           |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0         | N/A | 1.0   | mg/L     | 2018-10-24 |           |
| Ammonia, Total (as N)                               | 0.081         | N/A | 0.020 | mg/L     | 2018-10-28 |           |
| Colour, True                                        | < 5.0         | N/A | 5.0   | CU       | 2018-10-24 | HT1       |
| Conductivity (EC)                                   | 398           | N/A | 2.0   | µS/cm    | 2018-10-24 |           |
| pH                                                  | 8.15          | N/A | 0.10  | pH units | 2018-10-24 | HT2       |
| Solids, Total Dissolved                             | 232           | N/A | 15    | mg/L     | 2018-10-22 | HT1       |
| Sulfide, Total                                      | Not Available | N/A | 0.020 | mg/L     | 2018-10-27 | CST2, HT1 |
| Turbidity                                           | 31.4          | N/A | 0.10  | NTU      | 2018-10-24 | HT1       |

### Total Metals

|                 |         |     |         |      |            |  |
|-----------------|---------|-----|---------|------|------------|--|
| Aluminum, total | 28.4    | N/A | 0.0050  | mg/L | 2018-10-29 |  |
| Antimony, total | 0.00025 | N/A | 0.00020 | mg/L | 2018-10-29 |  |
| Arsenic, total  | 0.00894 | N/A | 0.00050 | mg/L | 2018-10-29 |  |
| Barium, total   | 0.388   | N/A | 0.0050  | mg/L | 2018-10-29 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>135 FT (8102061-04)   Matrix: Water   Sampled: 2018-10-15 14:00, Continued</b> |            |           |          |       |            | F2, PRES  |
| <i>Total Metals, Continued</i>                                                    |            |           |          |       |            |           |
| Beryllium, total                                                                  | 0.00056    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Bismuth, total                                                                    | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Boron, total                                                                      | 0.0566     | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Cadmium, total                                                                    | 0.000347   | N/A       | 0.000010 | mg/L  | 2018-10-29 |           |
| Calcium, total                                                                    | 78.3       | N/A       | 0.20     | mg/L  | 2018-10-29 |           |
| Chromium, total                                                                   | 0.0238     | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Cobalt, total                                                                     | 0.0455     | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Copper, total                                                                     | 0.0677     | N/A       | 0.00040  | mg/L  | 2018-10-29 |           |
| Iron, total                                                                       | 29.3       | N/A       | 0.010    | mg/L  | 2018-10-29 |           |
| Lead, total                                                                       | 0.00926    | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Lithium, total                                                                    | 0.0104     | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Magnesium, total                                                                  | 25.1       | N/A       | 0.010    | mg/L  | 2018-10-29 |           |
| Manganese, total                                                                  | 2.38       | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Mercury, total                                                                    | 0.000270   | N/A       | 0.000040 | mg/L  | 2018-10-29 | CT5       |
| Molybdenum, total                                                                 | 0.00146    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Nickel, total                                                                     | 0.0334     | N/A       | 0.00040  | mg/L  | 2018-10-29 |           |
| Phosphorus, total                                                                 | 0.996      | N/A       | 0.050    | mg/L  | 2018-10-29 |           |
| Potassium, total                                                                  | 3.65       | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Selenium, total                                                                   | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Silicon, total                                                                    | 66.4       | N/A       | 1.0      | mg/L  | 2018-10-29 |           |
| Silver, total                                                                     | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-29 |           |
| Sodium, total                                                                     | 25.1       | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Strontium, total                                                                  | 0.476      | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Sulfur, total                                                                     | 10.5       | N/A       | 3.0      | mg/L  | 2018-10-29 |           |
| Tellurium, total                                                                  | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Thallium, total                                                                   | 0.000123   | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Thorium, total                                                                    | 0.00219    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Tin, total                                                                        | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Titanium, total                                                                   | 0.336      | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Tungsten, total                                                                   | < 0.0010   | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Uranium, total                                                                    | 0.00263    | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Vanadium, total                                                                   | 0.0616     | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Zinc, total                                                                       | 0.0634     | N/A       | 0.0040   | mg/L  | 2018-10-29 |           |
| Zirconium, total                                                                  | 0.00155    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |

**155 FT (8102061-05) | Matrix: Water | Sampled: 2018-10-15 14:30**

F2, PRES

### Anions

|                |         |     |       |      |            |     |
|----------------|---------|-----|-------|------|------------|-----|
| Chloride       | 1.02    | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Fluoride       | < 0.10  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Nitrate (as N) | 0.037   | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Nitrite (as N) | < 0.010 | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>155 FT (8102061-05)   Matrix: Water   Sampled: 2018-10-15 14:30, Continued</b> |            |           |          |       |            | F2, PRES  |
| <i>Anions, Continued</i>                                                          |            |           |          |       |            |           |
| Sulfate                                                                           | 54.4       | N/A       | 1.0      | mg/L  | 2018-10-27 |           |
| <i>Calculated Parameters</i>                                                      |            |           |          |       |            |           |
| Hardness, Total (as CaCO <sub>3</sub> )                                           | 101        | N/A       | 0.500    | mg/L  | N/A        |           |
| <i>Dissolved Metals</i>                                                           |            |           |          |       |            |           |
| Aluminum, dissolved                                                               | 0.0147     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Antimony, dissolved                                                               | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Arsenic, dissolved                                                                | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Barium, dissolved                                                                 | 0.0324     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Beryllium, dissolved                                                              | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Bismuth, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Boron, dissolved                                                                  | 0.0361     | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Cadmium, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-28 |           |
| Calcium, dissolved                                                                | 31.8       | N/A       | 0.20     | mg/L  | 2018-10-28 |           |
| Chromium, dissolved                                                               | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Cobalt, dissolved                                                                 | 0.00064    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Copper, dissolved                                                                 | 0.00102    | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Iron, dissolved                                                                   | 0.022      | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Lead, dissolved                                                                   | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Lithium, dissolved                                                                | 0.00117    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Magnesium, dissolved                                                              | 5.09       | N/A       | 0.010    | mg/L  | 2018-10-28 |           |
| Manganese, dissolved                                                              | 0.0678     | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Mercury, dissolved                                                                | < 0.000010 | N/A       | 0.000010 | mg/L  | 2018-10-26 |           |
| Molybdenum, dissolved                                                             | 0.00306    | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Nickel, dissolved                                                                 | 0.00102    | N/A       | 0.00040  | mg/L  | 2018-10-28 |           |
| Phosphorus, dissolved                                                             | < 0.050    | N/A       | 0.050    | mg/L  | 2018-10-28 |           |
| Potassium, dissolved                                                              | 1.02       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Selenium, dissolved                                                               | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Silicon, dissolved                                                                | 6.9        | N/A       | 1.0      | mg/L  | 2018-10-28 |           |
| Silver, dissolved                                                                 | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-28 |           |
| Sodium, dissolved                                                                 | 32.7       | N/A       | 0.10     | mg/L  | 2018-10-28 |           |
| Strontium, dissolved                                                              | 0.192      | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Sulfur, dissolved                                                                 | 19.6       | N/A       | 3.0      | mg/L  | 2018-10-28 |           |
| Tellurium, dissolved                                                              | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-28 |           |
| Thallium, dissolved                                                               | < 0.000020 | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |
| Thorium, dissolved                                                                | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-28 |           |
| Tin, dissolved                                                                    | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-28 |           |
| Titanium, dissolved                                                               | < 0.0050   | N/A       | 0.0050   | mg/L  | 2018-10-28 |           |
| Tungsten, dissolved                                                               | < 0.0010   | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Uranium, dissolved                                                                | 0.000700   | N/A       | 0.000020 | mg/L  | 2018-10-28 |           |
| Vanadium, dissolved                                                               | < 0.0010   | N/A       | 0.0010   | mg/L  | 2018-10-28 |           |
| Zinc, dissolved                                                                   | < 0.0040   | N/A       | 0.0040   | mg/L  | 2018-10-28 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result | Guideline | RL | Units | Analyzed | Qualifier |
|-----------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>155 FT (8102061-05)   Matrix: Water   Sampled: 2018-10-15 14:30, Continued</b> |        |           |    |       |          | F2, PRES  |

### Dissolved Metals, Continued

|                      |           |     |         |      |            |  |
|----------------------|-----------|-----|---------|------|------------|--|
| Zirconium, dissolved | < 0.00010 | N/A | 0.00010 | mg/L | 2018-10-28 |  |
|----------------------|-----------|-----|---------|------|------------|--|

### General Parameters

|                                                     |         |     |       |          |            |     |
|-----------------------------------------------------|---------|-----|-------|----------|------------|-----|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | 130     | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0   | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | 130     | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0   | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0   | N/A | 1.0   | mg/L     | 2018-10-24 |     |
| Ammonia, Total (as N)                               | 0.056   | N/A | 0.020 | mg/L     | 2018-10-28 |     |
| Colour, True                                        | < 5.0   | N/A | 5.0   | CU       | 2018-10-24 | HT1 |
| Conductivity (EC)                                   | 369     | N/A | 2.0   | µS/cm    | 2018-10-24 |     |
| pH                                                  | 8.15    | N/A | 0.10  | pH units | 2018-10-24 | HT2 |
| Solids, Total Dissolved                             | 223     | N/A | 15    | mg/L     | 2018-10-22 | HT1 |
| Sulfide, Total                                      | < 0.020 | N/A | 0.020 | mg/L     | 2018-10-25 | HT1 |
| Turbidity                                           | 36.3    | N/A | 0.10  | NTU      | 2018-10-24 | HT1 |

### Total Metals

|                   |            |     |          |      |            |     |
|-------------------|------------|-----|----------|------|------------|-----|
| Aluminum, total   | 1.75       | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Antimony, total   | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Arsenic, total    | 0.00122    | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Barium, total     | 0.0447     | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Beryllium, total  | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Bismuth, total    | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Boron, total      | 0.0389     | N/A | 0.0050   | mg/L | 2018-10-29 |     |
| Cadmium, total    | 0.000019   | N/A | 0.000010 | mg/L | 2018-10-29 |     |
| Calcium, total    | 38.5       | N/A | 0.20     | mg/L | 2018-10-29 |     |
| Chromium, total   | 0.00263    | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Cobalt, total     | 0.00217    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Copper, total     | 0.00493    | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Iron, total       | 2.15       | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Lead, total       | 0.00057    | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Lithium, total    | 0.00159    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Magnesium, total  | 5.92       | N/A | 0.010    | mg/L | 2018-10-29 |     |
| Manganese, total  | 0.176      | N/A | 0.00020  | mg/L | 2018-10-29 |     |
| Mercury, total    | < 0.000040 | N/A | 0.000040 | mg/L | 2018-10-29 | CT5 |
| Molybdenum, total | 0.00302    | N/A | 0.00010  | mg/L | 2018-10-29 |     |
| Nickel, total     | 0.00267    | N/A | 0.00040  | mg/L | 2018-10-29 |     |
| Phosphorus, total | < 0.050    | N/A | 0.050    | mg/L | 2018-10-29 |     |
| Potassium, total  | 1.22       | N/A | 0.10     | mg/L | 2018-10-29 |     |
| Selenium, total   | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-29 |     |
| Silicon, total    | 11.6       | N/A | 1.0      | mg/L | 2018-10-29 |     |
| Silver, total     | < 0.000050 | N/A | 0.000050 | mg/L | 2018-10-29 |     |
| Sodium, total     | 36.0       | N/A | 0.10     | mg/L | 2018-10-29 |     |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                           | Result | Guideline | RL | Units | Analyzed | Qualifier |
|-----------------------------------------------------------------------------------|--------|-----------|----|-------|----------|-----------|
| <b>155 FT (8102061-05)   Matrix: Water   Sampled: 2018-10-15 14:30, Continued</b> |        |           |    |       |          | F2, PRES  |

### Total Metals, Continued

|                  |            |     |          |      |            |  |
|------------------|------------|-----|----------|------|------------|--|
| Strontium, total | 0.227      | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Sulfur, total    | 23.3       | N/A | 3.0      | mg/L | 2018-10-29 |  |
| Tellurium, total | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-29 |  |
| Thallium, total  | < 0.000020 | N/A | 0.000020 | mg/L | 2018-10-29 |  |
| Thorium, total   | 0.00013    | N/A | 0.00010  | mg/L | 2018-10-29 |  |
| Tin, total       | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-29 |  |
| Titanium, total  | 0.0603     | N/A | 0.0050   | mg/L | 2018-10-29 |  |
| Tungsten, total  | 0.0011     | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Uranium, total   | 0.000757   | N/A | 0.000020 | mg/L | 2018-10-29 |  |
| Vanadium, total  | 0.0045     | N/A | 0.0010   | mg/L | 2018-10-29 |  |
| Zinc, total      | 0.0062     | N/A | 0.0040   | mg/L | 2018-10-29 |  |
| Zirconium, total | 0.00116    | N/A | 0.00010  | mg/L | 2018-10-29 |  |

### Annulus (8102061-06) | Matrix: Water | Sampled: 2018-10-16 10:00

F2, PRES

### Anions

|                |         |     |       |      |            |     |
|----------------|---------|-----|-------|------|------------|-----|
| Chloride       | 0.52    | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Fluoride       | < 0.10  | N/A | 0.10  | mg/L | 2018-10-27 |     |
| Nitrate (as N) | < 0.010 | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Nitrite (as N) | < 0.010 | N/A | 0.010 | mg/L | 2018-10-27 | HT1 |
| Sulfate        | 9.1     | N/A | 1.0   | mg/L | 2018-10-27 |     |

### Calculated Parameters

|                            |     |     |       |      |     |  |
|----------------------------|-----|-----|-------|------|-----|--|
| Hardness, Total (as CaCO3) | 123 | N/A | 0.500 | mg/L | N/A |  |
|----------------------------|-----|-----|-------|------|-----|--|

### Dissolved Metals

|                      |            |     |          |      |            |  |
|----------------------|------------|-----|----------|------|------------|--|
| Aluminum, dissolved  | 0.0052     | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Antimony, dissolved  | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Arsenic, dissolved   | 0.00073    | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Barium, dissolved    | 0.0547     | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Beryllium, dissolved | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Bismuth, dissolved   | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Boron, dissolved     | 0.0249     | N/A | 0.0050   | mg/L | 2018-10-28 |  |
| Cadmium, dissolved   | < 0.000010 | N/A | 0.000010 | mg/L | 2018-10-28 |  |
| Calcium, dissolved   | 32.1       | N/A | 0.20     | mg/L | 2018-10-28 |  |
| Chromium, dissolved  | < 0.00050  | N/A | 0.00050  | mg/L | 2018-10-28 |  |
| Cobalt, dissolved    | < 0.00010  | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Copper, dissolved    | 0.00045    | N/A | 0.00040  | mg/L | 2018-10-28 |  |
| Iron, dissolved      | < 0.010    | N/A | 0.010    | mg/L | 2018-10-28 |  |
| Lead, dissolved      | < 0.00020  | N/A | 0.00020  | mg/L | 2018-10-28 |  |
| Lithium, dissolved   | 0.00100    | N/A | 0.00010  | mg/L | 2018-10-28 |  |
| Magnesium, dissolved | 10.4       | N/A | 0.010    | mg/L | 2018-10-28 |  |
| Manganese, dissolved | 0.0814     | N/A | 0.00020  | mg/L | 2018-10-28 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                            | Result         | Guideline | RL       | Units    | Analyzed   | Qualifier |
|------------------------------------------------------------------------------------|----------------|-----------|----------|----------|------------|-----------|
| <b>Annulus (8102061-06)   Matrix: Water   Sampled: 2018-10-16 10:00, Continued</b> |                |           |          |          |            | F2, PRES  |
| <b>Dissolved Metals, Continued</b>                                                 |                |           |          |          |            |           |
| Mercury, dissolved                                                                 | < 0.000010     | N/A       | 0.000010 | mg/L     | 2018-10-26 |           |
| Molybdenum, dissolved                                                              | <b>0.00317</b> | N/A       | 0.00010  | mg/L     | 2018-10-28 |           |
| Nickel, dissolved                                                                  | < 0.00040      | N/A       | 0.00040  | mg/L     | 2018-10-28 |           |
| Phosphorus, dissolved                                                              | < 0.050        | N/A       | 0.050    | mg/L     | 2018-10-28 |           |
| Potassium, dissolved                                                               | <b>2.10</b>    | N/A       | 0.10     | mg/L     | 2018-10-28 |           |
| Selenium, dissolved                                                                | < 0.00050      | N/A       | 0.00050  | mg/L     | 2018-10-28 |           |
| Silicon, dissolved                                                                 | <b>7.1</b>     | N/A       | 1.0      | mg/L     | 2018-10-28 |           |
| Silver, dissolved                                                                  | < 0.000050     | N/A       | 0.000050 | mg/L     | 2018-10-28 |           |
| Sodium, dissolved                                                                  | <b>12.6</b>    | N/A       | 0.10     | mg/L     | 2018-10-28 |           |
| Strontium, dissolved                                                               | <b>0.241</b>   | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Sulfur, dissolved                                                                  | < 3.0          | N/A       | 3.0      | mg/L     | 2018-10-28 |           |
| Tellurium, dissolved                                                               | < 0.00050      | N/A       | 0.00050  | mg/L     | 2018-10-28 |           |
| Thallium, dissolved                                                                | < 0.000020     | N/A       | 0.000020 | mg/L     | 2018-10-28 |           |
| Thorium, dissolved                                                                 | < 0.00010      | N/A       | 0.00010  | mg/L     | 2018-10-28 |           |
| Tin, dissolved                                                                     | < 0.00020      | N/A       | 0.00020  | mg/L     | 2018-10-28 |           |
| Titanium, dissolved                                                                | < 0.0050       | N/A       | 0.0050   | mg/L     | 2018-10-28 |           |
| Tungsten, dissolved                                                                | < 0.0010       | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Uranium, dissolved                                                                 | <b>0.00127</b> | N/A       | 0.000020 | mg/L     | 2018-10-28 |           |
| Vanadium, dissolved                                                                | < 0.0010       | N/A       | 0.0010   | mg/L     | 2018-10-28 |           |
| Zinc, dissolved                                                                    | < 0.0040       | N/A       | 0.0040   | mg/L     | 2018-10-28 |           |
| Zirconium, dissolved                                                               | < 0.00010      | N/A       | 0.00010  | mg/L     | 2018-10-28 |           |
| <b>General Parameters</b>                                                          |                |           |          |          |            |           |
| Alkalinity, Total (as CaCO <sub>3</sub> )                                          | <b>160</b>     | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> )                                | < 1.0          | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )                                    | <b>160</b>     | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )                                      | < 1.0          | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )                                      | < 1.0          | N/A       | 1.0      | mg/L     | 2018-10-24 |           |
| Ammonia, Total (as N)                                                              | <b>0.058</b>   | N/A       | 0.020    | mg/L     | 2018-10-28 |           |
| Colour, True                                                                       | < 5.0          | N/A       | 5.0      | CU       | 2018-10-24 | HT1       |
| Conductivity (EC)                                                                  | <b>310</b>     | N/A       | 2.0      | µS/cm    | 2018-10-24 |           |
| pH                                                                                 | <b>8.28</b>    | N/A       | 0.10     | pH units | 2018-10-24 | HT2       |
| Solids, Total Dissolved                                                            | <b>179</b>     | N/A       | 15       | mg/L     | 2018-10-22 | HT1       |
| Sulfide, Total                                                                     | < 0.020        | N/A       | 0.020    | mg/L     | 2018-10-25 | HT1       |
| Turbidity                                                                          | <b>37.3</b>    | N/A       | 0.10     | NTU      | 2018-10-24 | HT1       |
| <b>Total Metals</b>                                                                |                |           |          |          |            |           |
| Aluminum, total                                                                    | <b>1.23</b>    | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Antimony, total                                                                    | < 0.00020      | N/A       | 0.00020  | mg/L     | 2018-10-29 |           |
| Arsenic, total                                                                     | <b>0.00183</b> | N/A       | 0.00050  | mg/L     | 2018-10-29 |           |
| Barium, total                                                                      | <b>0.0758</b>  | N/A       | 0.0050   | mg/L     | 2018-10-29 |           |
| Beryllium, total                                                                   | < 0.00010      | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |
| Bismuth, total                                                                     | < 0.00010      | N/A       | 0.00010  | mg/L     | 2018-10-29 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analyte                                                                            | Result     | Guideline | RL       | Units | Analyzed   | Qualifier |
|------------------------------------------------------------------------------------|------------|-----------|----------|-------|------------|-----------|
| <b>Annulus (8102061-06)   Matrix: Water   Sampled: 2018-10-16 10:00, Continued</b> |            |           |          |       |            | F2, PRES  |
| <b>Total Metals, Continued</b>                                                     |            |           |          |       |            |           |
| Boron, total                                                                       | 0.0257     | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Cadmium, total                                                                     | 0.000035   | N/A       | 0.000010 | mg/L  | 2018-10-29 |           |
| Calcium, total                                                                     | 39.8       | N/A       | 0.20     | mg/L  | 2018-10-29 |           |
| Chromium, total                                                                    | 0.00213    | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Cobalt, total                                                                      | 0.00084    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Copper, total                                                                      | 0.00323    | N/A       | 0.00040  | mg/L  | 2018-10-29 |           |
| Iron, total                                                                        | 2.44       | N/A       | 0.010    | mg/L  | 2018-10-29 |           |
| Lead, total                                                                        | 0.00058    | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Lithium, total                                                                     | 0.00152    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Magnesium, total                                                                   | 12.0       | N/A       | 0.010    | mg/L  | 2018-10-29 |           |
| Manganese, total                                                                   | 0.154      | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Mercury, total                                                                     | < 0.000040 | N/A       | 0.000040 | mg/L  | 2018-10-29 | CT5       |
| Molybdenum, total                                                                  | 0.00317    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Nickel, total                                                                      | 0.00122    | N/A       | 0.00040  | mg/L  | 2018-10-29 |           |
| Phosphorus, total                                                                  | 0.056      | N/A       | 0.050    | mg/L  | 2018-10-29 |           |
| Potassium, total                                                                   | 2.61       | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Selenium, total                                                                    | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Silicon, total                                                                     | 10.0       | N/A       | 1.0      | mg/L  | 2018-10-29 |           |
| Silver, total                                                                      | < 0.000050 | N/A       | 0.000050 | mg/L  | 2018-10-29 |           |
| Sodium, total                                                                      | 13.6       | N/A       | 0.10     | mg/L  | 2018-10-29 |           |
| Strontium, total                                                                   | 0.283      | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Sulfur, total                                                                      | 3.4        | N/A       | 3.0      | mg/L  | 2018-10-29 |           |
| Tellurium, total                                                                   | < 0.00050  | N/A       | 0.00050  | mg/L  | 2018-10-29 |           |
| Thallium, total                                                                    | < 0.000020 | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Thorium, total                                                                     | < 0.00010  | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |
| Tin, total                                                                         | < 0.00020  | N/A       | 0.00020  | mg/L  | 2018-10-29 |           |
| Titanium, total                                                                    | 0.0749     | N/A       | 0.0050   | mg/L  | 2018-10-29 |           |
| Tungsten, total                                                                    | < 0.0010   | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Uranium, total                                                                     | 0.00143    | N/A       | 0.000020 | mg/L  | 2018-10-29 |           |
| Vanadium, total                                                                    | 0.0058     | N/A       | 0.0010   | mg/L  | 2018-10-29 |           |
| Zinc, total                                                                        | 0.0286     | N/A       | 0.0040   | mg/L  | 2018-10-29 |           |
| Zirconium, total                                                                   | 0.00075    | N/A       | 0.00010  | mg/L  | 2018-10-29 |           |

