

Clinton Hongyang Zhengong International
Investment Inc.

Well Drilling, Construction
and Pumping Test
for
Crystal Clinton Bottling Ltd.

File No. 1533 Rev A
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SUMMARY

Clinton Hongyang Zhengong International Investment Inc. is undertaking the development of a water bottling facility at 7072 Walch Road in Clinton B.C. from a groundwater source. The initial 2014-2015 work phase undertaken by EHD Consulting Ltd.¹ consisted in the testing of the existing well ID.41015, a first review of the hydrogeological settings and the rating of well 41015. It was concluded that the well could not meet the quantity requirements estimated at 10.7 L/s (170 USgpm). Based on EHD's findings and recommendation, the second phase of the project in which Lowen Hydrogeology Consulting Ltd. (LHC) took part was carried out in November 2015. The scope of work included the drilling of the production well (ID.39845) near well 41015, the installation of 2 monitoring wells at the subject property and a long-term pumping test on well 39845 at a constant rate.

The production well ID.39845 taps 20.7 m (68 ft) deep into the sand and gravel aquifer 0921. The pumping test confirms that the well 39845 can safely produce a quantity of up to 504 USgpm (31.8 L/s). The aquifer has a high transmissivity and can support high capacity wells. This yield meets the requirements of 170 USgpm (10.7 L/s) for the intended use.

Drawdown interference during the pumping test was assessed with groundwater level monitoring at 4 wells, at distances ranging from 42 to 1,212 m from the production well. The drawdown was estimated to extend to a theoretical 300 m radius at the end of the 3-day test, under a pumping rate of 12.6 L/s (200 USgpm), although the monitoring well located at the neighbouring property (Walsh well) did not show any impact from the pumping at well 39845.

Groundwater quality is good, with a few parameters in excess of the Canadian Drinking Water Quality Guidelines. The water is hard, with elevated total dissolved solids with respect to aesthetic objectives. The review of all the parameters suggests that the groundwater from the sand and gravels emanates from the bedrock formations located upstream to the south.

It is concluded that under appropriate water treatment for mineral water production and with well site management, the new groundwater source is suitable to support the bottling facility under the intended production rate.

1. Well 41015 Assessment Report, EHD Consulting Ltd., October, 2015

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1.0 INTRODUCTION

1.1 Project background

Clinton Hongyang Zhengong International Investment Inc., owner of the property at 7072 Walch Road in Clinton BC is seeking to develop a mineral water bottling facility using groundwater. An assessment of groundwater conditions at the property was undertaken in 2015 by EHD Consulting Ltd. The scope of work included the testing of the well ID.41015, completed in August 2014. The maximum long-term safe exploitation rate for this well was rated at 3.5 L/s (55 USgpm) due to a well screen limit. EHD Consulting Ltd. suggested in their report that greater capacity could be achieved by drilling a larger diameter well. For the purposes of this report the well 41015 is referred to as the "test well".

Lowen Hydrogeology Consulting Ltd. took part in the second phase of the work in 2015, by supervising the drilling of a larger diameter production well (ID.39845), located 6 m away from the test well ID.41015. Two extra monitoring wells were drilled north and south of the production well and a 3-day pumping test was performed to estimate the well capacity and assess the potential interferences caused by the pumping.

Groundwater was sampled at the well at the end of the pumping test and water quality analysed. All the findings and calculations are summarized in this report. A site plan is shown in Appendix A.

1.2 Water supply requirements

Development Permit drawings show two production lines with each bottling the equivalent of 36000 500 mL bottles per hour, or 10l/s (158 USgpm). To allow for losses and production variation, the pump test was conducted at 12.6l/s (200 USgpm).

1.3 Property settings and well site

The subject property is located south of the Village of Clinton along the Duck Lake eastern shore. Four wells are installed at the subject property and described in Table 1. The full well log records are provided in Appendix B.

Table 1 - Wells at the subject property

	ID.39845	ID.41015	ID.39847	ID.39851
Well Type	Production Well	Test Well	Monitoring Well	Temporary Monitoring Well
Date Drilled	24-11-2015	06-08-2014	19-11-2015	19-11-2015
UTM Coordinates [10 U]	598 691.14 5 659 288.87	598 683.61 5 659 283.60	598 717.16 5 659 328.07	598 680.64 5 659 215.36
Distance to Production Well	0	20 ft / 6.1 m	164 ft / 50 m	246 ft / 75 m
Well Diameter	8-inch / 203 mm	6-inch / 150 mm	6-inch / 150 mm	6-inch / 150 mm
Well Depth	68 ft / 20.7 m	70 ft / 21.3 m	58 ft / 17.7 m	58.5 ft / 17.8 m
Static Water Level	34.8 ft / 10.6 m	30.8 ft / 9.4 m	41.4 ft / 12.6 m	33.2 ft / 10.1 m
Well Screen	Slot Size: 80 [60 - 67] ft [18.3 - 20.4] m	Slot Size: 30 [62.4 - 67] ft [19.0 - 20.4] m	Slot Size: 40 [54.5 - 58.5] ft [16.6 - 17.8] m	Open bottom

GEOLOGICAL AND HYDROGEOLOGICAL SETTINGS

1.4 Type of aquifer and aquifer boundaries

The subject property lies over a fan-like sand and gravel aquifer 0921. The geological unit in which the aquifer occurs is described as glaciofluvial and glaciolacustrine deposits. These deposits lie at the bottom of narrow valleys converging to the village of Clinton. The aquifer is rated by the Ministry of Environment with moderate productivity, low demand and vulnerability.

1.5 Recharge conditions

Groundwater quality indicates high conductivity and high mineralization of the groundwater (see section 5.0) suggesting that it emanates (at least in part) from bedrock. The main recharge area is likely located on the high topographic points on the mountains located to the south of the subject property. Precipitation water infiltrating through the rock resurges at the valley bottom, feeding small lakes such as the Duck Lakes, and likewise the sand and gravels in which the wells tap. The aquifer is also recharged from precipitation over the surface of the aquifer.