### Sample Qualifiers:

|      |                                                                                                                                                               |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CST2 | Results non-reportable due to high matrix interference. Sample reanalysis confirms original data.                                                             |
| CT5  | This sample has been incorrectly preserved for Mercury analysis                                                                                               |
| F2   | The sample was not field-preserved with HNO3 and was therefore preserved in the laboratory and held for at least 16 hours prior to analysis for total metals. |
| HT1  | The sample was prepared and/or analyzed past the recommended holding time.                                                                                    |
| HT2  | The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.                                         |
| PRES | Sample has been preserved for NH3 in the laboratory and the holding time has been extended.                                                                   |

## APPENDIX 1: SUPPORTING INFORMATION

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
Well Drilling Groundwater Characterization

**WORK ORDER REPORTED** 8102061  
2018-10-30 15:10

| Analysis Description             | Method Ref.                       | Technique                                                                                         | Location |
|----------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|----------|
| Alkalinity in Water              | SM 2320 B* (2011)                 | Titration with H <sub>2</sub> SO <sub>4</sub>                                                     | Kelowna  |
| Ammonia, Total in Water          | SM 4500-NH <sub>3</sub> G* (2011) | Automated Colorimetry (Phenate)                                                                   | Kelowna  |
| Anions in Water                  | SM 4110 B (2011)                  | Ion Chromatography                                                                                | Kelowna  |
| Colour, True in Water            | SM 2120 C (2011)                  | Spectrophotometry (456 nm)                                                                        | Kelowna  |
| Conductivity in Water            | SM 2510 B (2011)                  | Conductivity Meter                                                                                | Kelowna  |
| Dissolved Metals in Water        | EPA 200.8 / EPA 6020B             | 0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)                        | Richmond |
| Hardness in Water                | SM 2340 B (2011)                  | Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]                                                    | N/A      |
| Mercury, dissolved in Water      | EPA 245.7*                        | BrCl <sub>2</sub> Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)                 | Richmond |
| pH in Water                      | SM 4500-H+ B (2011)               | Electrometry                                                                                      | Kelowna  |
| Solids, Total Dissolved in Water | SM 2540 C* (2011)                 | Gravimetry (Dried at 103-105C)                                                                    | Kelowna  |
| Sulfide, Total in Water          | SM 4500-S <sub>2</sub> D* (2011)  | Colorimetry (Methylene Blue)                                                                      | Edmonton |
| Total Metals in Water            | EPA 200.2* / EPA 6020B            | HNO <sub>3</sub> +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) | Richmond |
| Turbidity in Water               | SM 2130 B (2011)                  | Nephelometry                                                                                      | Kelowna  |

*Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method*

### Glossary of Terms:

|          |                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------|
| RL       | Reporting Limit (default)                                                                                             |
| <        | Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors |
| CU       | Colour Units (referenced against a platinum cobalt standard)                                                          |
| mg/L     | Milligrams per litre                                                                                                  |
| NTU      | Nephelometric Turbidity Units                                                                                         |
| pH units | pH < 7 = acidic, pH > 7 = basic                                                                                       |
| µS/cm    | Microsiemens per centimetre                                                                                           |
| EPA      | United States Environmental Protection Agency Test Methods                                                            |
| SM       | Standard Methods for the Examination of Water and Wastewater, American Public Health Association                      |

### General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.





## CERTIFICATE OF ANALYSIS

**REPORTED TO** BC Groundwater Consulting Services Ltd.  
835 Nicola Street  
Kamloops, BC V2C 2R6

**ATTENTION** Thierry Carriou

**PO NUMBER**

**PROJECT** 18007.2

**PROJECT INFO** Enhanced Potability

**WORK ORDER** 9083014

**RECEIVED / TEMP** 2019-08-30 09:20 / 21°C

**REPORTED** 2019-09-10 13:21

**COC NUMBER** B75373

### Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

#### *Big Picture Sidekicks*



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

#### *We've Got Chemistry*



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

#### *Ahead of the Curve*



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at [acrump@caro.ca](mailto:acrump@caro.ca)

#### Authorized By:

Alana Crump  
Junior Account Manager

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#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte                                                                                 | Result     | Guideline     | RL Units      | Analyzed   | Qualifier |
|-----------------------------------------------------------------------------------------|------------|---------------|---------------|------------|-----------|
| <b>River Ranch WIPN: 46314 (9083014-01)   Matrix: Water   Sampled: 2019-08-29 11:15</b> |            |               |               |            |           |
| <b>Anions</b>                                                                           |            |               |               |            |           |
| Chloride                                                                                | 1.10       | AO ≤ 250      | 0.10 mg/L     | 2019-08-31 |           |
| Fluoride                                                                                | < 0.10     | MAC = 1.5     | 0.10 mg/L     | 2019-08-31 |           |
| Nitrate (as N)                                                                          | 0.214      | MAC = 10      | 0.010 mg/L    | 2019-08-31 |           |
| Nitrite (as N)                                                                          | < 0.010    | MAC = 1       | 0.010 mg/L    | 2019-08-31 |           |
| Sulfate                                                                                 | 24.9       | AO ≤ 500      | 1.0 mg/L      | 2019-08-31 |           |
| <b>Calculated Parameters</b>                                                            |            |               |               |            |           |
| Hardness, Total (as CaCO <sub>3</sub> )                                                 | 188        | None Required | 0.500 mg/L    | N/A        |           |
| Nitrate+Nitrite (as N)                                                                  | 0.214      | N/A           | 0.0200 mg/L   | N/A        |           |
| <b>Dissolved Metals</b>                                                                 |            |               |               |            |           |
| Aluminum, dissolved                                                                     | < 0.0050   | N/A           | 0.0050 mg/L   | 2019-09-05 |           |
| Antimony, dissolved                                                                     | < 0.00020  | N/A           | 0.00020 mg/L  | 2019-09-05 |           |
| Arsenic, dissolved                                                                      | 0.00086    | N/A           | 0.00050 mg/L  | 2019-09-05 |           |
| Barium, dissolved                                                                       | 0.0516     | N/A           | 0.0050 mg/L   | 2019-09-05 |           |
| Beryllium, dissolved                                                                    | < 0.00010  | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Bismuth, dissolved                                                                      | < 0.00010  | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Boron, dissolved                                                                        | 0.0718     | N/A           | 0.0050 mg/L   | 2019-09-05 |           |
| Cadmium, dissolved                                                                      | < 0.000010 | N/A           | 0.000010 mg/L | 2019-09-05 |           |
| Calcium, dissolved                                                                      | 50.8       | N/A           | 0.20 mg/L     | 2019-09-05 |           |
| Chromium, dissolved                                                                     | 0.0116     | N/A           | 0.00050 mg/L  | 2019-09-05 |           |
| Cobalt, dissolved                                                                       | < 0.00010  | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Copper, dissolved                                                                       | < 0.00040  | N/A           | 0.00040 mg/L  | 2019-09-05 |           |
| Iron, dissolved                                                                         | < 0.010    | N/A           | 0.010 mg/L    | 2019-09-05 |           |
| Lead, dissolved                                                                         | 0.00022    | N/A           | 0.00020 mg/L  | 2019-09-05 |           |
| Lithium, dissolved                                                                      | 0.00162    | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Magnesium, dissolved                                                                    | 14.8       | N/A           | 0.010 mg/L    | 2019-09-05 |           |
| Manganese, dissolved                                                                    | 0.00116    | N/A           | 0.00020 mg/L  | 2019-09-05 |           |
| Mercury, dissolved                                                                      | < 0.000010 | N/A           | 0.000010 mg/L | 2019-09-04 |           |
| Molybdenum, dissolved                                                                   | 0.00083    | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Nickel, dissolved                                                                       | < 0.00040  | N/A           | 0.00040 mg/L  | 2019-09-05 |           |
| Phosphorus, dissolved                                                                   | < 0.050    | N/A           | 0.050 mg/L    | 2019-09-05 |           |
| Potassium, dissolved                                                                    | 1.50       | N/A           | 0.10 mg/L     | 2019-09-05 |           |
| Selenium, dissolved                                                                     | < 0.00050  | N/A           | 0.00050 mg/L  | 2019-09-05 |           |
| Silicon, dissolved                                                                      | 10.6       | N/A           | 1.0 mg/L      | 2019-09-05 |           |
| Silver, dissolved                                                                       | < 0.000050 | N/A           | 0.000050 mg/L | 2019-09-05 |           |
| Sodium, dissolved                                                                       | 22.9       | N/A           | 0.10 mg/L     | 2019-09-05 |           |
| Strontium, dissolved                                                                    | 0.377      | N/A           | 0.0010 mg/L   | 2019-09-05 |           |
| Sulfur, dissolved                                                                       | 7.2        | N/A           | 3.0 mg/L      | 2019-09-05 |           |
| Tellurium, dissolved                                                                    | < 0.00050  | N/A           | 0.00050 mg/L  | 2019-09-05 |           |
| Thallium, dissolved                                                                     | < 0.000020 | N/A           | 0.000020 mg/L | 2019-09-05 |           |
| Thorium, dissolved                                                                      | < 0.00010  | N/A           | 0.00010 mg/L  | 2019-09-05 |           |
| Tin, dissolved                                                                          | < 0.00020  | N/A           | 0.00020 mg/L  | 2019-09-05 |           |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte | Result | Guideline | RL | Units | Analyzed | Qualifier |
|---------|--------|-----------|----|-------|----------|-----------|
|---------|--------|-----------|----|-------|----------|-----------|

**River Ranch WIPN: 46314 (9083014-01) | Matrix: Water | Sampled: 2019-08-29 11:15, Continued**

### Dissolved Metals, Continued

|                      |                |     |          |      |            |  |
|----------------------|----------------|-----|----------|------|------------|--|
| Titanium, dissolved  | < 0.0050       | N/A | 0.0050   | mg/L | 2019-09-05 |  |
| Tungsten, dissolved  | < 0.0010       | N/A | 0.0010   | mg/L | 2019-09-05 |  |
| Uranium, dissolved   | <b>0.00258</b> | N/A | 0.000020 | mg/L | 2019-09-05 |  |
| Vanadium, dissolved  | <b>0.0039</b>  | N/A | 0.0010   | mg/L | 2019-09-05 |  |
| Zinc, dissolved      | < 0.0040       | N/A | 0.0040   | mg/L | 2019-09-05 |  |
| Zirconium, dissolved | < 0.00010      | N/A | 0.00010  | mg/L | 2019-09-05 |  |

### General Parameters

|                                                     |             |           |        |          |            |     |
|-----------------------------------------------------|-------------|-----------|--------|----------|------------|-----|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | <b>229</b>  | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0       | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | <b>229</b>  | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0       | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0       | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Colour, True                                        | < 5.0       | AO ≤ 15   | 5.0    | CU       | 2019-08-31 |     |
| Conductivity (EC)                                   | <b>460</b>  | N/A       | 2.0    | µS/cm    | 2019-09-03 |     |
| Cyanide, Total                                      | < 0.0020    | MAC = 0.2 | 0.0020 | mg/L     | 2019-09-06 | HT1 |
| pH                                                  | <b>7.99</b> | 7.0-10.5  | 0.10   | pH units | 2019-09-03 | HT2 |
| Solids, Total Dissolved                             | <b>270</b>  | AO ≤ 500  | 15     | mg/L     | 2019-09-03 |     |
| Solids, Total Suspended                             | < 2.0       | N/A       | 2.0    | mg/L     | 2019-09-04 |     |
| Sulfide, Total                                      | < 0.020     | AO ≤ 0.05 | 0.020  | mg/L     | 2019-09-05 |     |
| Turbidity                                           | < 0.10      | OG < 1    | 0.10   | NTU      | 2019-08-31 |     |
| UV Transmittance @ 254nm                            | <b>98.8</b> | N/A       | 0.10   | % T      | 2019-08-30 |     |

### Total Metals

|                   |                |               |          |      |            |  |
|-------------------|----------------|---------------|----------|------|------------|--|
| Aluminum, total   | <b>0.0052</b>  | OG < 0.1      | 0.0050   | mg/L | 2019-09-05 |  |
| Antimony, total   | < 0.00020      | MAC = 0.006   | 0.00020  | mg/L | 2019-09-05 |  |
| Arsenic, total    | <b>0.00087</b> | MAC = 0.01    | 0.00050  | mg/L | 2019-09-05 |  |
| Barium, total     | <b>0.0521</b>  | MAC = 1       | 0.0050   | mg/L | 2019-09-05 |  |
| Beryllium, total  | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Bismuth, total    | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Boron, total      | <b>0.0696</b>  | MAC = 5       | 0.0050   | mg/L | 2019-09-05 |  |
| Cadmium, total    | < 0.000010     | MAC = 0.005   | 0.000010 | mg/L | 2019-09-05 |  |
| Calcium, total    | <b>52.7</b>    | None Required | 0.20     | mg/L | 2019-09-05 |  |
| Chromium, total   | <b>0.0120</b>  | MAC = 0.05    | 0.00050  | mg/L | 2019-09-05 |  |
| Cobalt, total     | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Copper, total     | < 0.00040      | MAC = 2       | 0.00040  | mg/L | 2019-09-05 |  |
| Iron, total       | < 0.010        | AO ≤ 0.3      | 0.010    | mg/L | 2019-09-05 |  |
| Lead, total       | < 0.00020      | MAC = 0.005   | 0.00020  | mg/L | 2019-09-05 |  |
| Lithium, total    | <b>0.00170</b> | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Magnesium, total  | <b>15.7</b>    | None Required | 0.010    | mg/L | 2019-09-05 |  |
| Manganese, total  | <b>0.00121</b> | MAC = 0.12    | 0.00020  | mg/L | 2019-09-05 |  |
| Mercury, total    | < 0.000010     | MAC = 0.001   | 0.000010 | mg/L | 2019-09-05 |  |
| Molybdenum, total | <b>0.00090</b> | N/A           | 0.00010  | mg/L | 2019-09-05 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte | Result | Guideline | RL | Units | Analyzed | Qualifier |
|---------|--------|-----------|----|-------|----------|-----------|
|---------|--------|-----------|----|-------|----------|-----------|

### River Ranch WIPN: 46314 (9083014-01) | Matrix: Water | Sampled: 2019-08-29 11:15, Continued

#### Total Metals, Continued

|                   |            |               |          |      |            |  |
|-------------------|------------|---------------|----------|------|------------|--|
| Nickel, total     | < 0.00040  | N/A           | 0.00040  | mg/L | 2019-09-05 |  |
| Phosphorus, total | < 0.050    | N/A           | 0.050    | mg/L | 2019-09-05 |  |
| Potassium, total  | 1.56       | N/A           | 0.10     | mg/L | 2019-09-05 |  |
| Selenium, total   | < 0.00050  | MAC = 0.05    | 0.00050  | mg/L | 2019-09-05 |  |
| Silicon, total    | 11.3       | N/A           | 1.0      | mg/L | 2019-09-05 |  |
| Silver, total     | < 0.000050 | None Required | 0.000050 | mg/L | 2019-09-05 |  |
| Sodium, total     | 24.4       | AO ≤ 200      | 0.10     | mg/L | 2019-09-05 |  |
| Strontium, total  | 0.380      | 7             | 0.0010   | mg/L | 2019-09-05 |  |
| Sulfur, total     | 8.2        | N/A           | 3.0      | mg/L | 2019-09-05 |  |
| Tellurium, total  | < 0.00050  | N/A           | 0.00050  | mg/L | 2019-09-05 |  |
| Thallium, total   | < 0.000020 | N/A           | 0.000020 | mg/L | 2019-09-05 |  |
| Thorium, total    | < 0.00010  | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Tin, total        | < 0.00020  | N/A           | 0.00020  | mg/L | 2019-09-05 |  |
| Titanium, total   | < 0.0050   | N/A           | 0.0050   | mg/L | 2019-09-05 |  |
| Tungsten, total   | < 0.0010   | N/A           | 0.0010   | mg/L | 2019-09-05 |  |
| Uranium, total    | 0.00271    | MAC = 0.02    | 0.000020 | mg/L | 2019-09-05 |  |
| Vanadium, total   | 0.0046     | N/A           | 0.0010   | mg/L | 2019-09-05 |  |
| Zinc, total       | < 0.0040   | AO ≤ 5        | 0.0040   | mg/L | 2019-09-05 |  |
| Zirconium, total  | < 0.00010  | N/A           | 0.00010  | mg/L | 2019-09-05 |  |

#### Volatile Organic Compounds (VOC)

|                                   |       |          |     |      |            |  |
|-----------------------------------|-------|----------|-----|------|------------|--|
| Benzene                           | < 0.5 | MAC = 5  | 0.5 | µg/L | 2019-09-07 |  |
| Bromodichloromethane              | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| Bromoform                         | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| Carbon tetrachloride              | < 0.5 | MAC = 2  | 0.5 | µg/L | 2019-09-07 |  |
| Chlorobenzene                     | < 1.0 | AO ≤ 30  | 1.0 | µg/L | 2019-09-07 |  |
| Chloroethane                      | < 2.0 | N/A      | 2.0 | µg/L | 2019-09-07 |  |
| Chloroform                        | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| Dibromochloromethane              | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| 1,2-Dibromoethane                 | < 0.3 | N/A      | 0.3 | µg/L | 2019-09-07 |  |
| Dibromomethane                    | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| 1,2-Dichlorobenzene               | < 0.5 | AO ≤ 3   | 0.5 | µg/L | 2019-09-07 |  |
| 1,3-Dichlorobenzene               | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| 1,4-Dichlorobenzene               | < 1.0 | AO ≤ 1   | 1.0 | µg/L | 2019-09-07 |  |
| 1,1-Dichloroethane                | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| 1,2-Dichloroethane                | < 1.0 | MAC = 5  | 1.0 | µg/L | 2019-09-07 |  |
| 1,1-Dichloroethylene              | < 1.0 | MAC = 14 | 1.0 | µg/L | 2019-09-07 |  |
| cis-1,2-Dichloroethylene          | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| trans-1,2-Dichloroethylene        | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| Dichloromethane                   | < 3.0 | MAC = 50 | 3.0 | µg/L | 2019-09-07 |  |
| 1,2-Dichloropropane               | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| 1,3-Dichloropropene (cis + trans) | < 1.0 | N/A      | 1.0 | µg/L | 2019-09-07 |  |
| Ethylbenzene                      | < 1.0 | AO ≤ 1.6 | 1.0 | µg/L | 2019-09-07 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte                                                                                            | Result | Guideline | RL     | Units | Analyzed   | Qualifier |
|----------------------------------------------------------------------------------------------------|--------|-----------|--------|-------|------------|-----------|
| <b>River Ranch WIPN: 46314 (9083014-01)   Matrix: Water   Sampled: 2019-08-29 11:15, Continued</b> |        |           |        |       |            |           |
| <i>Volatile Organic Compounds (VOC), Continued</i>                                                 |        |           |        |       |            |           |
| Methyl tert-butyl ether                                                                            | < 1.0  | AO ≤ 15   | 1.0    | µg/L  | 2019-09-07 |           |
| Styrene                                                                                            | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,2,2-Tetrachloroethane                                                                          | < 0.5  | N/A       | 0.5    | µg/L  | 2019-09-07 |           |
| Tetrachloroethylene                                                                                | < 1.0  | MAC = 10  | 1.0    | µg/L  | 2019-09-07 |           |
| Toluene                                                                                            | < 1.0  | AO ≤ 24   | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,1-Trichloroethane                                                                              | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,2-Trichloroethane                                                                              | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Trichloroethylene                                                                                  | < 1.0  | MAC = 5   | 1.0    | µg/L  | 2019-09-07 |           |
| Trichlorofluoromethane                                                                             | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Vinyl chloride                                                                                     | < 1.0  | MAC = 2   | 1.0    | µg/L  | 2019-09-07 |           |
| Xylenes (total)                                                                                    | < 2.0  | AO ≤ 20   | 2.0    | µg/L  | 2019-09-07 |           |
| Surrogate: Toluene-d8                                                                              | 90     |           | 70-130 | %     | 2019-09-07 |           |
| Surrogate: 4-Bromofluorobenzene                                                                    | 139    |           | 70-130 | %     | 2019-09-07 | S02       |
| Surrogate: 1,4-Dichlorobenzene-d4                                                                  | 140    |           | 70-130 | %     | 2019-09-07 | S02       |

### Lou Cooke (9083014-02) | Matrix: Water | Sampled: 2019-08-29 12:45

#### Anions

|                |         |           |       |      |            |  |
|----------------|---------|-----------|-------|------|------------|--|
| Chloride       | 7.10    | AO ≤ 250  | 0.10  | mg/L | 2019-08-31 |  |
| Fluoride       | < 0.10  | MAC = 1.5 | 0.10  | mg/L | 2019-08-31 |  |
| Nitrate (as N) | 0.151   | MAC = 10  | 0.010 | mg/L | 2019-08-31 |  |
| Nitrite (as N) | < 0.010 | MAC = 1   | 0.010 | mg/L | 2019-08-31 |  |
| Sulfate        | 160     | AO ≤ 500  | 1.0   | mg/L | 2019-09-02 |  |

#### Calculated Parameters

|                            |       |               |        |      |     |  |
|----------------------------|-------|---------------|--------|------|-----|--|
| Hardness, Total (as CaCO3) | 360   | None Required | 0.500  | mg/L | N/A |  |
| Nitrate+Nitrite (as N)     | 0.151 | N/A           | 0.0200 | mg/L | N/A |  |

#### Dissolved Metals

|                      |           |     |          |      |            |  |
|----------------------|-----------|-----|----------|------|------------|--|
| Aluminum, dissolved  | < 0.0050  | N/A | 0.0050   | mg/L | 2019-09-05 |  |
| Antimony, dissolved  | < 0.00020 | N/A | 0.00020  | mg/L | 2019-09-05 |  |
| Arsenic, dissolved   | 0.00079   | N/A | 0.00050  | mg/L | 2019-09-05 |  |
| Barium, dissolved    | 0.0181    | N/A | 0.0050   | mg/L | 2019-09-05 |  |
| Beryllium, dissolved | < 0.00010 | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Bismuth, dissolved   | < 0.00010 | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Boron, dissolved     | 0.0307    | N/A | 0.0050   | mg/L | 2019-09-05 |  |
| Cadmium, dissolved   | 0.000013  | N/A | 0.000010 | mg/L | 2019-09-05 |  |
| Calcium, dissolved   | 105       | N/A | 0.20     | mg/L | 2019-09-05 |  |
| Chromium, dissolved  | 0.00248   | N/A | 0.00050  | mg/L | 2019-09-05 |  |
| Cobalt, dissolved    | < 0.00010 | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Copper, dissolved    | 0.00064   | N/A | 0.00040  | mg/L | 2019-09-05 |  |
| Iron, dissolved      | 0.010     | N/A | 0.010    | mg/L | 2019-09-05 |  |
| Lead, dissolved      | < 0.00020 | N/A | 0.00020  | mg/L | 2019-09-05 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte | Result | Guideline | RL | Units | Analyzed | Qualifier |
|---------|--------|-----------|----|-------|----------|-----------|
|---------|--------|-----------|----|-------|----------|-----------|

**Lou Cooke (9083014-02) | Matrix: Water | Sampled: 2019-08-29 12:45, Continued**

### *Dissolved Metals, Continued*

|                       |            |     |          |      |            |  |
|-----------------------|------------|-----|----------|------|------------|--|
| Lithium, dissolved    | 0.00129    | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Magnesium, dissolved  | 24.0       | N/A | 0.010    | mg/L | 2019-09-05 |  |
| Manganese, dissolved  | 0.00095    | N/A | 0.00020  | mg/L | 2019-09-05 |  |
| Mercury, dissolved    | < 0.000010 | N/A | 0.000010 | mg/L | 2019-09-04 |  |
| Molybdenum, dissolved | 0.00383    | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Nickel, dissolved     | < 0.00040  | N/A | 0.00040  | mg/L | 2019-09-05 |  |
| Phosphorus, dissolved | < 0.050    | N/A | 0.050    | mg/L | 2019-09-05 |  |
| Potassium, dissolved  | 0.97       | N/A | 0.10     | mg/L | 2019-09-05 |  |
| Selenium, dissolved   | < 0.00050  | N/A | 0.00050  | mg/L | 2019-09-05 |  |
| Silicon, dissolved    | 11.2       | N/A | 1.0      | mg/L | 2019-09-05 |  |
| Silver, dissolved     | < 0.000050 | N/A | 0.000050 | mg/L | 2019-09-05 |  |
| Sodium, dissolved     | 10.6       | N/A | 0.10     | mg/L | 2019-09-05 |  |
| Strontium, dissolved  | 0.506      | N/A | 0.0010   | mg/L | 2019-09-05 |  |
| Sulfur, dissolved     | 58.3       | N/A | 3.0      | mg/L | 2019-09-05 |  |
| Tellurium, dissolved  | < 0.00050  | N/A | 0.00050  | mg/L | 2019-09-05 |  |
| Thallium, dissolved   | < 0.000020 | N/A | 0.000020 | mg/L | 2019-09-05 |  |
| Thorium, dissolved    | < 0.00010  | N/A | 0.00010  | mg/L | 2019-09-05 |  |
| Tin, dissolved        | < 0.00020  | N/A | 0.00020  | mg/L | 2019-09-05 |  |
| Titanium, dissolved   | < 0.0050   | N/A | 0.0050   | mg/L | 2019-09-05 |  |
| Tungsten, dissolved   | < 0.0010   | N/A | 0.0010   | mg/L | 2019-09-05 |  |
| Uranium, dissolved    | 0.00102    | N/A | 0.000020 | mg/L | 2019-09-05 |  |
| Vanadium, dissolved   | 0.0027     | N/A | 0.0010   | mg/L | 2019-09-05 |  |
| Zinc, dissolved       | < 0.0040   | N/A | 0.0040   | mg/L | 2019-09-05 |  |
| Zirconium, dissolved  | < 0.00010  | N/A | 0.00010  | mg/L | 2019-09-05 |  |

### *General Parameters*

|                                                     |         |           |        |          |            |     |
|-----------------------------------------------------|---------|-----------|--------|----------|------------|-----|
| Alkalinity, Total (as CaCO <sub>3</sub> )           | 230     | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> ) | < 1.0   | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )     | 230     | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )       | < 1.0   | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )       | < 1.0   | N/A       | 1.0    | mg/L     | 2019-09-03 |     |
| Colour, True                                        | < 5.0   | AO ≤ 15   | 5.0    | CU       | 2019-08-31 |     |
| Conductivity (EC)                                   | 745     | N/A       | 2.0    | µS/cm    | 2019-09-03 |     |
| Cyanide, Total                                      | 0.0025  | MAC = 0.2 | 0.0020 | mg/L     | 2019-09-06 | HT1 |
| pH                                                  | 7.88    | 7.0-10.5  | 0.10   | pH units | 2019-09-03 | HT2 |
| Solids, Total Dissolved                             | 499     | AO ≤ 500  | 15     | mg/L     | 2019-09-03 |     |
| Solids, Total Suspended                             | < 2.0   | N/A       | 2.0    | mg/L     | 2019-09-04 |     |
| Sulfide, Total                                      | < 0.020 | AO ≤ 0.05 | 0.020  | mg/L     | 2019-09-05 |     |
| Turbidity                                           | 0.14    | OG < 1    | 0.10   | NTU      | 2019-08-31 |     |
| UV Transmittance @ 254nm                            | 97.6    | N/A       | 0.10   | % T      | 2019-08-30 |     |

### *Total Metals*

|                 |        |          |        |      |            |  |
|-----------------|--------|----------|--------|------|------------|--|
| Aluminum, total | 0.0081 | OG < 0.1 | 0.0050 | mg/L | 2019-09-05 |  |
|-----------------|--------|----------|--------|------|------------|--|

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte | Result | Guideline | RL | Units | Analyzed | Qualifier |
|---------|--------|-----------|----|-------|----------|-----------|
|---------|--------|-----------|----|-------|----------|-----------|

**Lou Cooke (9083014-02) | Matrix: Water | Sampled: 2019-08-29 12:45, Continued**

### Total Metals, Continued

|                   |                |               |          |      |            |  |
|-------------------|----------------|---------------|----------|------|------------|--|
| Antimony, total   | < 0.00020      | MAC = 0.006   | 0.00020  | mg/L | 2019-09-05 |  |
| Arsenic, total    | <b>0.00083</b> | MAC = 0.01    | 0.00050  | mg/L | 2019-09-05 |  |
| Barium, total     | <b>0.0188</b>  | MAC = 1       | 0.0050   | mg/L | 2019-09-05 |  |
| Beryllium, total  | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Bismuth, total    | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Boron, total      | <b>0.0327</b>  | MAC = 5       | 0.0050   | mg/L | 2019-09-05 |  |
| Cadmium, total    | < 0.000010     | MAC = 0.005   | 0.000010 | mg/L | 2019-09-05 |  |
| Calcium, total    | <b>110</b>     | None Required | 0.20     | mg/L | 2019-09-05 |  |
| Chromium, total   | <b>0.00244</b> | MAC = 0.05    | 0.00050  | mg/L | 2019-09-05 |  |
| Cobalt, total     | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Copper, total     | <b>0.00049</b> | MAC = 2       | 0.00040  | mg/L | 2019-09-05 |  |
| Iron, total       | < 0.010        | AO ≤ 0.3      | 0.010    | mg/L | 2019-09-05 |  |
| Lead, total       | < 0.00020      | MAC = 0.005   | 0.00020  | mg/L | 2019-09-05 |  |
| Lithium, total    | <b>0.00134</b> | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Magnesium, total  | <b>25.2</b>    | None Required | 0.010    | mg/L | 2019-09-05 |  |
| Manganese, total  | <b>0.00108</b> | MAC = 0.12    | 0.00020  | mg/L | 2019-09-05 |  |
| Mercury, total    | < 0.000010     | MAC = 0.001   | 0.000010 | mg/L | 2019-09-05 |  |
| Molybdenum, total | <b>0.00393</b> | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Nickel, total     | <b>0.00062</b> | N/A           | 0.00040  | mg/L | 2019-09-05 |  |
| Phosphorus, total | < 0.050        | N/A           | 0.050    | mg/L | 2019-09-05 |  |
| Potassium, total  | <b>0.98</b>    | N/A           | 0.10     | mg/L | 2019-09-05 |  |
| Selenium, total   | < 0.00050      | MAC = 0.05    | 0.00050  | mg/L | 2019-09-05 |  |
| Silicon, total    | <b>11.6</b>    | N/A           | 1.0      | mg/L | 2019-09-05 |  |
| Silver, total     | < 0.000050     | None Required | 0.000050 | mg/L | 2019-09-05 |  |
| Sodium, total     | <b>11.2</b>    | AO ≤ 200      | 0.10     | mg/L | 2019-09-05 |  |
| Strontium, total  | <b>0.534</b>   | 7             | 0.0010   | mg/L | 2019-09-05 |  |
| Sulfur, total     | <b>60.7</b>    | N/A           | 3.0      | mg/L | 2019-09-05 |  |
| Tellurium, total  | < 0.00050      | N/A           | 0.00050  | mg/L | 2019-09-05 |  |
| Thallium, total   | < 0.000020     | N/A           | 0.000020 | mg/L | 2019-09-05 |  |
| Thorium, total    | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |
| Tin, total        | < 0.00020      | N/A           | 0.00020  | mg/L | 2019-09-05 |  |
| Titanium, total   | < 0.0050       | N/A           | 0.0050   | mg/L | 2019-09-05 |  |
| Tungsten, total   | < 0.0010       | N/A           | 0.0010   | mg/L | 2019-09-05 |  |
| Uranium, total    | <b>0.00108</b> | MAC = 0.02    | 0.000020 | mg/L | 2019-09-05 |  |
| Vanadium, total   | <b>0.0034</b>  | N/A           | 0.0010   | mg/L | 2019-09-05 |  |
| Zinc, total       | <b>0.0044</b>  | AO ≤ 5        | 0.0040   | mg/L | 2019-09-05 |  |
| Zirconium, total  | < 0.00010      | N/A           | 0.00010  | mg/L | 2019-09-05 |  |

### Volatile Organic Compounds (VOC)

|                      |       |         |     |      |            |  |
|----------------------|-------|---------|-----|------|------------|--|
| Benzene              | < 0.5 | MAC = 5 | 0.5 | µg/L | 2019-09-07 |  |
| Bromodichloromethane | < 1.0 | N/A     | 1.0 | µg/L | 2019-09-07 |  |
| Bromoform            | < 1.0 | N/A     | 1.0 | µg/L | 2019-09-07 |  |
| Carbon tetrachloride | < 0.5 | MAC = 2 | 0.5 | µg/L | 2019-09-07 |  |

## TEST RESULTS

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analyte                                                                              | Result | Guideline | RL     | Units | Analyzed   | Qualifier |
|--------------------------------------------------------------------------------------|--------|-----------|--------|-------|------------|-----------|
| <b>Lou Cooke (9083014-02)   Matrix: Water   Sampled: 2019-08-29 12:45, Continued</b> |        |           |        |       |            |           |
| <i>Volatile Organic Compounds (VOC), Continued</i>                                   |        |           |        |       |            |           |
| Chlorobenzene                                                                        | < 1.0  | AO ≤ 30   | 1.0    | µg/L  | 2019-09-07 |           |
| Chloroethane                                                                         | < 2.0  | N/A       | 2.0    | µg/L  | 2019-09-07 |           |
| Chloroform                                                                           | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Dibromochloromethane                                                                 | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,2-Dibromoethane                                                                    | < 0.3  | N/A       | 0.3    | µg/L  | 2019-09-07 |           |
| Dibromomethane                                                                       | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,2-Dichlorobenzene                                                                  | < 0.5  | AO ≤ 3    | 0.5    | µg/L  | 2019-09-07 |           |
| 1,3-Dichlorobenzene                                                                  | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,4-Dichlorobenzene                                                                  | < 1.0  | AO ≤ 1    | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1-Dichloroethane                                                                   | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,2-Dichloroethane                                                                   | < 1.0  | MAC = 5   | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1-Dichloroethylene                                                                 | < 1.0  | MAC = 14  | 1.0    | µg/L  | 2019-09-07 |           |
| cis-1,2-Dichloroethylene                                                             | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| trans-1,2-Dichloroethylene                                                           | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Dichloromethane                                                                      | < 3.0  | MAC = 50  | 3.0    | µg/L  | 2019-09-07 |           |
| 1,2-Dichloropropane                                                                  | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,3-Dichloropropene (cis + trans)                                                    | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Ethylbenzene                                                                         | < 1.0  | AO ≤ 1.6  | 1.0    | µg/L  | 2019-09-07 |           |
| Methyl tert-butyl ether                                                              | < 1.0  | AO ≤ 15   | 1.0    | µg/L  | 2019-09-07 |           |
| Styrene                                                                              | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,2,2-Tetrachloroethane                                                            | < 0.5  | N/A       | 0.5    | µg/L  | 2019-09-07 |           |
| Tetrachloroethylene                                                                  | < 1.0  | MAC = 10  | 1.0    | µg/L  | 2019-09-07 |           |
| Toluene                                                                              | < 1.0  | AO ≤ 24   | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,1-Trichloroethane                                                                | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| 1,1,2-Trichloroethane                                                                | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Trichloroethylene                                                                    | < 1.0  | MAC = 5   | 1.0    | µg/L  | 2019-09-07 |           |
| Trichlorofluoromethane                                                               | < 1.0  | N/A       | 1.0    | µg/L  | 2019-09-07 |           |
| Vinyl chloride                                                                       | < 1.0  | MAC = 2   | 1.0    | µg/L  | 2019-09-07 |           |
| Xylenes (total)                                                                      | < 2.0  | AO ≤ 20   | 2.0    | µg/L  | 2019-09-07 |           |
| Surrogate: Toluene-d8                                                                | 85     |           | 70-130 | %     | 2019-09-07 |           |
| Surrogate: 4-Bromofluorobenzene                                                      | 131    |           | 70-130 | %     | 2019-09-07 | S02       |
| Surrogate: 1,4-Dichlorobenzene-d4                                                    | 132    |           | 70-130 | %     | 2019-09-07 | S02       |

### Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

S02 Surrogate recovery outside of control limits. Data accepted based on acceptable recovery of other surrogates.