2.0 WELL DRILLING

2.1 Well drilling

The production well ID.39845 was drilled on November 24, 2015 by certified driller Bud's Water Wells Ltd., under the supervision of senior hydrogeologist Dennis Lowen, P.Geo, P.Eng. The well was drilled by air rotary to a completion depth of 68 ft (20.7 m). The supervising team was in charge of monitoring the drilling and collecting soil samples for the well design. See Appendix B for the well log record.

2.2 Sieve analysis, screen design and well development

Samples of the aquifer materials were collected every 2 ft (0.6 m), and 6 samples, from 58 to 68 ft (17.7 to 20.7 m) were sent to EXP Services Inc. for sieve analysis. The aquifer materials are described at depth as medium to coarse sand and gravel. Fines represent less than 2% of the full samples. Sieve analysis results are provided in Appendix C.

The test well ID.41015 drilled in 2014 showed that the limiting factor to the well capacity was the screen rather than the aquifer. The 80-slot size was selected for the screen between 60 and 67 ft, as being an average of the 40% to 50% passing materials for the 6 samples. As a result of increasing the percent passing, therefore the slot size, longer development time was required to produce sand-free water and make an efficient well.

The well was developed by air lifting for 22.5 hours, until the water ran clear. The yield estimated by the driller after development was greater than 200 USgpm (> 12.6 L/s).

Table 2 - Well sieve analysis and screen slot selection

	58 ft	60 ft	62 ft	64 ft	66 ft	68 ft
						
40% passing [thou of an inch]	42.8	66.5	95.1	31.2	33.7	72.6
50% passing [thou of an inch]	70.5	107.8	168.0	42.3	40.8	120.6
Slot Size	80	80	80	80	80	80

2.3 Observation wells

Two monitoring wells were drilled at the subject property:

- ID.39847, located 50 m north of the production well
- ID.39851, temporarily installed 75 m south of the production well

The main purpose of these wells is to monitor potential well interference during the long-term pumping test. The well logs can be reviewed in Appendix B.

3.0 PUMPING TEST

3.1 Pumping test settings

The production well ID.39845 was tested for 3 days at constant rate between November 27 and 30, 2015. A 24-hour water level recovery was also recorded. A submersible pump was temporarily installed in the well and the pump size matched to the anticipated pumping rate of the well. Water level measurements were taken at specific intervals using an electric well sounder and a datalogger device was installed into the well to verify the manual data. A $\frac{3}{4}$ inch diameter PVC pipe was temporarily installed in the wells to facilitate accurate manual measurements. The flow rate was checked regularly throughout the pumping test to ensure that the pumping rate was held constant.

A total of 4 monitoring wells were used to assess the aquifer parameters and potential well interferences. Each of these wells was equipped with a datalogger to measure depth to water during the pumping and recovery phase. These wells are shown in Table 3. All manual drawdown / recovery data and plots are shown in Appendix B. One additional monitoring well operated by MOE (720m south south east) may be queried in future.

Table 3 - Wells monitored during the pumping test

	ID.39845	ID.39847	ID.39851	N/A	Tag.28521
Well Name	Production Well	North Observation Well	South Observation Well	Wayne Walsh Well	Village of Clinton
Distance to production well [m] / [ft]	0	50 / 164	75 / 246	294 / 965	1,212 / 3,976
UTM Coordinates [10 U]	598 691.14 5 659 288.87	598 717.16 5 659 328.07	598 680.64 5 659 215.36	598 649 5 659 520 *	598 691 5 660 441 *
Static Water Level [m] / [ft]	10.61 / 34.8	12.62 / 41.4	10.12 / 33.2	11.12 / 36.5	Artesian
Drawdown at the end of the test [m] / [ft]	1.63 / 5.3	0.50 / 1.6	0.37 / 1.2	0.00	0.00

* Approximate locations

3.2 Aquifer parameters

The aquifer transmissivity can be calculated from several methods. Although the production well log shows that the aquifer is locally unconfined, the pump test data indicates confined aquifer conditions, without the typical delayed water table response phenomenon. The Cooper-Jacob method is applied to calculate the aquifer transmissivity in the vicinity of the production well.

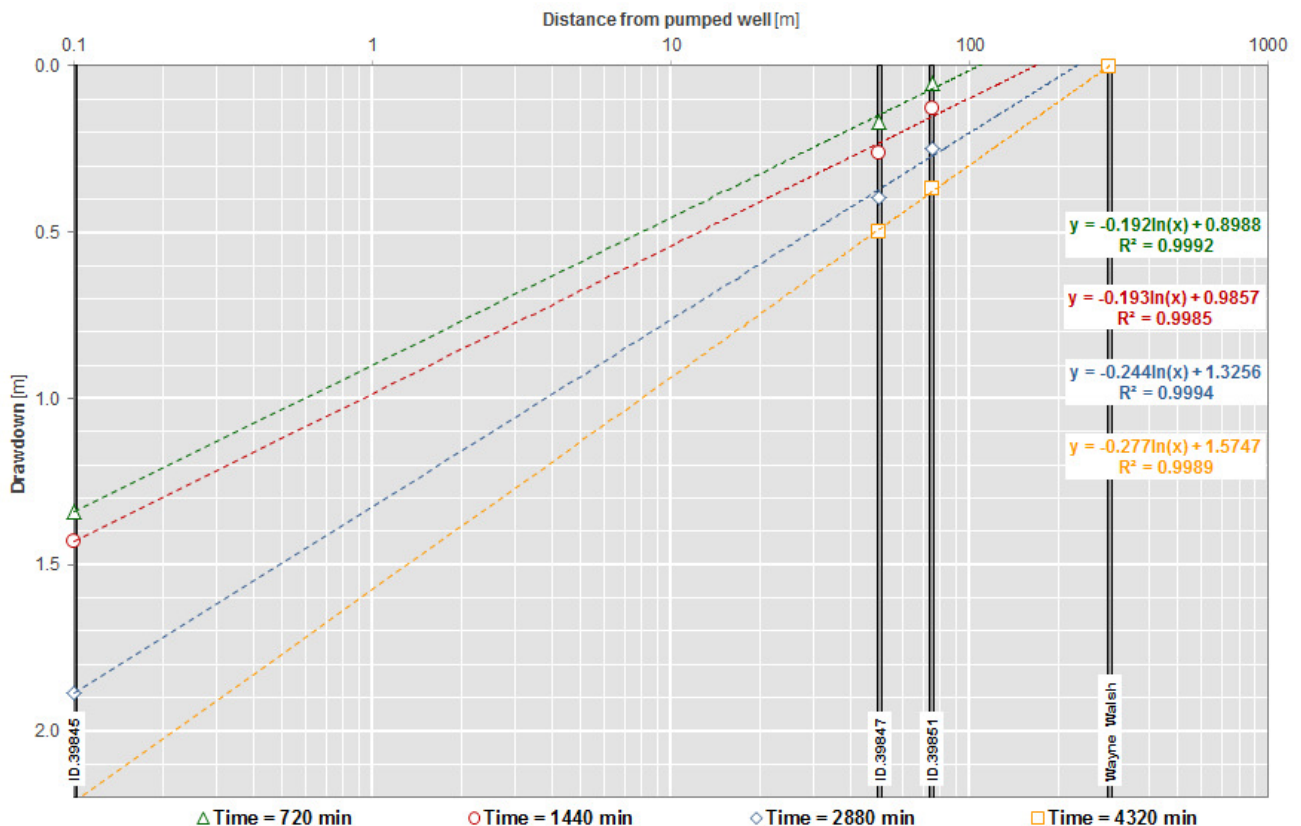
Table 4 - Calculation of Aquifer Parameters