## APPENDIX 1: SUPPORTING INFORMATION

**REPORTED TO PROJECT** BC Groundwater Consulting Services Ltd.  
18007.2

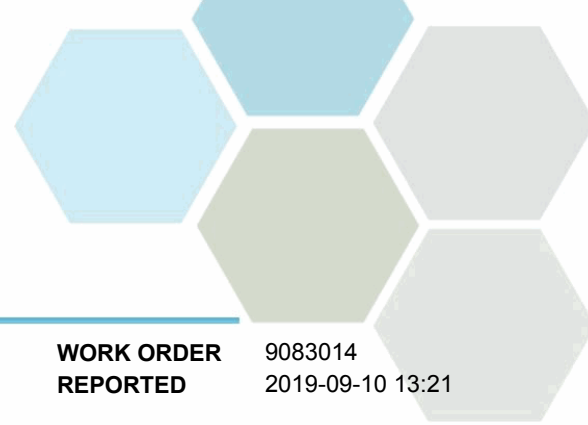
**WORK ORDER REPORTED** 9083014  
2019-09-10 13:21

| Analysis Description                | Method Ref.            | Technique                                                                            | Location |
|-------------------------------------|------------------------|--------------------------------------------------------------------------------------|----------|
| Alkalinity in Water                 | SM 2320 B* (2017)      | Titration with H2SO4                                                                 | Kelowna  |
| Anions in Water                     | SM 4110 B (2017)       | Ion Chromatography                                                                   | Kelowna  |
| Colour, True in Water               | SM 2120 C (2017)       | Spectrophotometry (456 nm)                                                           | Kelowna  |
| Conductivity in Water               | SM 2510 B (2017)       | Conductivity Meter                                                                   | Kelowna  |
| Cyanide, SAD in Water               | ASTM D7511-12          | Flow Injection with In-Line UV Digestion and Amperometry                             | Kelowna  |
| Dissolved Metals in Water           | EPA 200.8 / EPA 6020B  | 0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)           | Richmond |
| Hardness in Water                   | SM 2340 B (2017)       | Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]                                       | N/A      |
| Mercury, dissolved in Water         | EPA 245.7*             | BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)                | Richmond |
| Mercury, total in Water             | EPA 245.7*             | BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)                | Richmond |
| pH in Water                         | SM 4500-H+ B (2017)    | Electrometry                                                                         | Kelowna  |
| Solids, Total Dissolved in Water    | SM 2540 C* (2017)      | Gravimetry (Dried at 103-105C)                                                       | Kelowna  |
| Solids, Total Suspended in Water    | SM 2540 D* (2017)      | Gravimetry (Dried at 103-105C)                                                       | Kelowna  |
| Sulfide, Total in Water             | SM 4500-S2 D* (2017)   | Colorimetry (Methylene Blue)                                                         | Edmonton |
| Total Metals in Water               | EPA 200.2* / EPA 6020B | HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) | Richmond |
| Transmittance at 254 nm in Water    | SM 5910 B* (2017)      | Ultraviolet Absorption                                                               | Kelowna  |
| Turbidity in Water                  | SM 2130 B (2017)       | Nephelometry                                                                         | Kelowna  |
| Volatile Organic Compounds in Water | EPA 5030B / EPA 8260D  | Purge&Trap / GC-MSD (SIM)                                                            | Richmond |

*Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method*

### Glossary of Terms:

|          |                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------|
| RL       | Reporting Limit (default)                                                                                             |
| % T      | Percent Transmittance                                                                                                 |
| <        | Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors |
| AO       | Aesthetic Objective                                                                                                   |
| CU       | Colour Units (referenced against a platinum cobalt standard)                                                          |
| MAC      | Maximum Acceptable Concentration (health based)                                                                       |
| mg/L     | Milligrams per litre                                                                                                  |
| NTU      | Nephelometric Turbidity Units                                                                                         |
| OG       | Operational Guideline (treated water)                                                                                 |
| pH units | pH < 7 = acidic, pH > 7 = basic                                                                                       |
| µg/L     | Micrograms per litre                                                                                                  |
| µS/cm    | Microsiemens per centimetre                                                                                           |
| ASTM     | ASTM International Test Methods                                                                                       |
| EPA      | United States Environmental Protection Agency Test Methods                                                            |
| SM       | Standard Methods for the Examination of Water and Wastewater, American Public Health Association                      |



## APPENDIX 1: SUPPORTING INFORMATION

**REPORTED TO** BC Groundwater Consulting Services Ltd.  
**PROJECT** 18007.2

**WORK ORDER** 9083014  
**REPORTED** 2019-09-10 13:21

### Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, Feb 2017\)](#)

*Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user*

### General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing. The quality control (QC) data is available upon request

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: [acrump@caro.ca](mailto:acrump@caro.ca)



## **APPENDIX D**

### **WATER LEVEL DATABASES**

MANUAL READINGS ONLY



## **APPENDIX E**

### **PUMPING TESTS**

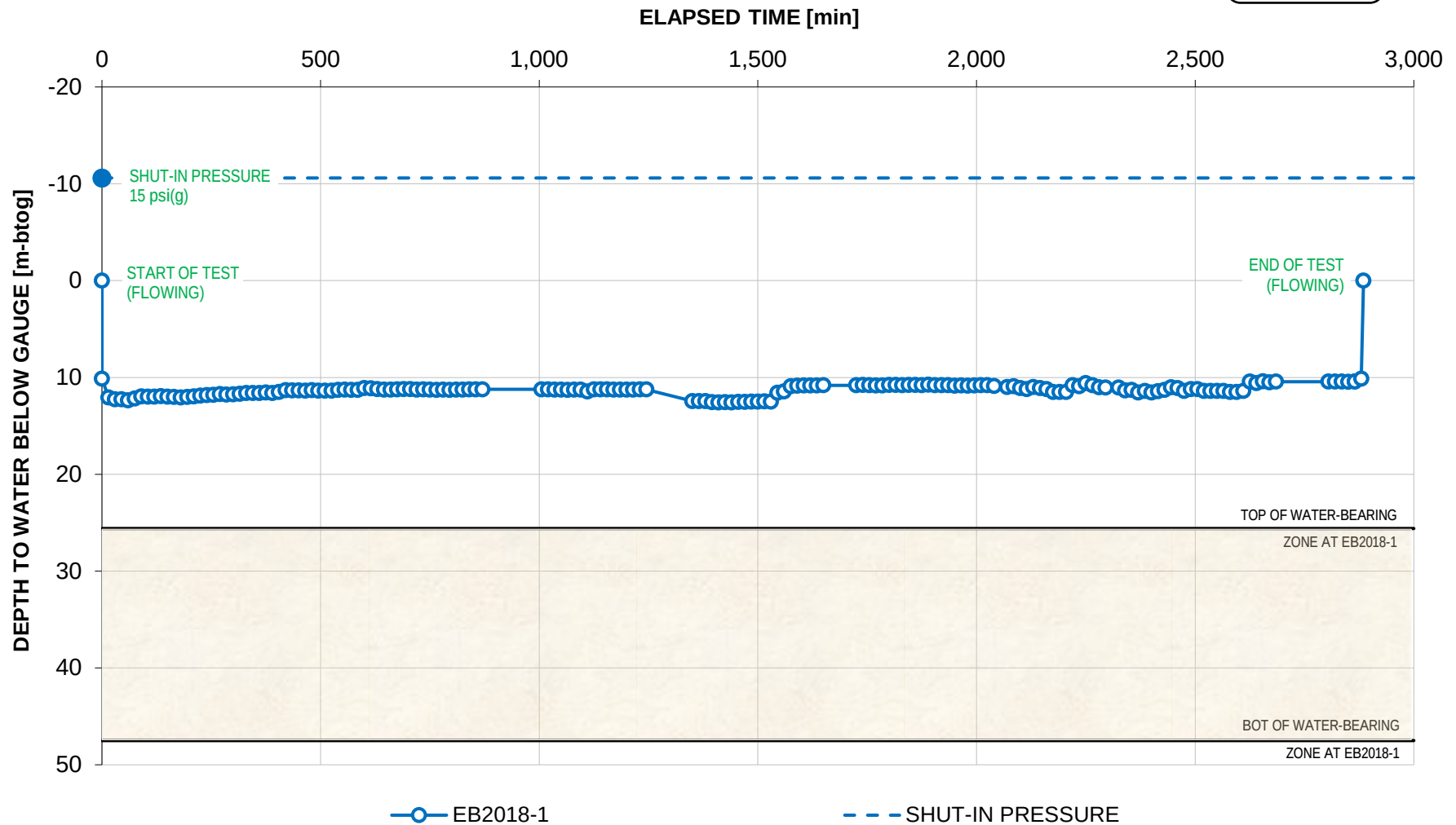


**RIVER RANCH CATTLE COMPANY**  
**GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN**  
EXPLORATORY BOREHOLE EB2018-1 (SCREENED) PUMPING TEST RESULTS  
EB2018-1 CONSTANT DISCHARGE TEST AUGUST 27 - 29<sup>TH</sup> 2019

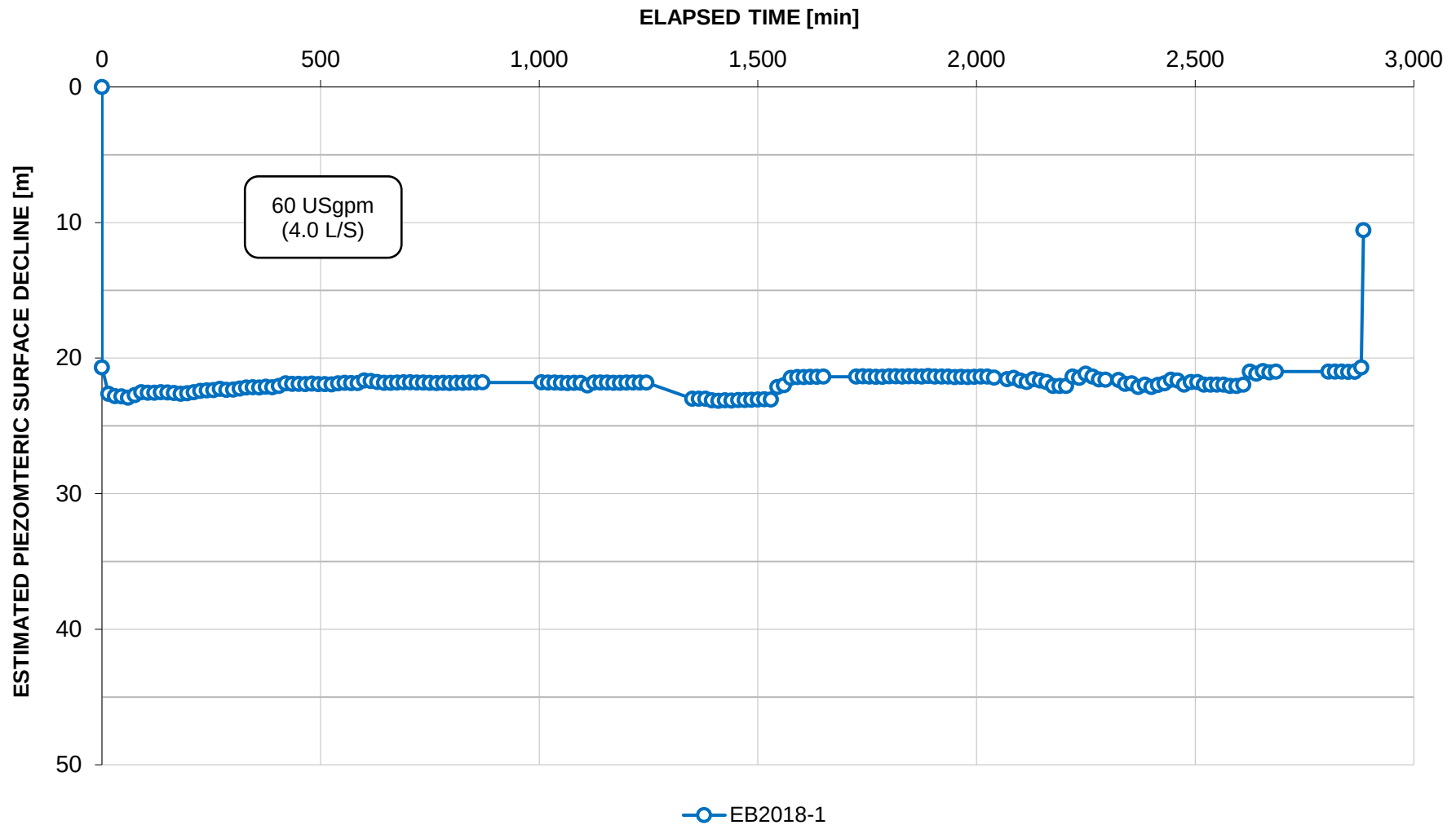
**SUMMARY OF EB2019-1 MEASUREMENTS**

BC GROUNDWATER FILE NO. 18007.2

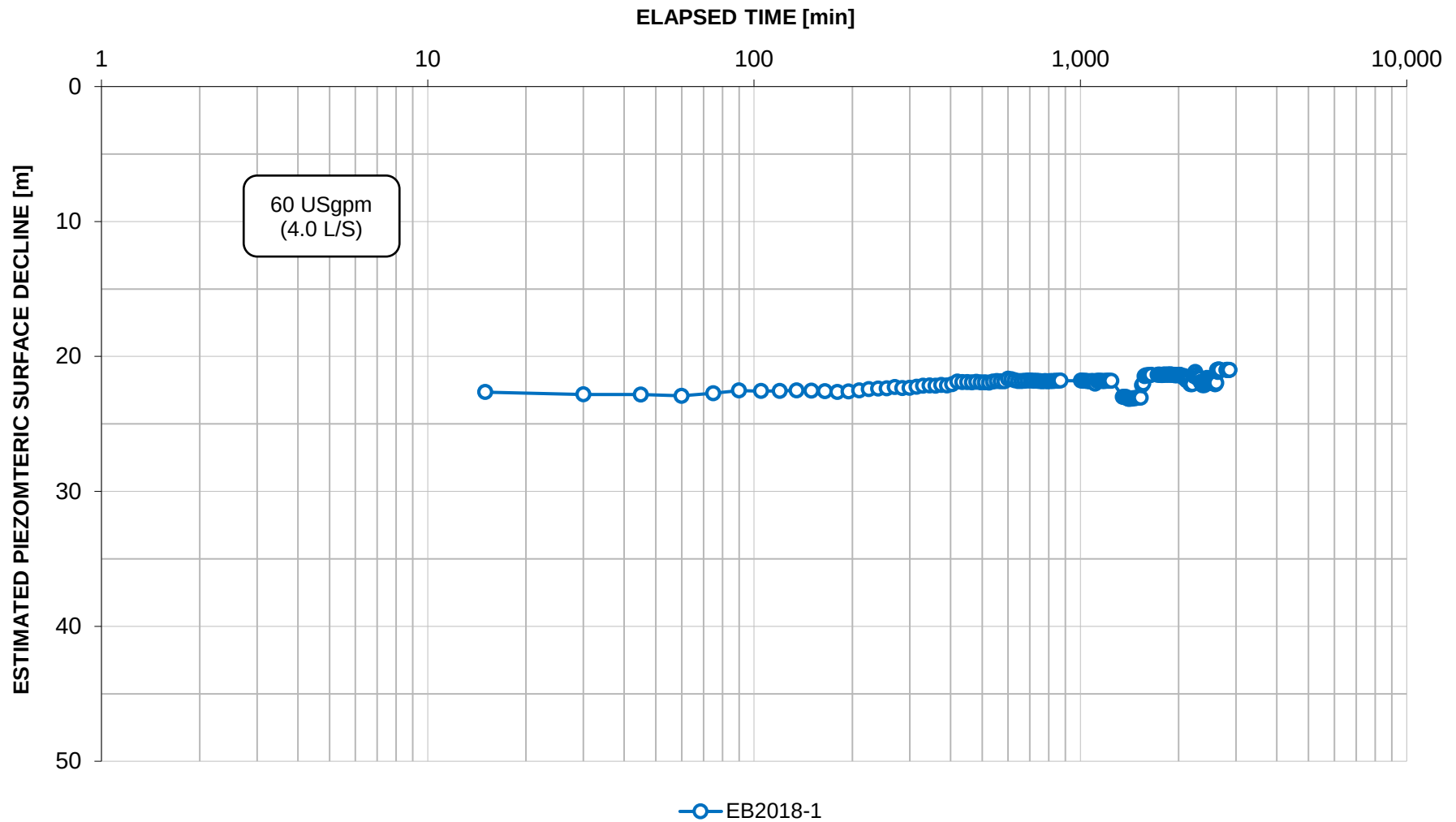
60 USgpm  
(4.0 L/S)



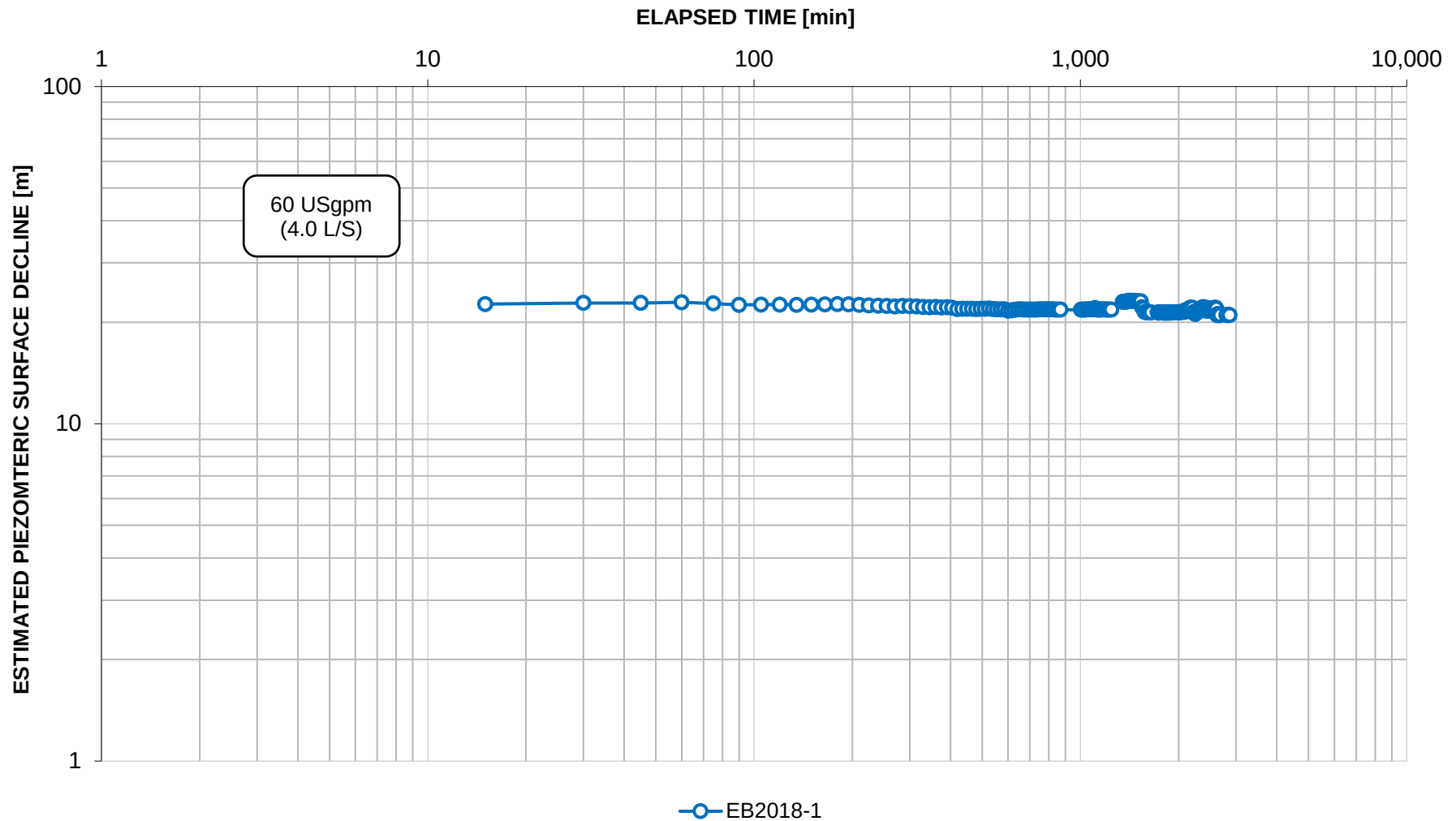
**RIVER RANCH CATTLE COMPANY**  
**GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN**  
EXPLORATORY BOREHOLE EB2018-1 (SCREENED) PUMPING TEST RESULTS  
EB2018-1 CONSTANT DISCHARGE TEST AUGUST 27 - 29<sup>TH</sup> 2019  
**SUMMARY OF EB2019-1 MEASUREMENTS**  
BC GROUNDWATER FILE NO. 18007.2



**RIVER RANCH CATTLE COMPANY**  
**GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN**  
EXPLORATORY BOREHOLE EB2018-1 (SCREENED) PUMPING TEST RESULTS  
EB2018-1 CONSTANT DISCHARGE TEST AUGUST 27 - 29<sup>TH</sup> 2019  
**SUMMARY OF EB2019-1 MEASUREMENTS**  
BC GROUNDWATER FILE NO. 18007.2



**RIVER RANCH CATTLE COMPANY**  
**GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN**  
EXPLORATORY BOREHOLE EB2018-1 (SCREENED) PUMPING TEST RESULTS  
EB2018-1 CONSTANT DISCHARGE TEST AUGUST 27 - 29<sup>TH</sup> 2019  
**SUMMARY OF EB2019-1 MEASUREMENTS**  
BC GROUNDWATER FILE NO. 18007.2





**BC Groundwater**  
Consulting Services Ltd.

## PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 27 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 08:00                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:15                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:30                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:45                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| ★ 09:00                 |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:10                   | 55                   | 20                                                 |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| ★ 09:15                 | 61.0                 | 15                                                 | 10m13              |                             |             |                        |                         |           | ✓                        | N     | /         | /          | N               | /                                  | ✓    | ✓    |        |
| 09:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| ★ 09:30                 |                      |                                                    | 12m08              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| ★ 09:45                 | 66.0                 | 16                                                 | 12m25              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

## PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS                                            |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|----------------------------------------------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758                                        |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177                                       |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES<br><i>Bear in Area<br/>exercise<br/>caution.</i> |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | Constant Discharge                                 |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                            |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 27th 2019                                      |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION                                                |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?                                                     | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 10:00                   | 61.8                 | 15                                                 | 12m26              |                             |             |                        |                         | ✓         |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:15                   |                      |                                                    | 12m36              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:30                   | 64                   | 16                                                 | 12m17              |                             |             |                        |                         |           | fuel 100 %                                                     | N     | /         | /          | N               | /                                  | /    | ✓    |        |
| 10:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:45                   |                      |                                                    | 11m96              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 10:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:00                   | 62                   | 18                                                 | 12m00              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:15                   |                      |                                                    | 11m99              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:25                   |                      |                                                    |                    |                             |             |                        |                         |           | ✓                                                              | N     | /         | /          | N               | /                                  | /    | ✓    |        |
| 11:30                   | 65                   | 18                                                 | 11m95              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:45                   |                      |                                                    | 11m98              |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |
| 11:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                                                                |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |      |            |          |                 |                                    |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|------|------------|----------|-----------------|------------------------------------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |      |            |          |                 |                                    |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |      |            |          |                 |                                    |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |      |            |          |                 |                                    |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| TYPE OF TEST            |                      | constant discharge                                 |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| PUMP AND MOTOR          |                      | 90 gal                                             |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 27 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLED |
| 12:00                   | 60                   | 17                                                 | 12m02              |                             |             |                        |                         | ✓         |                          |       |      |            |          |                 |                                    |      |        |
| 12:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:15                   |                      |                                                    | 12m08              |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:30                   | 66                   | 18                                                 | 12m03              |                             |             |                        |                         | ✓         |                          |       |      |            |          |                 |                                    |      |        |
| 12:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:45                   |                      | 20                                                 | 11m96              |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 12:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:00                   | 64                   | 20                                                 | 11m87              |                             |             |                        |                         | ✓         |                          |       |      |            |          |                 |                                    |      |        |
| 13:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:15                   |                      |                                                    | 11m82              |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:30                   | 62                   | 20                                                 | 11m80              |                             |             |                        |                         | ✓         |                          |       |      |            |          |                 |                                    |      |        |
| 13:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:45                   |                      |                                                    | 11m71              |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |
| 13:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |                                    |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

## PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |               |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|---------------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |               |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |               |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |               |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| TYPE OF TEST            |                      | constant (60 usg/m)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| PUMP AND MOTOR          |                      | 90 gal                                             |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| DATE OF MEASUREMENTS    |                      | Aug 27 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |               |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED | VOICE CONTACT |
| 14:00                   | 63                   | 21                                                 | 11m78              |                             |             |                        |                         | ✓         | N                        | /     | /         | N          | /               | /                                  | ✓    |      |        |               |
| 14:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:15                   |                      |                                                    | 11m76              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:30                   | 64                   | 20                                                 | 11m69              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:45                   |                      |                                                    | 11m61              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 14:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:00                   | 62                   | 21                                                 | 11m60              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:15                   |                      |                                                    | 11m61              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:30                   | 62                   | 21                                                 | 11m56              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:45                   |                      |                                                    | 11m60              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |
| 15:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |               |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |           | 18007.2                                            |             |                   |      |               |                |           | SUPERVISOR CONTACTS      |       |      |            |          |                 |                                    |      |        |               |
|-------------------------|-----------|----------------------------------------------------|-------------|-------------------|------|---------------|----------------|-----------|--------------------------|-------|------|------------|----------|-----------------|------------------------------------|------|--------|---------------|
| CLIENT NAME AND PROJECT |           | RIVER RANCH                                        |             |                   |      |               |                |           | T. CARRIOU 250 377-5758  |       |      |            |          |                 |                                    |      |        |               |
| LOCATION                |           | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |             |                   |      |               |                |           | C. MORRISOI 250 318-5177 |       |      |            |          |                 |                                    |      |        |               |
| PRODUCTION WELL         |           | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |             |                   |      |               |                |           | SPECIAL NOTES            |       |      |            |          |                 |                                    |      |        |               |
|                         |           | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| TYPE OF TEST            |           | constant (60 usg/m)                                |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| SURVEY COORDINATES      |           | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| PUMP AND MOTOR          |           | 90 gal                                             |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| POINT OF DISCHARGE      |           | ONTO GROUND PER BCGW DISCHARGE PLAN                |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| DATE OF MEASUREMENTS    |           | Aug 27 <sup>th</sup> 2019                          |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| CLOCK TIME              | DISCHARGE |                                                    | WELL        |                   | PUMP |               |                | FUEL OK ? | SAND PRODUCTION          |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |        |               |
|                         | FLOW RATE | BACK PRESSURE                                      | WATER LEVEL | ARTESIAN PRESSURE | VFD  | AMPS L1 L2 L3 | VOLTS L1 L2 L3 |           | YES / NO ?               | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLED | VOICE CONTACT |
|                         | [USgpm]   | [psig]                                             | [m]         | [psig]            | [Hz] |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:00                   | 65        | 21                                                 | 11m50       |                   |      |               |                | ✓         | N                        | /     | ✓    | N          | /        | ✓               | ✓                                  |      |        |               |
| 16:05                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:10                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:15                   |           |                                                    | 11m31       |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:20                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:25                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:30                   | 64        | 23                                                 | 11m35       |                   |      |               |                | ✓         |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:35                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:40                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:45                   |           |                                                    | 11m35       |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:50                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 16:55                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:00                   | 61        | 23                                                 | 11m36       |                   |      |               |                | ✓         |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:05                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:10                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:15                   |           |                                                    | 11m32       |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:20                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:25                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:30                   | 62        | 22                                                 | 11m37       |                   |      |               |                | ✓         |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:35                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:40                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:45                   |           |                                                    | 11m37       |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:50                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |
| 17:55                   |           |                                                    |             |                   |      |               |                |           |                          |       |      |            |          |                 |                                    |      |        |               |

COMMENTS

\* fueled up \*  
fuel = 100%  
full



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                                                          |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                                                      |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)                                  |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)<br>WIPN 46314 WTN 116263 (TD 160 ft-bgl) |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant discharge (60 usg/m)                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m                               |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal                                                                           |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                                              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 27th 2019                                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                                                  | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                                                          | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 18:00                   | 60.04                | 23                                                                               | 11.38              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:05                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:10                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:15                   |                      |                                                                                  | 11.30              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:20                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:25                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:30                   | 62.01                | 23                                                                               | 11.26              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:35                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:40                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:45                   |                      |                                                                                  | 11.28              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:50                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:55                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:00                   | 62.02                | 22                                                                               | 11.28              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:05                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:10                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:15                   |                      |                                                                                  | 11.1               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:20                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:25                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:30                   | 67                   | 23                                                                               | 11.13              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:35                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:40                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:45                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:50                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:55                   |                      |                                                                                  | 11.2               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
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# PRODUCTION WELL TEST MONITORING

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28th 2019                                      |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 02:00                   | 64.2                 |                                                    | 11.21              | 23                          |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:15                   | 64.3                 |                                                    | 11.24              | 23                          |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:30                   | 63.9                 |                                                    | 11.25              | 22                          |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:45                   |                      |                                                    | 11.27              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:00                   | 65.2                 |                                                    | 11.28              | 23                          |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:15                   |                      |                                                    | 11.26              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:30                   | 65.4                 |                                                    | 11.26              | 23                          |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:45                   |                      |                                                    | 11.25              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 04:00                   | 64.3                 | 24                                                 | 11.24              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:15                   |                      |                                                    | 11.24              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:30                   | 64                   | 23                                                 | 11.24              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:45                   |                      |                                                    | 11.26              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 04:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:00                   | 64.6                 | 23                                                 | 11.26              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:15                   |                      |                                                    | 11.25              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:30                   | 65.5                 | 23                                                 | 11.25              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:45                   |                      |                                                    | 11.24              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 05:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
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|                         |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28th 2019                                      |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 06:00                   | 64.6                 | 22                                                 | 11.24              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:15                   |                      |                                                    | 10.8               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:30                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:45                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 06:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:00                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:15                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:30                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:45                   | 62                   | 21                                                 | 12.44              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 07:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



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|                         |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|------|------------|----------|-----------------|------|-----------|---------------|
| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |      |            |          |                 |      |           |               |
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |      |            |          |                 |      |           |               |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |      |            |          |                 |      |           |               |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |      |            |          |                 |      |           |               |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| TYPE OF TEST            |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| PUMP AND MOTOR          |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| DATE OF MEASUREMENTS    |                      | Aug 28 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? |                          |       |      |            |          | SAND PRODUCTION |      | TURBIDITY |               |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ? | YES / NO ? | BOTTLE # | OK ?            | TEXT | CALLED    | VOICE CONTACT |
| 08:00                   | 62                   | 20                                                 | 12m44              |                             |             |                        |                         | ✓         | N                        | /     | /    | N          | /        | ✓               |      |           |               |
| 08:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:15                   |                      |                                                    | 12m44              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:30                   | 60                   | 20                                                 | 12m55              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:45                   |                      |                                                    | 12m59              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 08:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:00                   | 64                   | 20                                                 | 12m55              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:15                   |                      |                                                    | 12m57              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:30                   | 62                   | 19                                                 | 12m54              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:45                   |                      |                                                    | 12m54              |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |
| 09:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |      |            |          |                 |      |           |               |

COMMENTS



**BC Groundwater**  
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# PRODUCTION WELL TEST MONITORING

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|                         |  |                                                    |  |  |  |  |  |  |                                                                                          |  |  |  |
|-------------------------|--|----------------------------------------------------|--|--|--|--|--|--|------------------------------------------------------------------------------------------|--|--|--|
| PROJECT NO.             |  | 18007.2                                            |  |  |  |  |  |  | SUPERVISOR CONTACTS                                                                      |  |  |  |
| CLIENT NAME AND PROJECT |  | RIVER RANCH                                        |  |  |  |  |  |  | T. CARRIOU 250 377-5758                                                                  |  |  |  |
| LOCATION                |  | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |  |  |  |  |  |  | C. MORRISOI 250 318-5177                                                                 |  |  |  |
| PRODUCTION WELL         |  | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |  |  |  |  |  |  | SPECIAL NOTES<br>Noticed SWLA<br>come up when<br>adjusting flow rate<br>@ 11:00am.<br>CM |  |  |  |
|                         |  | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |  |  |  |  |  |  |                                                                                          |  |  |  |
| TYPE OF TEST            |  | constant @ 60 usg/m                                |  |  |  |  |  |  |                                                                                          |  |  |  |
| SURVEY COORDINATES      |  | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |  |  |  |  |  |  |                                                                                          |  |  |  |
| PUMP AND MOTOR          |  | 90 gal.                                            |  |  |  |  |  |  |                                                                                          |  |  |  |
| POINT OF DISCHARGE      |  | ONTO GROUND PER BCGW DISCHARGE PLAN                |  |  |  |  |  |  |                                                                                          |  |  |  |
| DATE OF MEASUREMENTS    |  | Aug 28 <sup>th</sup> 2019                          |  |  |  |  |  |  |                                                                                          |  |  |  |

| CLOCK TIME | DISCHARGE            |                         | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |        |               |
|------------|----------------------|-------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|-----------------|-------|------|------------|----------|-----------------|------------------------------------|------|--------|---------------|
|            | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig] | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?      | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLED | VOICE CONTACT |
| 10:00      | 63                   | 18                      | 12m51              |                             |             | fueled-up              |                         |           | ✓               | N     | /    | ✓          | N        | /               | ✓                                  |      |        |               |
| 10:05      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:15      |                      |                         | 12m49              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:30      | 65                   | 19                      | 12m48              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:45      |                      |                         | 12m49              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 10:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:00      | 59                   | 21                      | 11m58              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:05      | 63                   |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:15      |                      |                         | 11m44              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:30      | 63                   | 29                      | 10m91              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:45      |                      |                         | 10m85              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 11:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |               |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

## PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                                                          |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                                                      |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)                                  |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)<br>WIPN 46314 WTN 116263 (TD 160 ft-bgl) |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/m)                                                              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m                               |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                                                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                                              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28th 2019                                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                                                  | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                                                          | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 12:00                   | 60                   | 28                                                                               | 10m84              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:05                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:10                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:15                   |                      |                                                                                  | 10m83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:20                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:25                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:30                   | 61                   | 29                                                                               | 10m83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:35                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:40                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:45                   |                      |                                                                                  | 10m81              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:50                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 12:55                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:00                   | fuel-run             |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:05                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:10                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:15                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:20                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:25                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:30                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:35                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:40                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:45                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:50                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 13:55                   |                      |                                                                                  |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/m)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                            |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 14:00                   | 61                   | 28                                                 | 10m81              |                             |             |                        |                         | ✓         | N                        | /     | ✓         | N          | /               | ✓                                  |      |      |        |
| 14:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:15                   |                      |                                                    | 10m79              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:30                   | 61                   | 30                                                 | 10m80              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:45                   |                      |                                                    | 10m83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 14:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:00                   | 61                   | 28                                                 | 10m83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:15                   | 61                   | 28                                                 | 10m78              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:30                   | 62                   | 27                                                 | 10m78              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:45                   |                      |                                                    | 10m81              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 15:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/m)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal                                             |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28th 2019                                      |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 16:00                   | 60                   | 28                                                 | 10m78              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:15                   |                      |                                                    | 10m78              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:30                   | 62                   | 29                                                 | 10m80              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:45                   |                      |                                                    | 10m76              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 16:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:00                   | 60                   | 29                                                 | 10m81              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:15                   |                      |                                                    | 10m81              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:30                   | 64                   | 29                                                 | 10m80              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:45                   |                      |                                                    | 10m85              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 17:55                   | fueled-up            |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/m)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal                                             |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 28th 2019                                      |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 18:00                   | 63                   | 30                                                 | 10.83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:15                   |                      |                                                    | 10.85              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:30                   | 64                   | 30                                                 | 10.83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:45                   |                      |                                                    | 10.80              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 18:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:00                   | 63.2                 | 30                                                 | 10.80              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:15                   |                      | 29                                                 | 10.89              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:30                   | 64                   |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:45                   |                      |                                                    | 11.0               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 19:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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|                         |  |                                                    |  |  |  |  |  |  |                          |  |  |  |  |
|-------------------------|--|----------------------------------------------------|--|--|--|--|--|--|--------------------------|--|--|--|--|
| PROJECT NO.             |  | 18007.2                                            |  |  |  |  |  |  | SUPERVISOR CONTACTS      |  |  |  |  |
| CLIENT NAME AND PROJECT |  | RIVER RANCH                                        |  |  |  |  |  |  | T. CARRIOU 250 377-5758  |  |  |  |  |
| LOCATION                |  | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |  |  |  |  |  |  | C. MORRISOI 250 318-5177 |  |  |  |  |
| PRODUCTION WELL         |  | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |  |  |  |  |  |  | SPECIAL NOTES            |  |  |  |  |
|                         |  | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |  |  |  |  |  |  |                          |  |  |  |  |
| TYPE OF TEST            |  | constant (60 usg/m)                                |  |  |  |  |  |  |                          |  |  |  |  |
| SURVEY COORDINATES      |  | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |  |  |  |  |  |  |                          |  |  |  |  |
| PUMP AND MOTOR          |  | 90 gal.                                            |  |  |  |  |  |  |                          |  |  |  |  |
| POINT OF DISCHARGE      |  | ONTO GROUND PER BCGW DISCHARGE PLAN                |  |  |  |  |  |  |                          |  |  |  |  |
| DATE OF MEASUREMENTS    |  | Aug 28th 2019                                      |  |  |  |  |  |  |                          |  |  |  |  |

| CLOCK TIME | DISCHARGE            |                         | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |        |
|------------|----------------------|-------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|-----------------|-------|------|------------|----------|-----------------|------------------------------------|------|--------|
|            | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig] | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?      | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLED |
| 20:00      | 63.4                 | 30                      | 10.9               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:05      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:15      |                      |                         | 11.1               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:30      | 62                   | 29                      | 11.2               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:45      |                      |                         | 11.0               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 20:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:00      | 63.4                 | 30                      | 11.1               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:05      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:15      |                      |                         | 11.2               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:30      | 63                   | 30                      | 11.3               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:45      |                      |                         | 11.3               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |
| 21:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| <b>E</b>                       |                      | 18007.2                                            |                    |                             |             |                        |                         |           | <b>SUPERVISOR CONTACTS</b> |       |      |            |          |                 |                                    |      |      |
|--------------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|----------------------------|-------|------|------------|----------|-----------------|------------------------------------|------|------|
| <b>CLIENT NAME AND PROJECT</b> |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758    |       |      |            |          |                 |                                    |      |      |
| <b>LOCATION</b>                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177   |       |      |            |          |                 |                                    |      |      |
| <b>PRODUCTION WELL</b>         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | <b>SPECIAL NOTES</b>       |       |      |            |          |                 |                                    |      |      |
|                                |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| <b>TYPE OF TEST</b>            |                      | constant (6005 g/m)                                |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| <b>SURVEY COORDINATES</b>      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| <b>PUMP AND MOTOR</b>          |                      | 90 gal.                                            |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| <b>POINT OF DISCHARGE</b>      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| <b>DATE OF MEASUREMENTS</b>    |                      | Aug 28 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| CLOCK TIME                     | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION            |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |
|                                | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?                 | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALL |
| 22:00                          | 64                   | 30                                                 | 11.5               |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:05                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:10                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:15                          |                      |                                                    | 10.8               |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:20                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:25                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:30                          | 62.9                 | 29                                                 | 10.9               |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:35                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:40                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:45                          |                      |                                                    | 10.6               |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:50                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 22:55                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:00                          | 63.6                 | 30                                                 | 10.8               |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:05                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:10                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:15                          |                      |                                                    | 11.02              |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:20                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:25                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:30                          | 61                   | 28                                                 | 11.04              |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:35                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:40                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:45                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:50                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |
| 23:55                          |                      |                                                    |                    |                             |             |                        |                         |           |                            |       |      |            |          |                 |                                    |      |      |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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|                         |  |                                                    |  |                          |  |
|-------------------------|--|----------------------------------------------------|--|--------------------------|--|
| PROJECT NO.             |  | 18007.2                                            |  | SUPERVISOR CONTACTS      |  |
| CLIENT NAME AND PROJECT |  | RIVER RANCH                                        |  | T. CARRIOU 250 377-5758  |  |
| LOCATION                |  | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |  | C. MORRISOI 250 318-5177 |  |
| PRODUCTION WELL         |  | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |  | SPECIAL NOTES            |  |
|                         |  | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |  |                          |  |
| TYPE OF TEST            |  | constant (60 usg/m)                                |  |                          |  |
| SURVEY COORDINATES      |  | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |  |                          |  |
| PUMP AND MOTOR          |  | 90 gal.                                            |  |                          |  |
| POINT OF DISCHARGE      |  | ONTO GROUND PER BCGW DISCHARGE PLAN                |  |                          |  |
| DATE OF MEASUREMENTS    |  | Aug 29th 2019                                      |  |                          |  |

| CLOCK TIME | DISCHARGE            |                         | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |         |
|------------|----------------------|-------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|-----------------|-------|------|------------|----------|-----------------|------------------------------------|------|---------|
|            | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig] | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?      | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLLED |
| 00:00      | 62                   | 28                      | 11.05              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:05      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:15      |                      |                         | 11.35              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:30      | 11                   | 29                      | 11.3               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:45      |                      |                         | 11.57              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 00:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:00      | 62                   | 29                      | 11.4               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:05      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:10      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:15      |                      |                         | 11.57              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:20      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:25      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:30      | 61                   | 30                      | 11.42              |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:35      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:40      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:45      |                      |                         | 11.3               |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:50      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |
| 01:55      |                      |                         |                    |                             |             |                        |                         |           |                 |       |      |            |          |                 |                                    |      |         |

## COMMENTS

- ① Well registration submitted to the Comptrollers Office by JR Drilling Central. This well has not yet been added to the provincial well database (verified May 7, 2019).