Time - Drawdown Method	Distance - Drawdown Method
Pumping rate [m ³ /d] 1,090.2	Pumping rate [m ³ /d] 1,090.2
S _{10min} [m] 0.71	Time [d] 3
S _{100min} [m] 1.05	S _{10min} [m] 0.94
Δs [m] 0.34	S _{100min} [m] 0.30
	Δs [m] 0.64
	r ₀ [m] 294.4
TRANSMISSIVITY [m ² /d] 0.183*Q/Δs = 582	TRANSMISSIVITY [m ² /d] 0.366*Q/Δs = 626
(Compares to 468 m ² /d for well 41015)	COEFFICIENT OF STORAGE 2.25*T*t/r ₀ ² = 0.05

3.3 Well Efficiency

The well efficiency is assessed from drawdown data given by the observation wells during the pumping test, presented on a distance-drawdown graph. A comparison between the theoretical drawdown (ideal well) and the actual drawdown measured at the pumping well gives an estimate of the well efficiency. Graph 1 shows distance-drawdown lines at 4 different times during the pumping test. The drawdown points at the 2 observation wells and the pumped well are perfectly aligned on a semi-log scale (R^2 ranging from 0.9985 to 0.9994), meaning that the pumped well was 100% efficient throughout the test.

Graph 1 - Distance-Drawdown



3.4 Well theoretical long-term capacity

Well long-term capacity corresponds to a safe long-term yield for a well. According to this capacity, the well is able to sustain the determined flow rate continuously using a maximum of 70% of the total available drawdown under the lowest seasonal aquifer static level. The estimated theoretical long-term capacity of the wells has been estimated as follows:

$$\text{Long-term capacity} = \text{Specific capacity @ 100 day} \times \text{safe available drawdown}$$

Where:

- Specific capacity = Pumping rate during the test / Extrapolated drawdown @ 100 days
- Safe available drawdown = 0.7 x Total available drawdown

Pumping rate	[USgpm]	200
	[m ³ /d]	1,090.2
100-d extrapolated drawdown	[m]	2.1
100-d specific capacity	[m ³ /d/m]	510.5
Depth to top of the screen	[m]	18.3
Static water level	[m]	10.6
Total available drawdown	[m]	7.7
Safe available drawdown	[m]	5.4
WELL LONG-TERM CAPACITY	[m ³ /d]	2,750
	[USgpm]	504

The well recovered 72% of the water level within the first 3 hours after pumping stopped. The recovery was at 82% after 24 hours. The water level recovery in the aquifer is excellent.

3.5 Well screen capacity

The pumping test has shown that the well would be able to produce up to 504 USgpm (31.8 L/s), additionally, the well screen has a maximum transmitting capacity. This maximum capacity can be calculated from the technical information provided by the screen manufacturer.

Johnson Screen® Free-Flow® 304 Stainless Steel Screens		
Diameter Size [in]	Max Depth [ft]	Intake Area [in²/ft of screen] Screen slot size [thou on an in]: <u>80</u>
8" Telescope	250	117

$$\text{Transmitting capacity [gpm/ft of screen]} = \text{Intake area} \times 0.31$$

Maximum screen capacity = 117 x 0.31 x 7 = 254 USgpm (16.0 L/s) according to Johnson Screens based on a 0.1 ft./sec. screen entrance velocity. However, subsequent research (Williams, D.E., 1981) has shown screen entrance velocities can safely exceed 0.1 ft/sec. by a factor of 2-4 times. Therefore we conclude the screen transmitting capacity ranges from **508 to 1016 USgpm**.

3.6 Well interference

The 2 closest wells of the 4 monitoring wells responded to the pumping. At the end of the 3-day test, the drawdown theoretically extended to 300 m, although the Wayne Walsh well located 294 m away did not shown any significant response.

The drawdown at the production well should not have any significant effect beyond the subject property boundaries. There is an MOE observation well south of the subject well which will track levels in the local aquifer.

4.0 WATER QUALITY

4.1 Groundwater sample analysis

A groundwater sample was collected at the production well ID.39845 by EHD Consulting Ltd. on November 30, 2015, and analyzed by ALS Environmental.

The groundwater quality is overall good, although hard, with high TDS content. The parameters that are in excess are listed in the table below and compared to the standards from the Canadian Drinking Water Quality Guidelines (CDWQG).

Table 5 - Groundwater Parameters in Excess

Parameter	Result	Standard
Hardness (as CaCO ₃) [mg/L]	770	AO = 500
Total Dissolved Solids [mg/L]	882	AO = 500
Manganese (Mn) [mg/L]	0.455	AO = 0.05

AO = Aesthetic Objectives | MAC = Maximum Acceptable Concentration

The water will be treated appropriately for the intended use as bottled mineral water. The mineralization is classified as medium (US FDA).

4.2 Potential impact on licensed water users and existing wells

As discussed in Section 4.6, significant drawdown interference from pumping at the recommended rate is not expected to extend beyond the subject property lines. The aquifer has a high transmissivity and recovers rather quickly. The closest neighboring well is Walsh Well located on the property to the north. This well did not respond to the long-term pumping test at a constant rate of 200 USgpm (12.6 L/s).

4.3 Possibility of pollution

Interaction with surface water is unlikely considering the distance separating the production well to Duck Lake (approximately 50 m). The pumping test data show that the drawdown theoretically extended to a distance of 50 m after 120 min while pumping at 200 USgpm. The drawdown therefore theoretically extended to the lake; however the geological data available do not allow concluding that a hydraulic connection to the lake exists. The lake is likely to be directly fed by groundwater resurging from the bedrock. The gravel aquifer tapped by the subject well is also likely recharged from the bedrock. This possibility is supported by the high conductivity and mineralization of the groundwater extracted from the production well. Lake levels could not be monitored during the pumping test as the lake was frozen, however lake levels were monitored when well 41015 was tested and no impact was measured.

5.0 RECOMMENDATIONS

5.1 Operation of the well

- The production well should not be pumped at a rate higher than 504 USgpm or 31.8 L/s.
- The groundwater level at the well should be controlled regularly to ensure that the level does not drop below the top of the pump intake. The pump intake should be set at 50 feet (15.2 m.) below the top of the casing.

5.2 Monitoring program

- The wells ID.41015 and ID.39847 should be used as permanent monitoring wells during the exploitation of the production well. Data loggers should be installed in these wells to monitor the drawdown extent at all times.
- Groundwater samples at the production well should be taken as indicated by the Interior Health guidelines for such an installation.

5.3 Well and aquifer protection

- The production well head should be protected and a protection perimeter established to ensure that no pollution can reach the well. A 10 m. radius "well protection zone" around the well should be maintained.
- The local recharge is likely from the south. Land use activities to the south of the subject property should be monitored for potential impacts on the subject well.

6.0 CONCLUSION

A successful well ID.39845 was drilled at the subject property. The groundwater needs for the water bottling facility is estimated to be 10.7 L/s (170 USgpm). The production well can be exploited at a maximum safe rate of 31.8 L/s (504 USgpm), meeting the quantity requirements for the intended use.

The aquifer in which the production well taps has a high transmissivity, resulting in generally high well yields. A hydraulic connection between the subject production well and Duck Lake is not likely as the pumping test indicates the aquifer is confined.

The sand and gravel aquifer in which the production well taps is believed to be mainly replenished by groundwater resurgence from the bedrock constituting the mountains upstream, south of the subject property. Groundwater is slightly alkaline, hard, with high mineralization and high conductivity. Water treatment options for mineral water bottling may be considered but are beyond the scope of this report.

7.0 CLOSURE / DISCLAIMER

This report has been prepared in accordance with generally accepted groundwater engineering practices. The opinions expressed herein are considered valid at the time of writing. Changes in site conditions can occur, however, whether due to natural events or to human activities on these, or adjacent properties. In addition, changes in regulations and standards may occur, whether they result from legislation or the broadening of knowledge. This report is therefore subject to review and revision as changed conditions are identified.

Well yields and water quality can vary over time due to climate change, recharge area modification, or earth movements (earthquakes and blasting). Water quality standards also evolve over time and future revisions of the standards may necessitate changes to the recommendations for water treatment or testing.

In formulating our analyses, conclusions and recommendations we have relied on information supplied by others; well drilling contractors, and LHC's partners. The information provided by others is believed to be accurate but cannot be guaranteed. If the recommendations in this report are not implemented, we assume no responsibility for any adverse consequences that may result.

If you have any questions or require any further information, please contact the undersigned.

Respectfully Submitted,

LOWEN HYDROGEOLOGY CONSULTING LTD.