**BC Groundwater**  
Consulting Services Ltd.

## PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/m)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                            |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 29 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 02:00                   | 60                   | 29                                                 | 11.83              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:15                   |                      |                                                    | 11.1               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:30                   | 62                   | 29                                                 | 11.4               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:45                   |                      |                                                    | 11.2               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 02:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:00                   | 61                   | 29                                                 | 11.2               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:15                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:20                   |                      |                                                    | 11.4               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:30                   | 63                   | 29                                                 | 11.4               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:45                   |                      |                                                    | 11.4               |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 03:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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|                         |  |                                                    |  |  |  |  |  |  |                          |  |  |  |  |
|-------------------------|--|----------------------------------------------------|--|--|--|--|--|--|--------------------------|--|--|--|--|
| PROJECT NO.             |  | 18007.2                                            |  |  |  |  |  |  | SUPERVISOR CONTACTS      |  |  |  |  |
| CLIENT NAME AND PROJECT |  | RIVER RANCH                                        |  |  |  |  |  |  | T. CARRIOU 250 377-5758  |  |  |  |  |
| LOCATION                |  | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |  |  |  |  |  |  | C. MORRISOI 250 318-5177 |  |  |  |  |
| PRODUCTION WELL         |  | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |  |  |  |  |  |  | SPECIAL NOTES            |  |  |  |  |
|                         |  | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |  |  |  |  |  |  |                          |  |  |  |  |
| TYPE OF TEST            |  | constant (60 usg/m)                                |  |  |  |  |  |  |                          |  |  |  |  |
| SURVEY COORDINATES      |  | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |  |  |  |  |  |  |                          |  |  |  |  |
| PUMP AND MOTOR          |  | 90 gal                                             |  |  |  |  |  |  |                          |  |  |  |  |
| POINT OF DISCHARGE      |  | ONTO GROUND PER BCGW DISCHARGE PLAN                |  |  |  |  |  |  |                          |  |  |  |  |
| DATE OF MEASUREMENTS    |  | Aug 29 <sup>th</sup> 2019                          |  |  |  |  |  |  |                          |  |  |  |  |

| CLOCK TIME | DISCHARGE |               | WELL        |                   | PUMP |               |                | FUEL OK ? | SAND PRODUCTION |       |      | TURBIDITY  |          | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |        |               |
|------------|-----------|---------------|-------------|-------------------|------|---------------|----------------|-----------|-----------------|-------|------|------------|----------|-----------------|------------------------------------|------|--------|---------------|
|            | FLOW RATE | BACK PRESSURE | WATER LEVEL | ARTESIAN PRESSURE | VFD  | AMPS L1 L2 L3 | VOLTS L1 L2 L3 |           | YES / NO ?      | BAG # | OK ? | YES / NO ? | BOTTLE # |                 | OK ?                               | TEXT | CALLED | VOICE CONTACT |
|            | [USgpm]   | [psig]        | [m]         | [psig]            | [Hz] |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:00      | 61        | 29            | 11.4        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:05      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:10      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:15      |           |               | 11.5        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:20      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:25      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:30      | 62        | 29            | 11.5        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:35      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:40      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:45      |           |               | 11.4        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:50      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 04:55      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:00      | 61        | 28            | 10.43       |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:05      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:10      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:15      |           |               | 10.6        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:20      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:25      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:30      | 60        | 29            | 10.4        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:35      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:40      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:45      |           |               | 10.5        |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:50      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |
| 05:55      |           |               |             |                   |      |               |                |           |                 |       |      |            |          |                 |                                    |      |        |               |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         | SUPERVISOR CONTACTS      |                 |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|--------------------------|-----------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         | T. CARRIOU 250 377-5758  |                 |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         | C. MORRISOI 250 318-5177 |                 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         | SPECIAL NOTES            |                 |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (660 usg/m)                               |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                            |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 29 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ?                | SAND PRODUCTION |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |                          | YES / NO ?      | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 06:00                   | 65                   | 30                                                 | 10.43              |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:05                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:10                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:15                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:20                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:25                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:30                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:35                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:40                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:45                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:50                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 06:55                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:00                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:05                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:10                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:15                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:20                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:25                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:30                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:35                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:40                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:45                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:50                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |
| 07:55                   |                      |                                                    |                    |                             |             |                        |                         |                          |                 |       |           |            |                 |                                    |      |      |        |

COMMENTS



**BC Groundwater**  
Consulting Services Ltd.

# PRODUCTION WELL TEST MONITORING

INCLUDING POINT-OF-DISCHARGE OBSERVATIONS

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| PROJECT NO.             |                      | 18007.2                                            |                    |                             |             |                        |                         |           | SUPERVISOR CONTACTS      |       |           |            |                 |                                    |      |      |        |
|-------------------------|----------------------|----------------------------------------------------|--------------------|-----------------------------|-------------|------------------------|-------------------------|-----------|--------------------------|-------|-----------|------------|-----------------|------------------------------------|------|------|--------|
| CLIENT NAME AND PROJECT |                      | RIVER RANCH                                        |                    |                             |             |                        |                         |           | T. CARRIOU 250 377-5758  |       |           |            |                 |                                    |      |      |        |
| LOCATION                |                      | COLDWATER ROAD (16 km SOUTHWEST OF MERRITT, BC)    |                    |                             |             |                        |                         |           | C. MORRISOI 250 318-5177 |       |           |            |                 |                                    |      |      |        |
| PRODUCTION WELL         |                      | EB2018-1 (FLOWING EXPLORATORY BOREHOLE)            |                    |                             |             |                        |                         |           | SPECIAL NOTES            |       |           |            |                 |                                    |      |      |        |
|                         |                      | WIPN 46314 WTN 116263 (TD 160 ft-bgl)              |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| TYPE OF TEST            |                      | constant (60 usg/n)                                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| SURVEY COORDINATES      |                      | UTM Zone 10U 5 540 074 mN 649 818 mE 714 mEL ± 2 m |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| PUMP AND MOTOR          |                      | 90 gal.                                            |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| POINT OF DISCHARGE      |                      | ONTO GROUND PER BCGW DISCHARGE PLAN                |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| DATE OF MEASUREMENTS    |                      | Aug 29 <sup>th</sup> 2019                          |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| CLOCK TIME              | DISCHARGE            |                                                    | WELL               |                             | PUMP        |                        |                         | FUEL OK ? | SAND PRODUCTION          |       | TURBIDITY |            | DISCHARGE CHECK | COMMUNICATION WITH BCGW SUPERVISOR |      |      |        |
|                         | FLOW RATE<br>[USgpm] | BACK PRESSURE<br>[psig]                            | WATER LEVEL<br>[m] | ARTESIAN PRESSURE<br>[psig] | VFD<br>[Hz] | AMPS<br>L1<br>L2<br>L3 | VOLTS<br>L1<br>L2<br>L3 |           | YES / NO ?               | BAG # | OK ?      | YES / NO ? |                 | BOTTLE #                           | OK ? | TEXT | CALLED |
| 08:00                   | 61                   | 28                                                 | 10m43              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:15                   |                      |                                                    | 10m44              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:20                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:25                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:30                   | 62                   | 29                                                 | 10m44              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:45                   |                      |                                                    | 10m45              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 08:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:00                   | 61                   | 28                                                 | 10m44              |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:05                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:10                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:15                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:20                   | back to static       |                                                    |                    | Artesian                    |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:25                   | level. flowing       |                                                    |                    | = 36 usg/n                  |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:30                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:35                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:40                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:45                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:50                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |
| 09:55                   |                      |                                                    |                    |                             |             |                        |                         |           |                          |       |           |            |                 |                                    |      |      |        |

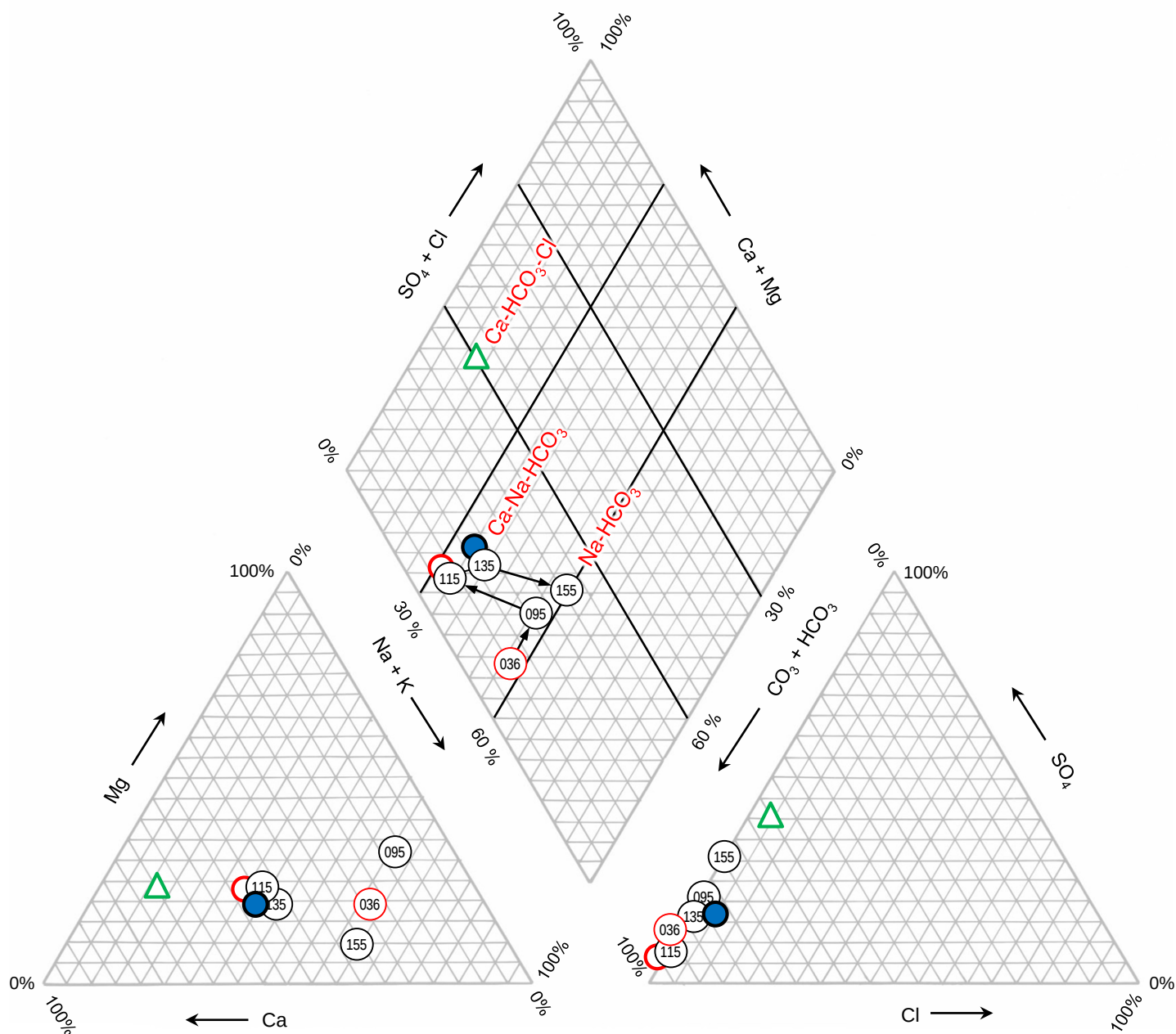
COMMENTS

★  
48 hrs  
★



## **APPENDIX F**

### **CALCULATIONS AND FORECASTS**



#### LEGEND

- 036 EB2018-1 Ø12x10" (36 FT-BGL) SAMPLE FROM ANNULUS OVERFLOW
- 095 EB2018-1 GRAB SAMPLES DURING DRILLING
- EB2018-1 DISCHARGE FROM ANNULUS (PRE-CEMENTING)
- BH2018-1 FREE-DISCHARGE & PUMPING TEST (48 HOURS)
- △ WTN 071419 LOU COOK WELL (FREE-DISCHARGE)



**BC Groundwater**  
Consulting Services Ltd.

#### DESCRIPTION **PIPER ANALYSIS RESULTS**

PROJECT GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN:

BCGW  
FILE NO. **18007.2**

CLIENT **RIVER RANCH CATTLE COMPANY**

APR 05 2020

# RIVER RANCH CATTLE COMPANY GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN

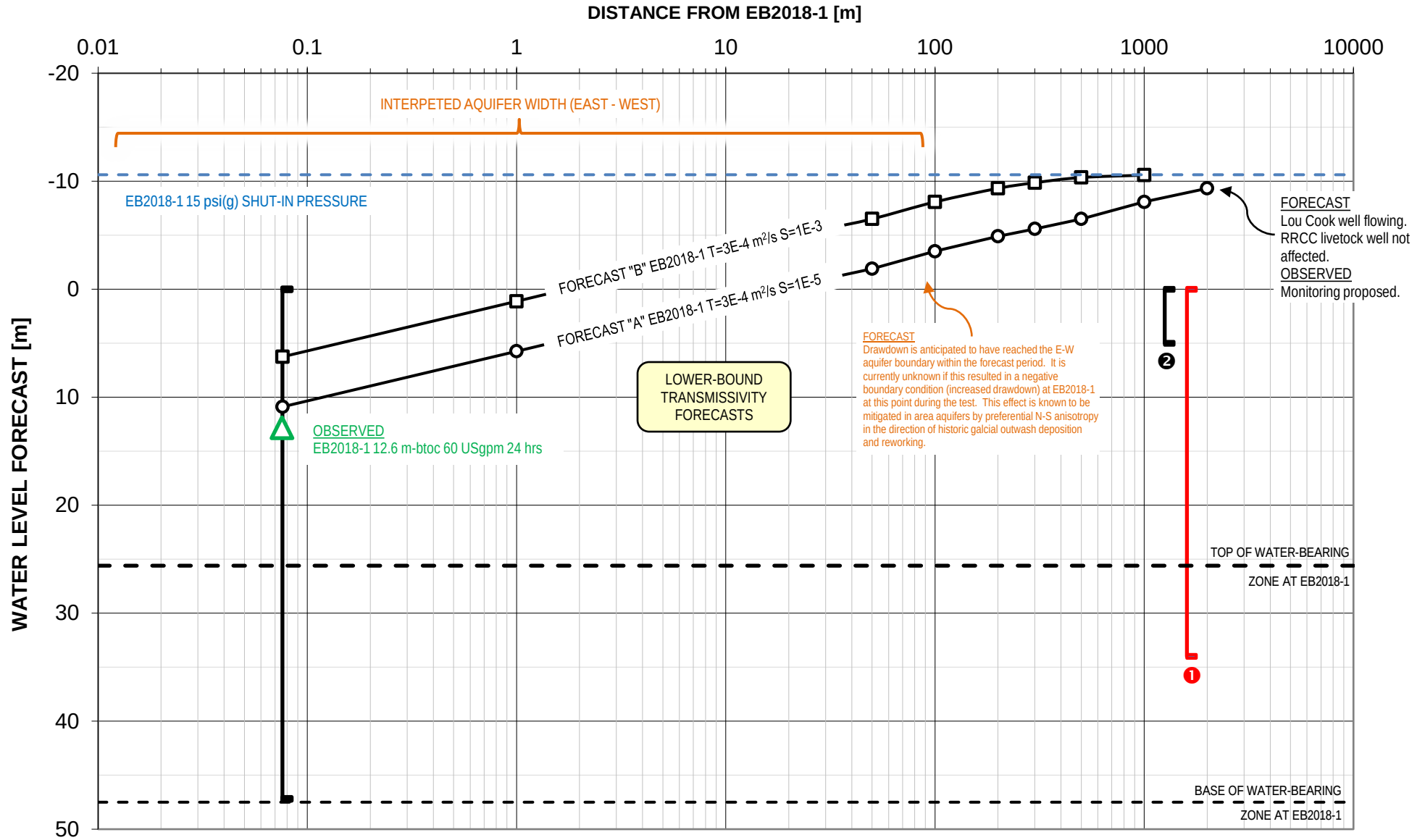
## PRELIMINARY ANALYTICAL FORECAST OF EB2018-1 PUMPING TEST COMPARISON TO OBSERVED RESULTS (THEIS MODEL)

BC GROUNDWATER FILE NO. 18007.2

### ASSUMPTIONS

- This model is suitable for early-time and late-time estimates.
- $K_H = 2 \times 10^{-5}$  to  $1 \times 10^{-4}$  m/s representative aquifer sediments.
- $T = 3 \times 10^{-4}$  to  $7 \times 10^{-4}$  m<sup>2</sup>/s representative of the aquifer.
- Effect of aquifer boundaries currently unknown.
- Aquitard leakage recognized but not simulated<sup>1</sup>.
- Analysis varies storativity values.

<sup>1</sup> Observation well information not applicable.



- ❶ NORTH (LOU COOK) WTN 71419 WIPN N/A **ARTESIAN**  $r = 1,600$  m (5,200 ft)
- ❷ SOUTH (RIVER RANCH CATTLE CO.) WTN 115219 WIPN 49407  $r = 1,200$  m (4,000 ft)

PRELIMINARY FORECAST ONLY  
•  
24 HOUR BASIS

# RIVER RANCH CATTLE COMPANY GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN

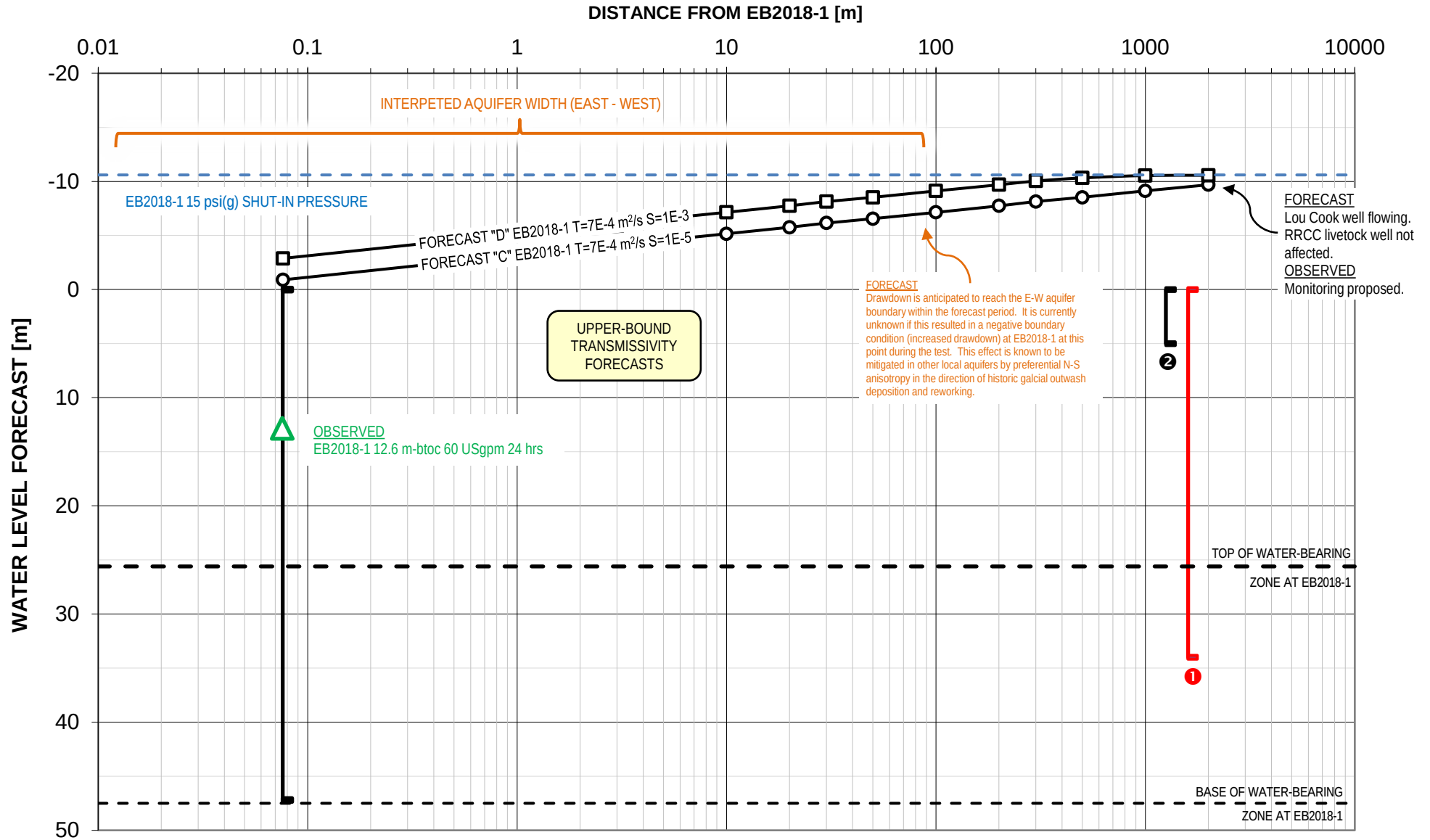
## PRELIMINARY ANALYTICAL FORECAST OF EB2018-1 PUMPING TEST COMPARISON TO OBSERVED RESULTS (THEIS MODEL)

BC GROUNDWATER FILE NO. 18007.2

### ASSUMPTIONS

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- $K_H = 2 \times 10^{-5}$  to  $1 \times 10^{-4}$  m/s representative aquifer sediments.
- $T = 3 \times 10^{-4}$  to  $7 \times 10^{-4}$  m<sup>2</sup>/s representative of the aquifer.
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**PRELIMINARY FORECAST ONLY**  
•  
**24 HOUR BASIS**

# RIVER RANCH CATTLE COMPANY GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN

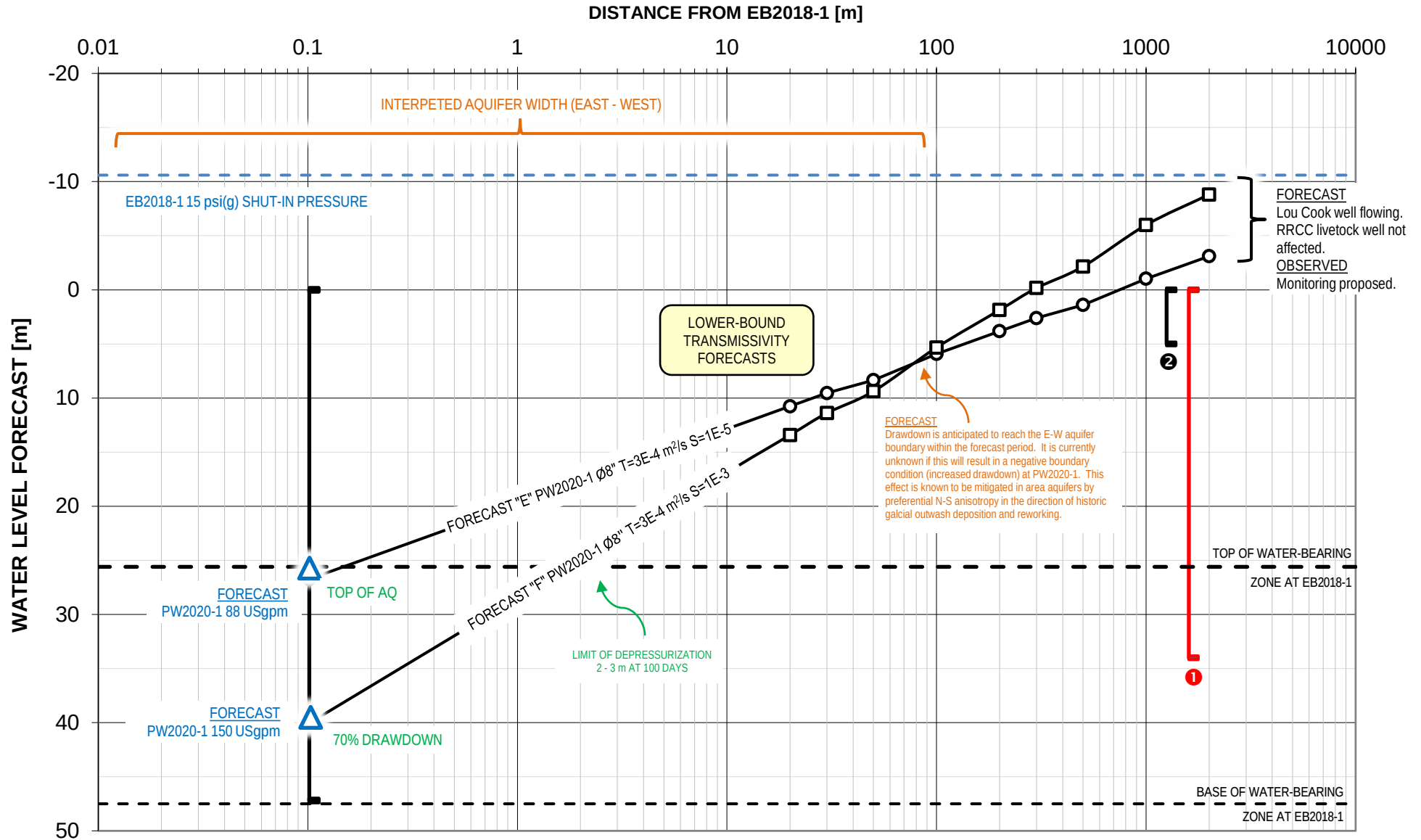
## PRELIMINARY ANALYTICAL FORECAST OF EB2018-1 PUMPING TEST COMPARISON TO OBSERVED RESULTS (THEIS MODEL)

BC GROUNDWATER FILE NO. 18007.2

### ASSUMPTIONS

- This model is suitable for early-time and late-time estimates.
- $K_{H1} = 2 \times 10^{-5}$  to  $1 \times 10^{-4}$  m/s representative aquifer sediments.
- $T = 3 \times 10^{-4}$  to  $7 \times 10^{-4}$  m<sup>2</sup>/s representative of the aquifer.
- Effect of aquifer boundaries currently unknown.
- Aquitard leakage recognized but not simulated<sup>1</sup>.
- Analysis varies storativity values.