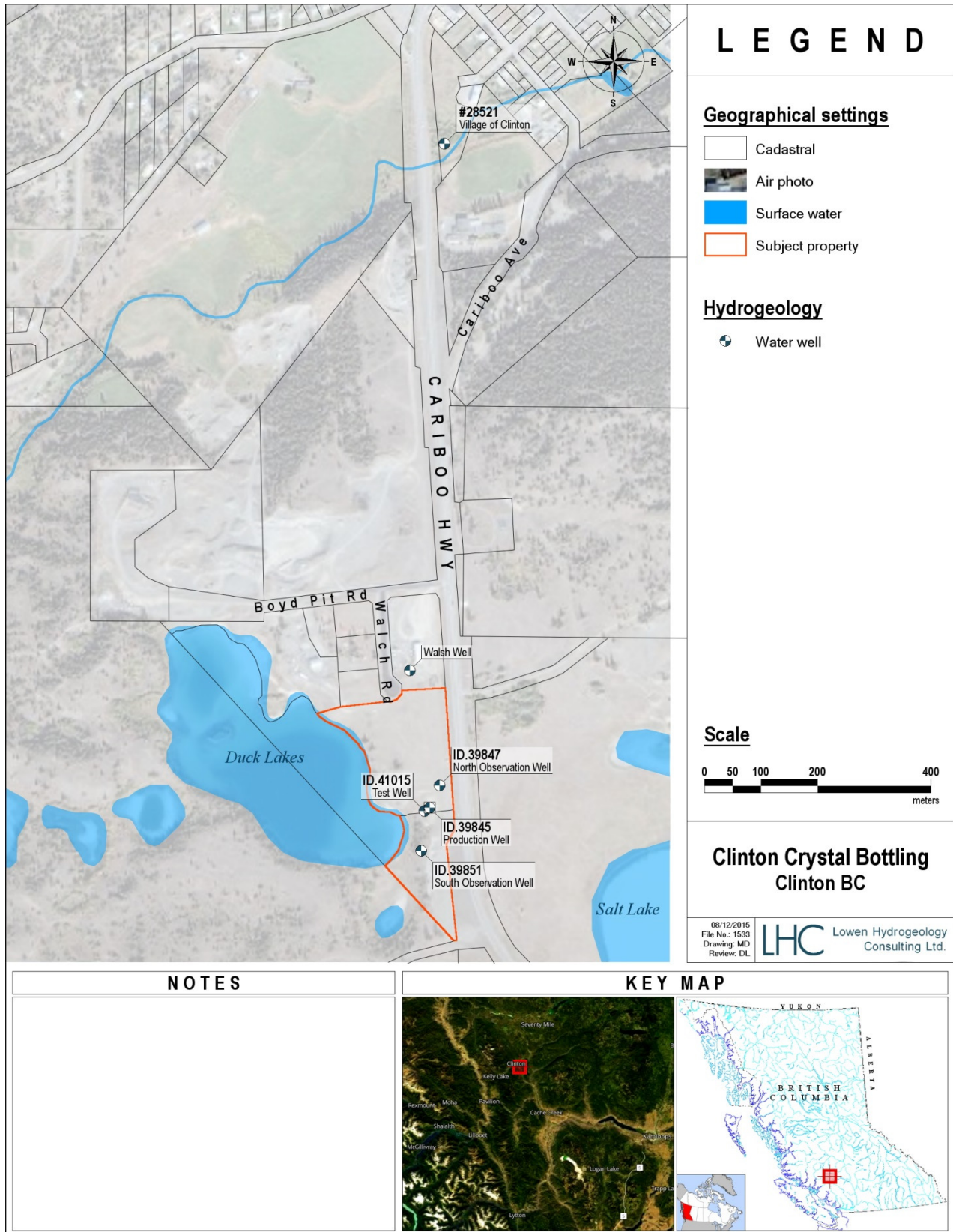


Dennis A. Lowen, P. Eng., P.Geo.

DL/MD/hr

APPENDIX A

Well Location Plan



APPENDIX B

Well Log Records

PROJECT:	Clinton Crystal Bottling Co	GROUND ELEVATION:	2999 ft	914.0 m
PROJECT No.:	1533	WELL DEPTH:	68 ft	20.7 m
DATE:	24-11-2015	STATIC WATER LEVEL:	34.7 ft	10.6 m
WELL ID. PLATE No.:	39845	METHOD OF DRILLING:	Air Rotary	
WELL REF:	Production Well	METHOD OF DEVELOPMENT:	Air Lifting (22.5 hours)	
DRILLING CONTRACTOR:	Bud's Water Wells Ltd.	ESTIMATED YIELD:	200+ USgpm	
CLIENT:	Clinton Crystal Bottling	LOGGED BY:	Bud's Water Wells Ltd.	

[illegible]

Depth (ft bgl.)		Well Construction
From	To	
+2 (24-in)	0	Stick-up
0	60	Casing
60	67	Screen, 80 slot, 7" diameter

Notes:			
Water:	Fresh, clear		
Surface seal:	Bentonite, 18 ft deep		
GPS Coordinates:	NAD 83 Zone 10 U	UTM Easting	5 659 288
		UTM Northing	0 598 691



- ☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

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

Ministry Well ID Plate Number: **39845**
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information.

See reverse for notes & definitions of abbreviations.

Owner name: **Clinton Crystal Bottling Co.** Town: **Clinton** Prov: **BC** Postal Code:

Mailing address: Street no. Street name Town

Well Location: Address: Street no. Street name Town

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

or PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: (see note 2) (and) UTM Northing: m or Latitude (see note 3): **N51°04'36.8"**
UTM Easting: m or Longitude: **W121°35'28.4"**

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

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: **2999** ft (asl) Method (see note 4):

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

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

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

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	5	soft	Br	dirty sand + gravel		
5	58	soft	Br	med + coarse sand + gravel - layered		
58	64	soft	Br	coarser sand + gravel		
64	68	soft	Br.	med + coarse S+G		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	60	8 7/8	steel	.250	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
67	60	7"	stainless	.080

Surface seal: Type: **Bentonite** Depth: **1.8'** ft

Method of installation: ☒ Poured ☐ Pumped Thickness: **1"** in

Backfill: Type: Depth: ft

Liner: ☐ PVC ☐ Other (specify):

Diameter: in Thickness: in

From: ft (bgl) To: ft (bgl) Perforated: From: ft (bgl) To: ft (bgl)

Intake: ☒ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☒ Telescope ☐ Pipe size

Screen material: ☒ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☒ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Bail ☒ Plug ☐ Plate ☐ Other (specify):

Filter pack: From: ft To: ft Thickness: in

Type and size of material:

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): Total duration: **22.5** hrs

Notes:

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify):

Rate: USgpm Duration: **22.5** hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): **Duane Bocek**

Registration no. (see note 20): **05040601**

Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be,

has been done in accordance with the requirements in the Water Act and the Ground

Water Protection Regulation.

Signature of Driller Responsible: **Duane Bocek**

PLEASE NOTE: The information recorded in this Well report describes the works and hydrogeologic conditions at the time of construction,

alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a

number of factors, including natural variability, human activities and condition of the works, which may change over time.

Final well completion data:

Total depth drilled: **68** ft Finished well depth: **67** ft (bgl)

Final stick up: **7.4"** in Depth to bedrock: ft (bgl)

SWL: **34.7"** ft (btoc) Estimated well yield: **200** USgpm

Artesian flow: USgpm, or Artesian pressure: ft

Type of well cap: **aluminum** Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: **to casing**

Well closure information:

Reason for closure:

Method of closure: ☐ Poured ☐ Pumped

Sealant material: Backfill material:

Details of closure (see note 17):

Date of work (YYYY/MM/DD):

Started: **2015/11/17** Completed: **2015/11/24**

Comments:

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

PROJECT:	Clinton Crystal Bottling Co	GROUND ELEVATION:	2997 ft	913.5 m
PROJECT No.:	1533	WELL DEPTH:	70 ft	21.3 m
DATE:	06-08-2014	STATIC WATER LEVEL:	31 ft	9.4 m
WELL ID. PLATE No.:	41015	METHOD OF DRILLING:	Air Rotary	
WELL REF:	Test Well	METHOD OF DEVELOPMENT:	Air Lifting	
DRILLING CONTRACTOR:	Weston Water Wells Ltd.	ESTIMATED YIELD:	72 USgpm	
CLIENT:	Clinton Crystal Bottling	LOGGED BY:	Weston Water Wells Ltd.	