<sup>1</sup> Observation well information not applicable.



# RIVER RANCH CATTLE COMPANY GROUNDWATER-BASED IRRIGATION DEVELOPMENT PLAN

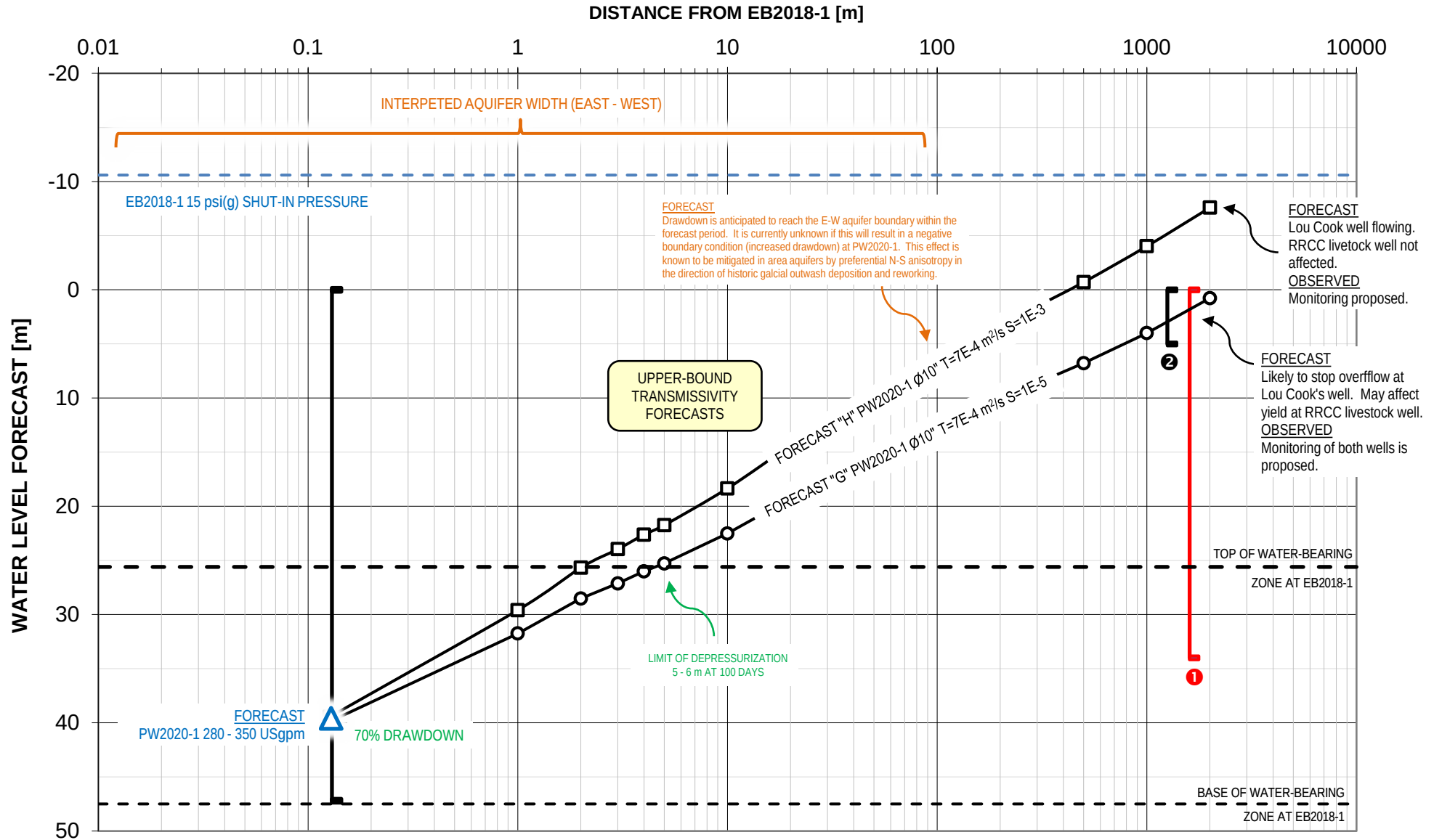
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BC GROUNDWATER FILE NO. 18007.2

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- $K_H = 2 \times 10^{-5}$  to  $1 \times 10^{-4}$  m/s representative aquifer sediments.
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- ❶ NORTH (LOU COOK) WTN 71419 WIPN N/A **ARTESIAN**  $r = 1,600$  m (5,200 ft)
- ❷ SOUTH (RIVER RANCH CATTLE CO.) WTN 115219 WIPN 49407  $r = 1,200$  m (4,000 ft)

PRELIMINARY FORECAST ONLY  
•  
100 DAY BASIS

| FLOW RATE                                                                     |         |          | TRANS-MISSIVITY | STORAGE | DISTANCE |         | TIME    |        | "u"   | W(u)   | PREDICTED | SHUT-IN |      | PREDICTED |        |
|-------------------------------------------------------------------------------|---------|----------|-----------------|---------|----------|---------|---------|--------|-------|--------|-----------|---------|------|-----------|--------|
| Q [USgpm]                                                                     | Q [L/s] | Q [m3/s] | T [m2/s]        | S [-]   | r [m]    | t [day] | t [min] | t [s]  |       |        | DRAW-DOWN | psi(g)  | [m]  | [m-btoc]  | psi(g) |
| ANALYTICAL FORECAST "A" EB2018-1 PUMPING TEST (LOWER-BOUND T & S)             |         |          |                 |         |          |         |         |        |       |        |           |         |      |           |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 0.0762   | 2       | 2,880   | 172800 | 3E-10 | 21.35  | 21.4      | 15      | 10.6 | 10.9      |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 1        | 2       | 2,880   | 172800 | 5E-08 | 16.23  | 16.3      | 15      | 10.6 | 5.7       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 2        | 2       | 2,880   | 172800 | 2E-07 | 14.85  | 14.9      | 15      | 10.6 | 4.4       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 3        | 2       | 2,880   | 172800 | 4E-07 | 14.15  | 14.2      | 15      | 10.6 | 3.7       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 4        | 2       | 2,880   | 172800 | 8E-07 | 13.46  | 13.5      | 15      | 10.6 | 3.0       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 5        | 2       | 2,880   | 172800 | 1E-06 | 13.24  | 13.3      | 15      | 10.6 | 2.7       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 10       | 2       | 2,880   | 172800 | 5E-06 | 11.63  | 11.7      | 15      | 10.6 | 1.1       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 20       | 2       | 2,880   | 172800 | 2E-05 | 10.24  | 10.3      | 15      | 10.6 | -0.3      | 0.4    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 30       | 2       | 2,880   | 172800 | 4E-05 | 9.55   | 9.6       | 15      | 10.6 | -1.0      | 1      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 50       | 2       | 2,880   | 172800 | 1E-04 | 8.63   | 8.7       | 15      | 10.6 | -1.9      | 3      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 100      | 2       | 2,880   | 172800 | 5E-04 | 7.02   | 7.1       | 15      | 10.6 | -3.5      | 5      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 200      | 2       | 2,880   | 172800 | 2E-03 | 5.64   | 5.7       | 15      | 10.6 | -4.9      | 7      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 300      | 2       | 2,880   | 172800 | 4E-03 | 4.95   | 5.0       | 15      | 10.6 | -5.6      | 8      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 500      | 2       | 2,880   | 172800 | 1E-02 | 4.04   | 4.1       | 15      | 10.6 | -6.5      | 9      |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 1000     | 2       | 2,880   | 172800 | 5E-02 | 2.47   | 2.5       | 15      | 10.6 | -8.1      | 11     |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 2000     | 2       | 2,880   | 172800 | 2E-01 | 1.22   | 1.2       | 15      | 10.6 | -9.3      | 13     |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 3000     | 2       | 2,880   | 172800 | 4E-01 | 0.70   | 0.7       | 15      | 10.6 | -9.9      | 14     |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-05 | 4000     | 2       | 2,880   | 172800 | 8E-01 | 0.31   | 0.3       | 15      | 10.6 | -10.3     | 15     |
| ANALYTICAL FORECAST "B" EB2018-1 PUMPING TEST (LOWER-BOUND T & UPPER-BOUND S) |         |          |                 |         |          |         |         |        |       |        |           |         |      |           |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 0.0762   | 2       | 2,880   | 172800 | 3E-08 | 16.74  | 16.8      | 15      | 10.6 | 6.3       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 1        | 2       | 2,880   | 172800 | 5E-06 | 11.63  | 11.7      | 15      | 10.6 | 1.1       |        |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 2        | 2       | 2,880   | 172800 | 2E-05 | 10.24  | 10.3      | 15      | 10.6 | -0.3      | 0.4    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 3        | 2       | 2,880   | 172800 | 4E-05 | 9.55   | 9.6       | 15      | 10.6 | -1.0      | 1.4    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 4        | 2       | 2,880   | 172800 | 8E-05 | 8.86   | 8.9       | 15      | 10.6 | -1.7      | 2.4    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 5        | 2       | 2,880   | 172800 | 1E-04 | 8.63   | 8.7       | 15      | 10.6 | -1.9      | 2.7    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 10       | 2       | 2,880   | 172800 | 5E-04 | 7.02   | 7.1       | 15      | 10.6 | -3.5      | 5.0    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 20       | 2       | 2,880   | 172800 | 2E-03 | 5.64   | 5.7       | 15      | 10.6 | -4.9      | 7.0    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 30       | 2       | 2,880   | 172800 | 4E-03 | 4.95   | 5.0       | 15      | 10.6 | -5.6      | 7.9    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 50       | 2       | 2,880   | 172800 | 1E-02 | 4.04   | 4.1       | 15      | 10.6 | -6.5      | 9.2    |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 100      | 2       | 2,880   | 172800 | 5E-02 | 2.47   | 2.5       | 15      | 10.6 | -8.1      | 11.5   |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 200      | 2       | 2,880   | 172800 | 2E-01 | 1.22   | 1.2       | 15      | 10.6 | -9.3      | 13.3   |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 300      | 2       | 2,880   | 172800 | 4E-01 | 0.70   | 0.7       | 15      | 10.6 | -9.9      | 14.0   |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 500      | 2       | 2,880   | 172800 | 1E+00 | 0.22   | 0.2       | 15      | 10.6 | -10.3     | 14.7   |
| 60                                                                            | 3.79    | 3.79E-03 | 3.0E-04         | 1.0E-03 | 1000     | 2       | 2,880   | 172800 | 5E+00 | 0.0011 | 0.0       | 15      | 10.6 | -10.6     | 15.0   |
| ANALYTICAL FORECAST "C" EB2018-1 PUMPING TEST (UPPER-BOUND T & LOWER-BOUND S) |         |          |                 |         |          |         |         |        |       |        |           |         |      |           |        |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 0.0762   | 2       | 2,880   | 172800 | 1E-10 | 22.45  | 9.7       | 15      | 10.6 | -0.9      | 1.3    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 1        | 2       | 2,880   | 172800 | 2E-08 | 17.15  | 7.4       | 15      | 10.6 | -3.2      | 4.5    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 2        | 2       | 2,880   | 172800 | 8E-08 | 15.76  | 6.8       | 15      | 10.6 | -3.8      | 5.4    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 3        | 2       | 2,880   | 172800 | 2E-07 | 14.85  | 6.4       | 15      | 10.6 | -4.2      | 5.9    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 4        | 2       | 2,880   | 172800 | 3E-07 | 14.44  | 6.2       | 15      | 10.6 | -4.3      | 6.2    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 5        | 2       | 2,880   | 172800 | 5E-07 | 13.93  | 6.0       | 15      | 10.6 | -4.6      | 6.5    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 10       | 2       | 2,880   | 172800 | 2E-06 | 12.55  | 5.4       | 15      | 10.6 | -5.2      | 7.3    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 20       | 2       | 2,880   | 172800 | 8E-06 | 11.16  | 4.8       | 15      | 10.6 | -5.8      | 8.2    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 30       | 2       | 2,880   | 172800 | 2E-05 | 10.24  | 4.4       | 15      | 10.6 | -6.2      | 8.7    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 50       | 2       | 2,880   | 172800 | 5E-05 | 9.33   | 4.0       | 15      | 10.6 | -6.5      | 9.3    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 100      | 2       | 2,880   | 172800 | 2E-04 | 7.94   | 3.4       | 15      | 10.6 | -7.1      | 10.1   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 200      | 2       | 2,880   | 172800 | 8E-04 | 6.55   | 2.8       | 15      | 10.6 | -7.7      | 11.0   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 300      | 2       | 2,880   | 172800 | 2E-03 | 5.64   | 2.4       | 15      | 10.6 | -8.1      | 11.6   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 500      | 2       | 2,880   | 172800 | 5E-03 | 4.73   | 2.0       | 15      | 10.6 | -8.5      | 12.1   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 1000     | 2       | 2,880   | 172800 | 2E-02 | 3.35   | 1.4       | 15      | 10.6 | -9.1      | 13.0   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 2000     | 2       | 2,880   | 172800 | 8E-02 | 2.03   | 0.9       | 15      | 10.6 | -9.7      | 13.8   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 3000     | 2       | 2,880   | 172800 | 2E-01 | 1.22   | 0.5       | 15      | 10.6 | -10.0     | 14.3   |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-05 | 4000     | 2       | 2,880   | 172800 | 3E-01 | 0.91   | 0.4       | 15      | 10.6 | -10.2     | 14.4   |
| ANALYTICAL FORECAST "D" EB2018-1 PUMPING TEST (UPPER-BOUND T & UPPER-BOUND S) |         |          |                 |         |          |         |         |        |       |        |           |         |      |           |        |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-03 | 0.0762   | 2       | 2,880   | 172800 | 1E-08 | 17.84  | 7.7       | 15      | 10.6 | -2.9      | 4.1    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-03 | 1        | 2       | 2,880   | 172800 | 2E-06 | 12.55  | 5.4       | 15      | 10.6 | -5.2      | 7.3    |
| 60                                                                            | 3.79    | 3.79E-03 | 7.0E-04         | 1.0E-03 | 2        | 2       | 2,880   | 172800 | 8E-06 | 11     |           |         |      |           |        |



## **APPENDIX G**

### **WELL RECORDS**

BRITISH  
COLUMBIA

## Groundwater Wells and Aquifers

## Well Summary

Well Tag Number: 116263

Well Identification Plate Number: 46314

Owner Name: River Ranch Cattle Co. Ltd

Intended Water Use:

Well Status: New

Well Class: Water Supply

Well Subclass: Non Domestic

Aquifer Number:

Observation Well Number:

Observation Well Status:

Environmental Monitoring System (EMS) ID:

Alternative specs submitted: No

## Licensing Information

Licensed Status: Unlicensed

Licence Number:

## Location Information

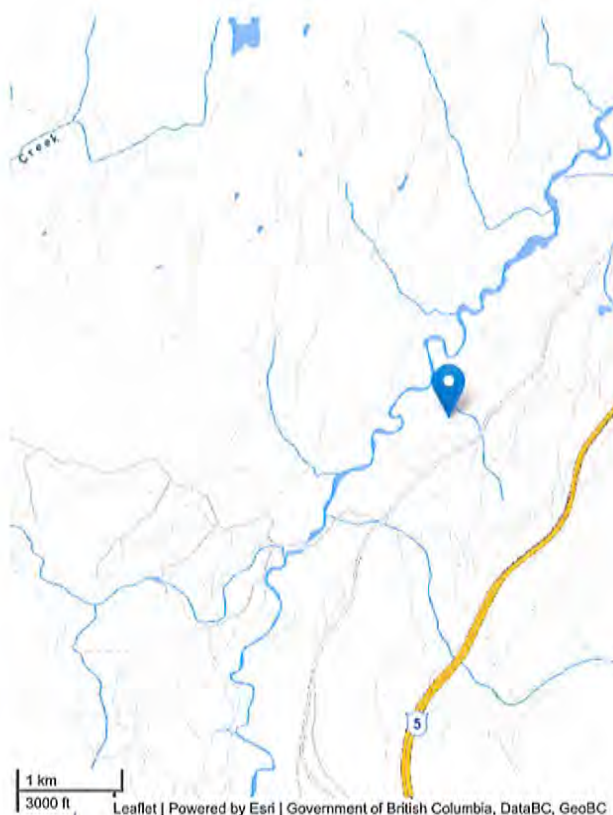
Street Address:

Town/City:

Legal Description:

|                                           |           |
|-------------------------------------------|-----------|
| Lot                                       |           |
| Plan                                      |           |
| District Lot                              | 746       |
| Block                                     |           |
| Section                                   |           |
| Township                                  |           |
| Range                                     |           |
| Land District                             | 59        |
| Property Identification Description (PID) | 013018906 |

Description of Well Location: none attached. Plan A1369363 16967



## Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.994158

Longitude: -120.909847

UTM Easting: 649808

UTM Northing: 5540075

Zone: 10

Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

## Well Activity

| Activity                                         | ⇅ Work Start Date | ⇅ Work End Date | ⇅ Drilling Company | ⇅ Date Entered | ⇅ |
|--------------------------------------------------|-------------------|-----------------|--------------------|----------------|---|
| There has been no activity related to this well. |                   |                 |                    |                |   |

## Well Work Dates

| Start Date of Construction | End Date of Construction | Start Date of Alteration | End Date of Alteration | Start Date of Decommission | End Date of Decommission |
|----------------------------|--------------------------|--------------------------|------------------------|----------------------------|--------------------------|
| 2018-10-11                 | 2018-10-18               |                          |                        |                            |                          |

## Well Completion Data

Total Depth Drilled: 160.00 feet  
 Finished Well Depth: 135.00 feet  
 Final Casing Stick Up: 36.000 inches  
 Depth to Bedrock:  
 Ground elevation:

Static Water Level (BTOC):  
 Estimated Well Yield: 100.000 USGPM  
 Artesian Flow: 30.00 USGPM  
 Artesian Pressure:  
 Method of determining elevation: Unknown

Well Cap: locking  
 Well Disinfected Status: Not Disinfected  
 Drilling Method: Air Rotary  
 Orientation of Well: VERTICAL

## Lithology

| From (ft bgl) | To (ft bgl) | Raw Data                                   | Description | Moisture | Colour | Hardness | Observations                   | Water Bearing Flow Estimate (USGPM) |
|---------------|-------------|--------------------------------------------|-------------|----------|--------|----------|--------------------------------|-------------------------------------|
| 0.00          | 2.00        | silt, dry                                  |             |          | brown  | Loose    |                                |                                     |
| 2.00          | 8.00        | sand with gravel, dry                      |             |          | brown  | Loose    | started hitting water about 6' |                                     |
| 8.00          | 34.00       | sand with gravel, clay, wet                |             |          | brown  | Loose    |                                |                                     |
| 34.00         | 38.00       | clay, dense/stiff, moist                   |             |          | brown  |          |                                |                                     |
| 38.00         | 84.00       | clay, sand with gravel, dense/stiff, moist |             |          | brown  |          |                                |                                     |
| 84.00         | 150.00      | sand with gravel, high production          |             |          | brown  | Loose    |                                |                                     |
| 150.00        | 156.00      | sand with gravel, clay, wet                |             |          | brown  | Loose    |                                |                                     |

## Casing Details

| From (ft) | To (ft) | Casing Type | Casing Material | Diameter | Wall Thickness | Drive Shoe    |
|-----------|---------|-------------|-----------------|----------|----------------|---------------|
| 0.00      | 16.00   |             | Steel           | 16.000   | 365.000        | Not Installed |
| 0.00      | 20.00   |             | Steel           | 12.000   | 365.000        | Installed     |
| 0.00      | 58.00   |             | Steel           | 10.000   | 365.000        | Installed     |
| 0.00      | 127.00  |             | Steel           | 6.000    | 250.000        | Installed     |

## Surface Seal and Backfill Details

Surface Seal Material: Other  
 Surface Seal Installation Method: Pumped  
 Surface Seal Thickness: 1.00  
 Surface Seal Depth:

Backfill Material Above Surface Seal:  
 Backfill Depth:

## Liner Details

Liner Material:  
 Liner Diameter:  
 Liner from:

Liner Thickness:  
 Liner to:

Liner perforations

From

To

There are no records to show

## Screen Details

**Intake Method:****Type:****Material:****Opening:****Bottom:****Installed Screens**

| From      | To        | Diameter | Assembly Type | Slot Size |
|-----------|-----------|----------|---------------|-----------|
| 150.00 ft | 152.00 ft |          | K_RISER       |           |
| 152.00 ft | 160.00 ft |          | SCREEN        | 40.00     |

## Well Development

**Developed by:****Development Total Duration:** 4.00 hours

## Well Yield

No well yield data available.