[illegible]

Depth (ft bgl.)		Well Construction
From	To	
+1.5 (18-in)	0	Stick-up
0	62	Casing
62	67	Screen, 30 slot, 4" diameter

Notes:			
Water:	N/A		
Surface seal:	Bentonite, 17 ft deep		
GPS Coordinates:	NAD 83 Zone 10 U	UTM Easting	5 659 283
		UTM Northing	0 598 683

BRITISH COLUMBIA
Ministry of Environment

☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Weston Water Wells Ltd.
7778 Hwy 24
Lone Butte BC, V0K 1X2
250-593-4307

Ministry Well ID Plate Number: 41015
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

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

Owner name: Clinton Hongyang Zhenghoun International
Mailing address: Box 237 Town Clinton Prov BC Postal Code V0K 1K0
Well Location: Address: Street no. 7029 Street name Cariboo Hwy 97 Town Clinton B.C.
☐ Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District CLD
☐ PID: 024-938-734 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: _____ (and) **UTM Northing:** _____ m (or) **Latitude (see note 3):** N 51° 04' 33.0"
(see note 2) **UTM Easting:** _____ m (or) **Longitude:** W 121° 35' 32.2"

Method of drilling: ☒ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2997 ft (asl) Method (see note 4): _____
Class of well (see note 5): Water Supply **Sub-class of well:** Domestic
Water supply wells: indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

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

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	62			Sand & Sm Gravel		
62	68			Medium Size Gravel		
68	70			Heavy Sand		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	64'7"	6	steel	219	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
62'4"	67	4	stainless steel	30

Surface seal: Type: Benseal Depth: 17 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 1 1/2 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: _____ ft (bgl) To: _____ ft (bgl) Perforated: From: _____ ft (bgl) To: _____ ft (bgl)

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): _____ Total duration: _____ hrs
Notes: _____

Well yield estimated by:
☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 60 imp USgpm Duration: _____ hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☐ Fresh ☐ Salty ☐ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Jerry Weston
Registration no. (see note 20): WD 05021001
Consultant (if applicable, name and company): _____
DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.
Signature of Driller Responsible: [Signature]
PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

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

Final well completion data:
Total depth drilled: 70 ft Finished well depth: 67 ft (bgl)
Final stick up: 18 in Depth to bedrock: _____ ft (bgl)
SWL: 31 ft (btoc) Estimated well yield: 72 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: Well Cap Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: casing stick up

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

Date of work (YYYY/MM/DD):
Started: 2014/08/05 **Completed:** 2014/08/06
Comments: Rec Pump Depth 55' - 60'

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

PROJECT:	Clinton Crystal Bottling Co	GROUND ELEVATION:	3000 ft	914.4 m
PROJECT No.:	1533	WELL DEPTH:	58 ft	17.7 m
DATE:	19-11-2015	STATIC WATER LEVEL:	N/A	N/A
WELL ID. PLATE No.:	39847	METHOD OF DRILLING:	Air Rotary	
WELL REF:	North Observation Well	METHOD OF DEVELOPMENT:	Air Lifting	
DRILLING CONTRACTOR:	Weston Water Wells Ltd.	ESTIMATED YIELD:	50 USgpm	
CLIENT:	Clinton Crystal Bottling	LOGGED BY:	Weston Water Wells Ltd.	

[illegible]

Depth (ft bgl.)		Well Construction
From	To	
+2.0 (24-in)	0	Stick-up
0	54.5	Casing
54.5	58.5	Screen, 40 slot, 5" diameter

Notes:			
Water:	Fresh, clear		
Surface seal:	N/A		
GPS Coordinates:	NAD 83 Zone 10 U	UTM Easting	5 659 328
		UTM Northing	0 598 707

PROJECT:	Clinton Crystal Bottling Co	GROUND ELEVATION:	2997 ft	913.5 m
PROJECT No.:	1533	WELL DEPTH:	58.5 ft	17.8 m
DATE:	19-11-2015	STATIC WATER LEVEL:	N/A	N/A
WELL ID. PLATE No.:	39851	METHOD OF DRILLING:	Air Rotary	
WELL REF:	South Observation Well	METHOD OF DEVELOPMENT:	Air Lifting	
DRILLING CONTRACTOR:	Weston Water Wells Ltd.	ESTIMATED YIELD:	15 USgpm	
CLIENT:	Clinton Crystal Bottling	LOGGED BY:	Weston Water Wells Ltd.	

[illegible]

Depth (ft bgl.)		Well Construction
From	To	
+1.5 (18-in)	0	Stick-up
0	58.5	Casing

Notes:			
Water:	Fresh, cloudy		
Surface seal:	N/A		
GPS Coordinates:	NAD 83 Zone 10 U	UTM Easting	5 659 215
		UTM Northing	0 598 680



☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

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

Ministry Well ID Plate Number: **39851**
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information.

See reverse for notes & definitions of abbreviations.

Owner name: **Clinton Crystal Bottling Co**

Mailing address: _____ Town _____ Prov. _____ Postal Code _____

Well Location: Address: Street no. _____ Street name _____ Town _____

or Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

or PID: _____ (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: _____ (see note 2) and UTM Northing: _____ m or Latitude (see note 3): **N50°04'33.5"**
UTM Easting: _____ m or Longitude: **W121°35'28.9"**

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

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: **2997** ft (asl) Method (see note 4): _____

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

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

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

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	28	soft	Br.	med & fine sand & gravels		
28	40	soft	Br.	med & fine clean sands		
40	58 1/2	soft	Br.	silty fine sand & some gravels		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	58 1/2	6 5/8	steel	.188	☒

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
58 1/2				

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

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): _____ Total duration: **2** hrs
Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: _____ USgpm Duration: **2** hrs
SWL before test: _____ ft (bloc) Pumping water level: _____ ft (bloc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☐ Clear ☒ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): **Daane Bocek**
Registration no. (see note 20): **05040601**
Consultant (if applicable, name and company): _____

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

Signature of Driller Responsible

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

Final well completion data:

Total depth drilled: **58 1/2** ft Finished well depth: **58 1/2** ft (bgl)
Final stick up: **13 1/2** in Depth to bedrock: _____ ft (bgl)
SWL: _____ ft (bloc) Estimated well yield: **15** USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: **steel** Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: **to casing**

Well closure information:

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

Date of work (YYYY/MM/DD):

Started: **2015/11/19** Completed: **2015/11/19**
Comments: _____

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

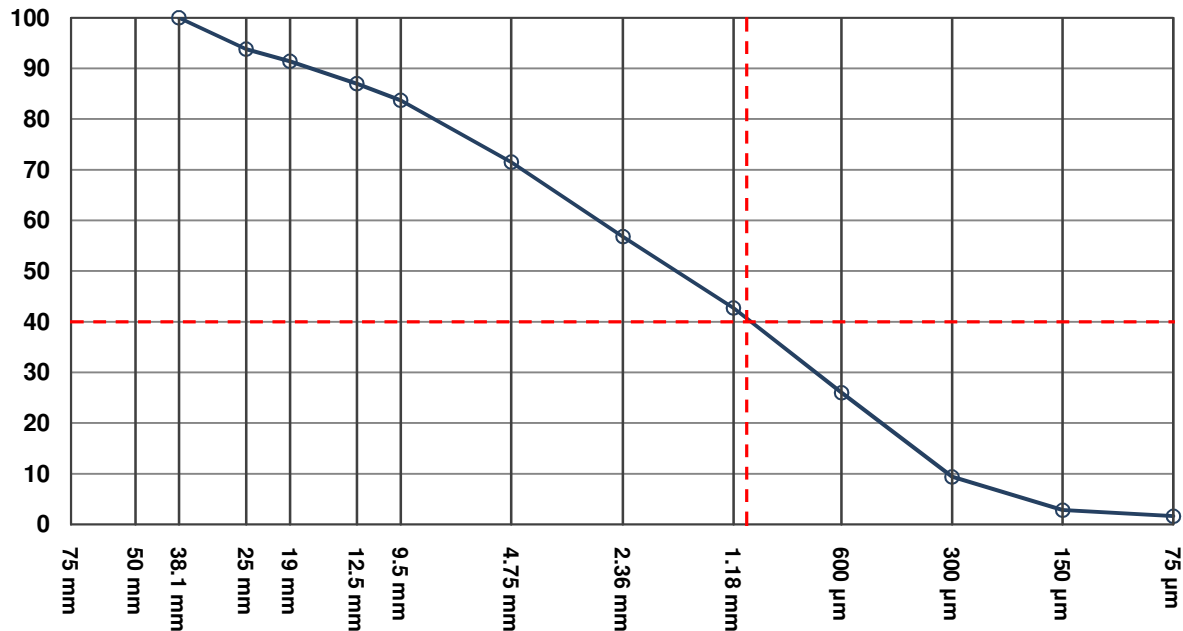
APPENDIX C

Sieve Analysis

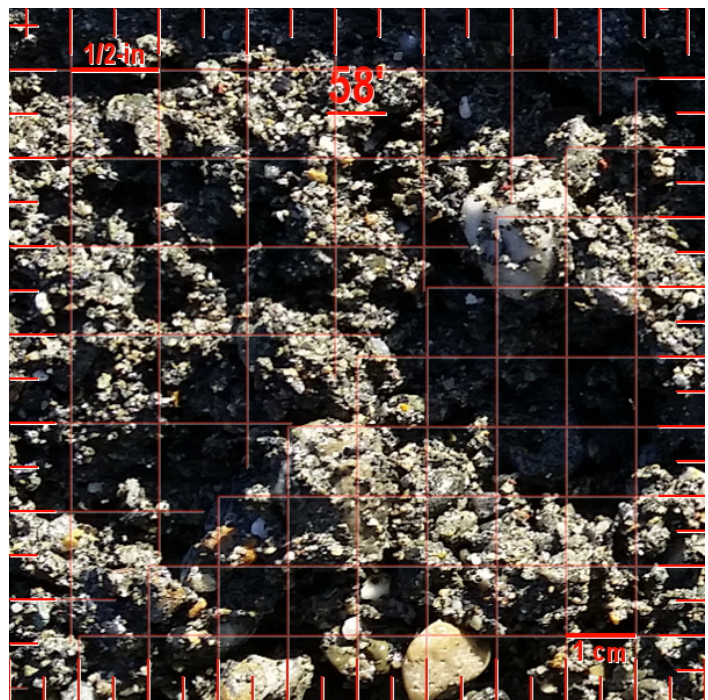
58 ft

Sample: LHC 58 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Gravelly sand

40% passing: 1.1 mm / 42.8 thou of an inch
Comments: 28.5% Gravel – 69.9% Sand – 1.6% Silt



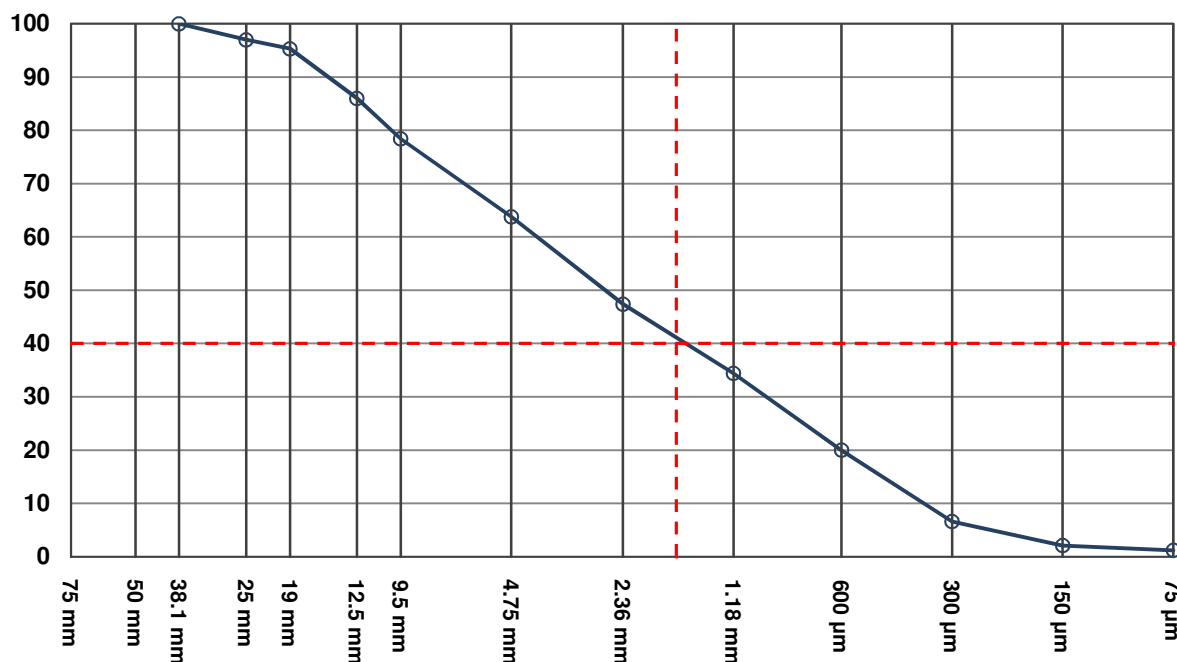
	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	100.0
	25 mm	93.8
	19 mm	91.4
	12.5 mm	87.0
Sand Sizes and Fine	9.5 mm	83.7
	4.75 mm	74.5
	2.36 mm	56.8
	1.18 mm	42.7
	600 µm	26.0
	300 µm	9.4
	150 µm	2.8
	75 µm	1.6