## Well Decommission Information

**Reason for Decommission:****Method of Decommission:****Sealant Material:****Backfill Material:****Decommission Details:**

## Comments

cement surface seal, estimated well yield 100+ USgpm

**Alternative Specs Submitted:** No

## Documents

No additional documentation available for this well.

## Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.





## Groundwater Wells and Aquifers

### Well Summary

Well Tag Number: 115219  
 Well Identification Plate Number: 49407  
 Owner Name: River Ranch Cattle Co  
 Intended Water Use:

Well Status: New  
 Well Class: Water Supply  
 Well Subclass: Non Domestic  
 Aquifer Number:

Observation Well Number:  
 Observation Well Status:  
 Environmental Monitoring System (EMS) ID:  
 Alternative specs submitted: No

### Licensing Information

Licensed Status: Licensed

Licence Number: 500505

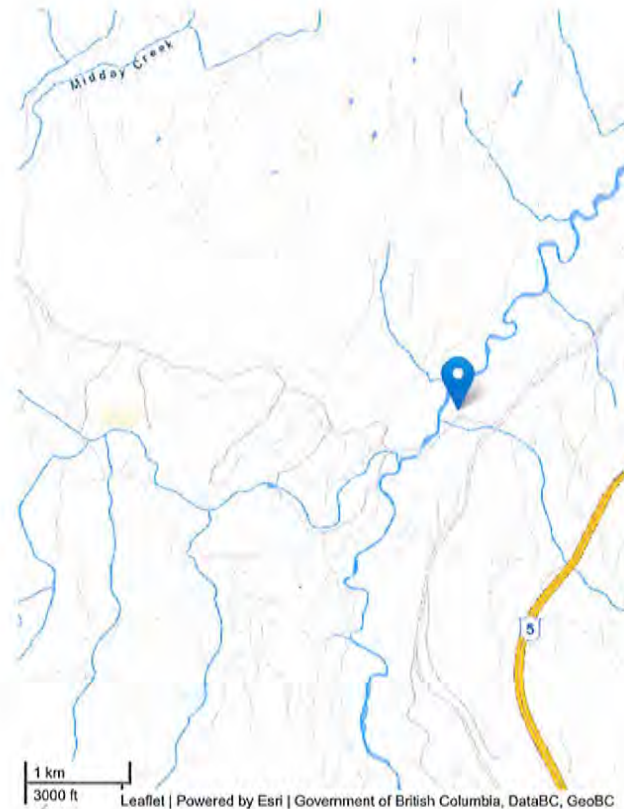
### Location Information

Street Address:  
 Town/City:

Legal Description:

|                                           |           |
|-------------------------------------------|-----------|
| Lot                                       |           |
| Plan                                      |           |
| District Lot                              | 340       |
| Block                                     |           |
| Section                                   |           |
| Township                                  |           |
| Range                                     |           |
| Land District                             | 59        |
| Property Identification Description (PID) | 014998432 |

**Description of Well Location:** District Lot 340 Yale Division Yale District Except Plans A136, Plan Attached to DD 189128F, KAP46042 And H932.



#### Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.986986 Longitude: -120.923444  
 UTM Easting: 648855 UTM Northing: 5539250  
 Zone: 10 Coordinate Acquisition Code:

### Well Activity

| Activity                                         | Work Start Date | Work End Date | Drilling Company | Date Entered |
|--------------------------------------------------|-----------------|---------------|------------------|--------------|
| There has been no activity related to this well. |                 |               |                  |              |

### Well Work Dates

| Start Date of Construction | End Date of Construction | Start Date of Alteration | End Date of Alteration | Start Date of Decommission | End Date of Decommission |
|----------------------------|--------------------------|--------------------------|------------------------|----------------------------|--------------------------|
| 1995-06-01                 | 1995-06-01               |                          |                        |                            |                          |

## Well Completion Data

Total Depth Drilled: 13.80 feet  
 Finished Well Depth: 15.00 feet  
 Final Casing Stick Up:  
 Depth to Bedrock:  
 Ground elevation:

Static Water Level (BTOC): 4.70 feet  
 Estimated Well Yield:  
 Artesian Flow:  
 Artesian Pressure:  
 Method of determining elevation: Unknown

Well Cap:  
 Well Disinfected Status: Not Disinfected  
 Drilling Method: Excavating  
 Orientation of Well: VERTICAL

## Lithology

| From (ft bgl)                | To (ft bgl) | Raw Data | Description | Moisture | Colour | Hardness | Observations | Water Bearing Flow Estimate (USGPM) |
|------------------------------|-------------|----------|-------------|----------|--------|----------|--------------|-------------------------------------|
| There are no records to show |             |          |             |          |        |          |              |                                     |

## Casing Details

| From (ft)                    | To (ft) | Casing Type | Casing Material | Diameter | Wall Thickness | Drive Shoe |
|------------------------------|---------|-------------|-----------------|----------|----------------|------------|
| There are no records to show |         |             |                 |          |                |            |

## Surface Seal and Backfill Details

Surface Seal Material:  
 Surface Seal Installation Method:  
 Surface Seal Thickness:  
 Surface Seal Depth:

Backfill Material Above Surface Seal:  
 Backfill Depth:

## Liner Details

Liner Material:  
 Liner Diameter:  
 Liner from:

Liner Thickness:  
 Liner to:

Liner perforations  
 From To

There are no records to show

## Screen Details

Intake Method:  
 Type:  
 Material:  
 Opening:  
 Bottom:

### Installed Screens

| From | To | Diameter | Assembly Type | Slot Size |
|------|----|----------|---------------|-----------|
|------|----|----------|---------------|-----------|

There are no records to show

## Well Development

Developed by:

Development Total Duration:

## Well Yield

No well yield data available.

## Well Decommission Information

Reason for Decommission:  
 Sealant Material:  
 Decommission Details:

Method of Decommission:  
 Backfill Material:

## Comments

No comments submitted

Alternative Specs Submitted: No

## Documents

No additional documentation available for this well.





BRITISH  
COLUMBIA

## Groundwater Wells and Aquifers

## Well Summary

Well Tag Number: 71419  
 Well Identification Plate Number:  
 Owner Name: GLENWALKER CATTLE CO  
 Intended Water Use:

Well Status: New  
 Well Class: Unknown  
 Well Subclass:  
 Aquifer Number:

Observation Well Number:  
 Observation Well Status:  
 Environmental Monitoring System (EMS) ID:  
 Alternative specs submitted: No

## Licensing Information

Licensed Status: Unlicensed

Licence Number:

## Location Information

Street Address: COLDWATER ROAD  
 Town/City: MERRITT

## Legal Description:

|                                           |           |
|-------------------------------------------|-----------|
| Lot                                       |           |
| Plan                                      |           |
| District Lot                              | 745       |
| Block                                     |           |
| Section                                   |           |
| Township                                  |           |
| Range                                     |           |
| Land District                             | 25        |
| Property Identification Description (PID) | 013018841 |

## Description of Well Location:



## Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 50.005079 Longitude: -120.894783  
 UTM Easting: 650853 UTM Northing: 5541319  
 Zone: 10 Coordinate Acquisition Code: (10 m accuracy) ICF cadastre and good location sketch

## Well Activity

| Activity                                         | ↕ Work Start Date | ↕ Work End Date | ↕ Drilling Company | ↕ Date Entered | ↕ |
|--------------------------------------------------|-------------------|-----------------|--------------------|----------------|---|
| There has been no activity related to this well. |                   |                 |                    |                |   |

## Well Work Dates

| Start Date of Construction | End Date of Construction | Start Date of Alteration | End Date of Alteration | Start Date of Decommission | End Date of Decommission |
|----------------------------|--------------------------|--------------------------|------------------------|----------------------------|--------------------------|
| 1980-03-30                 |                          |                          |                        |                            |                          |

## Well Completion Data

Total Depth Drilled: 112.00 feet

Finished Well Depth:

Final Casing Stick Up: 30.000 inches

Depth to Bedrock:

Ground elevation:

Static Water Level (BTOC):

Estimated Well Yield: 0.000 USGPM

Artesian Flow: 0.01 USGPM

Artesian Pressure:

Method of determining elevation: Unknown

Well Cap:

Well Disinfected Status: Not Disinfected

Drilling Method: Other

Orientation of Well: VERTICAL

## Lithology

| From (ft bgl) | To (ft bgl) | Raw Data                                 | Description | Molsture | Colour | Hardness | Observations | Water Bearing Flow Estimate (USGPM) |
|---------------|-------------|------------------------------------------|-------------|----------|--------|----------|--------------|-------------------------------------|
| 110.00        | 112.00      | BACK FILLED                              |             |          |        |          |              |                                     |
| 104.00        | 110.00      | CLEAN WATER BEARING FINE SAND FLOWING    |             |          |        |          |              |                                     |
| 94.00         | 104.00      | CLEAN WATER BEARING GRAVEL & FLOWING     |             |          |        |          |              |                                     |
| 0.00          | 0.00        | FLOWING                                  |             |          |        |          |              |                                     |
| 66.00         | 94.00       | COARSE WATER BEARING SAND & GRAVEL RED & |             |          |        |          |              |                                     |
| 62.00         | 66.00       | DIRTY WATER BEARING COARSE SAND & GRAVEL |             |          |        |          |              |                                     |
| 20.00         | 62.00       | CEMENTED TILL & BOULDERS                 |             |          |        |          |              |                                     |
| 11.00         | 20.00       | CEMENTED TILL & BOULDERS                 |             |          |        |          |              |                                     |
| 9.00          | 11.00       | DIRTY WATER BEARING COARSE GRAVEL        |             |          |        |          |              |                                     |
| 4.00          | 9.00        | GREY STICKY CLAY                         |             |          |        |          |              |                                     |
| 0.00          | 4.00        | TOP SOIL                                 |             |          |        |          |              |                                     |

## Casing Details

| From (ft) | To (ft) | Casing Type | Casing Material | Diameter | Wall Thickness | Drive Shoe |
|-----------|---------|-------------|-----------------|----------|----------------|------------|
| 0.00      | 95.00   |             | Steel           | 8.000    |                | Installed  |

## Surface Seal and Backfill Details

Surface Seal Material:

Surface Seal Installation Method:

Surface Seal Thickness:

Surface Seal Depth:

Backfill Material Above Surface Seal:

Backfill Depth:

## Liner Details

Liner Material:

Liner Diameter:

Liner from:

Liner Thickness:

Liner to:

Liner perforations

From

To

There are no records to show

Screen Details

Intake Method:

Type:

Material: Stainless

Steel

Opening:

Bottom:

Installed Screens

| From                         | To | Diameter | Assembly Type | Slot Size |
|------------------------------|----|----------|---------------|-----------|
| There are no records to show |    |          |               |           |

Well Development

Developed by:

Development Total Duration:

Well Yield

No well yield data available.

Well Decommission Information

Reason for Decommission:

Method of Decommission:

Sealant Material:

Backfill Material:

Decommission Details:

Comments

Top of Screen 94 ft. Bottom of screen 105 ft. Screen top #80 slot S.S., bottom #100 slot S.S. c/w 5 ft tail pipe. Flow. METHOD OF DRILLING = DRILLED

Alternative Specs Submitted: No

Documents

- WTN 71419\_Well Record.pdf

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

# NOR-WEST WATER WELL DRILLING LTD.

P.O. Box 3446  
Langley 534-4108

23191 Fraser Highway, Langley  
Evenings: Langley 534-4222

1164/80  
✓

## WELLS LOG

OWNER GLENWALKER CATTLE CO. LTD.

ADDRESS P. O. BOX 767,

MERRITT, B. C.

LOCATION GLENWALKER RANCH - 10 MILES SOUTH

OF MERRITT, B.C. (COLDWATER ROAD)

MARCH 30th, 19 80

Date Begun MARCH 19/80 Completed MARCH 30/80

Yield ..... Gallons per minute

Static Water Level FLOWING ..... feet from surface

Pumping Water Level 80 ..... feet from surface

Casing Used 97FT 6 INCHES OF 8 INCH

Bottom of Casing 95 ..... feet from surface

Stick-up above ground 2FT 6 INCHES ..... feet

TOP: #80 SLOT STAINLESS STEEL SCREEN

Screen Used BOTTOM: #100 SLOT STAINLESS STEEL SCREEN c/w  
5FT TAIL PIPE

Top of Screen 94 ..... feet from surface

Bottom of Screen 105 ..... feet from surface

Sources of Water ..... g.p.m. at ..... feet

Sources of Water ..... g.p.m. at ..... feet

Sources of Water ..... g.p.m. at ..... feet

Sources of Water ..... g.p.m. at ..... feet

Rig No. A/R #1

Driller LES. MACDONALD

RECOMMENDED PUMP SET AT ..... FT. RATE ..... G.P.M.

Depth

Material

0

TOP SOIL

4

GRAY STICKY CLAY

9

DIRTY WATER BEARING  
COURSE GRAVEL

11

CEMENTED TILL AND  
BOULDERS

20

CEMENTED TILL AND  
BOULDERS

CEMENTED TILL AND  
BOULDERS

CEMENTED TILL AND  
BOULDERS

62

DIRTY WATER BEARING  
COURSE SAND AND GRAVEL

66

COURSE WATER BEARING  
SAND & GRAVEL (RED)  
AND FLOWING

94

CLEAN WATER BEARING  
GRAVEL AND FLOWING

104

CLEAN WATER BEARING FINE  
SAND (FLOWING

110

112

BACK FILLED

092 I/007

092 I 006 211

WTN: 71419

## WATER WELL RECORD

PID 013018841

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT \_\_\_\_\_ SEC. \_\_\_\_\_ TP. \_\_\_\_\_ R. \_\_\_\_\_ D.L. 745 LAND DISTRICT KAMLOOPS PLAN \_\_\_\_\_DESCRIPTIVE LOCATION GLENWALKER RANCH - 10 Miles South of Merritt, Collierville Rd. LICENCE NO. \_\_\_\_\_ DATE \_\_\_\_\_OWNER'S NAME GLENWALKER CATTLE CO. LTD. ADDRESS P.O. Box 767, MerrittDRILLER'S NAME NOR WEST. ADDRESS Langley DATE COMPLETED 80.3.30DEPTH 100' ELEVATION \_\_\_\_\_ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. \_\_\_\_\_ LENGTH \_\_\_\_\_METHOD OF CONSTRUCTION air rotary CASING DIAM. 8" LENGTH +2.5'-95'SCREEN LOCATION 94'-105' SCREEN ☒ SIZE 50 LENGTH 4.5' TYPE \_\_\_\_\_SANITARY SEAL YES ☐ NO ☐ SCREEN ☒ SIZE 100 LENGTH 4.5' TYPE \_\_\_\_\_PERFORATED CASING ☐ LENGTH \_\_\_\_\_ PERFORATIONS FROM \_\_\_\_\_ TO \_\_\_\_\_GRAVEL PACK ☐ LENGTH \_\_\_\_\_ DIAM. \_\_\_\_\_ SIZE GRAVEL, ETC. \_\_\_\_\_DISTANCE TO WATER Flows ☐ ESTIMATED WATER LEVELFROM \_\_\_\_\_ ☐ MEASURED ELEVATION \_\_\_\_\_ ARTESIAN PRESSURE \_\_\_\_\_

DATE OF WATER LEVEL MEASUREMENT \_\_\_\_\_ WATER USE \_\_\_\_\_

## CHEMISTRY

TEST BY \_\_\_\_\_ DATE \_\_\_\_\_

TOTAL DISSOLVED SOLIDS \_\_\_\_\_ mg/l TEMPERATURE \_\_\_\_\_ °C pH \_\_\_\_\_ SILICA (SiO<sub>2</sub>) \_\_\_\_\_ mg/lCONDUCTANCE \_\_\_\_\_  $\mu$ mhos/cm AT 25°C TOTAL IRON (Fe) \_\_\_\_\_ mg/l TOTAL HARDNESS (CaCO<sub>3</sub>) \_\_\_\_\_ mg/lTOTAL ALKALINITY (CaCO<sub>3</sub>) \_\_\_\_\_ mg/l PHEN. ALKALINITY (CaCO<sub>3</sub>) \_\_\_\_\_ mg/l MANGANESE (Mn) \_\_\_\_\_ mg/l

COLOUR \_\_\_\_\_ ODOUR \_\_\_\_\_ TURBIDITY \_\_\_\_\_

## ANIONS

mg/l

epm

CARBONATE (CO<sub>3</sub>)BICARBONATE (HCO<sub>3</sub>)SULPHATE (SO<sub>4</sub>)

CHLORIDE (Cl)

NO<sub>2</sub> + NO<sub>3</sub> (NITROGEN)

\* TKN. (NITROGEN)

PHOSPHORUS (P)

\* TKN = TOTAL KJELDAHL NITROGEN

NO<sub>2</sub> = NITRITE NO<sub>3</sub> = NITRATE

## CATIONS

mg/l

epm

CALCIUM (Ca)

MAGNESIUM (Mg)

SODIUM (Na)

POTASSIUM (K)

IRON (DISSOLVED)

## CHEMISTRY FIELD TESTS

TEST BY \_\_\_\_\_ DATE \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## CONTENTS OF FOLDER

☒ DRILL LOG☐ SIEVE ANALYSIS☐ PUMP TEST DATA☐ GEOPHYSICAL LOGS☐ CHEMICAL ANALYSIS☐ REPORT

OTHER \_\_\_\_\_

SOURCES OF INFORMATION \_\_\_\_\_

Z 10 WELL NO. 002650833 E8541319 N

Z \_\_\_\_\_ X \_\_\_\_\_ Y \_\_\_\_\_ NO. \_\_\_\_\_

NAT. TOPO. SHEET NO. 92 I/2

## 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 \_\_\_\_\_

RECOMMENDED PUMPING RATE \_\_\_\_\_

RECOMMENDED PUMP SETTING \_\_\_\_\_

## LITHOLOGY

FROM TO DESCRIPTION

0 4' TOP SOIL4' 9' GREY STICKY CLAY9' 11' DIRTY WATER BEARING COARSEGRAVEL11' 20' CEMENTED TILL + BOULDERS20' 62' CEMENTED TILL + BOULDERS62' 66' DIRTY WATER BEARING COARSESAND + GRAVEL66' 94' COARSE WATER BEARING SAND+ GRAVEL (RED) + FLOWING94' 104' CLEAN WATER BEARING GRAVELAND FLOWING104' 110' CLEAN WATER BEARING FINESAND (FLOWING)110' 112' BACK FILLED

\_\_\_\_\_

\_\_\_\_\_

6/3-86 Located but not drilledno well casing accordingto Kamloops Office

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