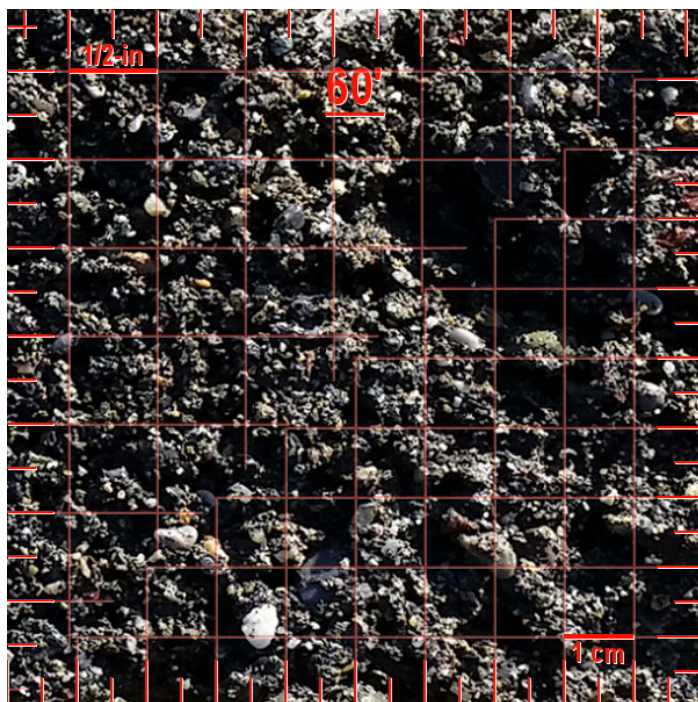
60 ft

Sample: LHC 60 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Sand and gravel

40% passing: 1.7 mm / 66.5 thou of an inch
Comments: 36.2% Gravel – 62.6% Sand – 1.2% Silt



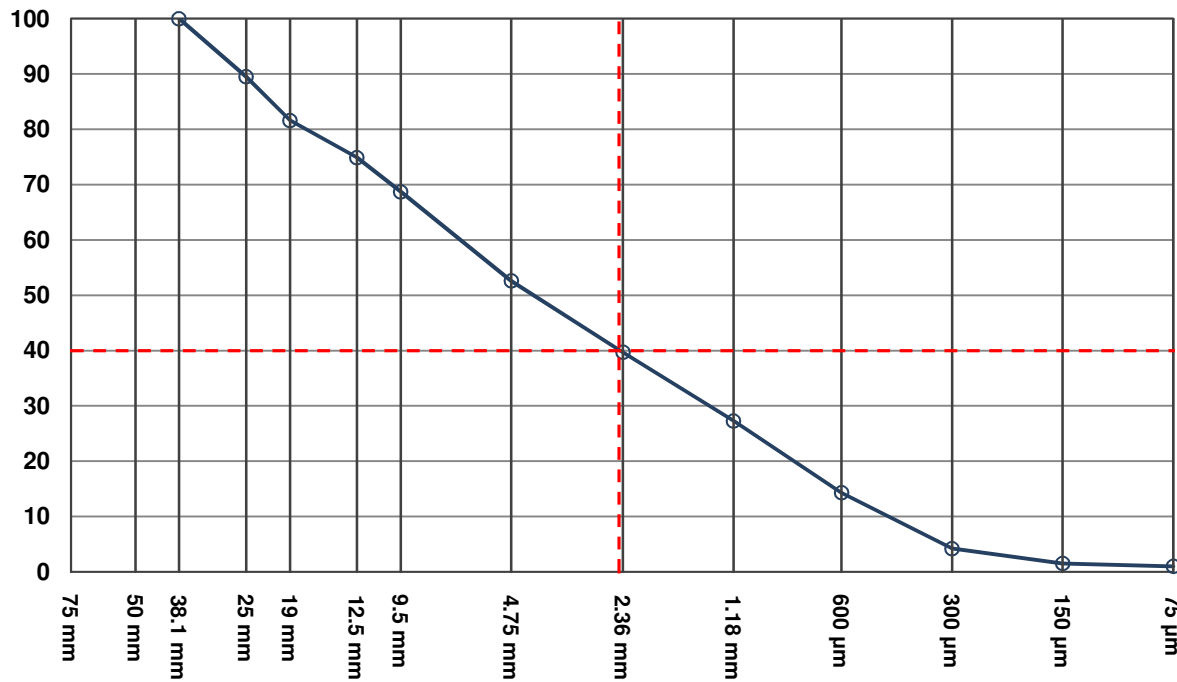
	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	100.0
	25 mm	97.0
	19 mm	95.3
	12.5 mm	86.0
Sand Sizes and Fine	9.5 mm	78.4
	4.75 mm	63.8
	2.36 mm	47.4
	1.18 mm	34.4
	600 µm	20.0
	300 µm	6.6
	150 µm	2.1
	75 µm	1.2



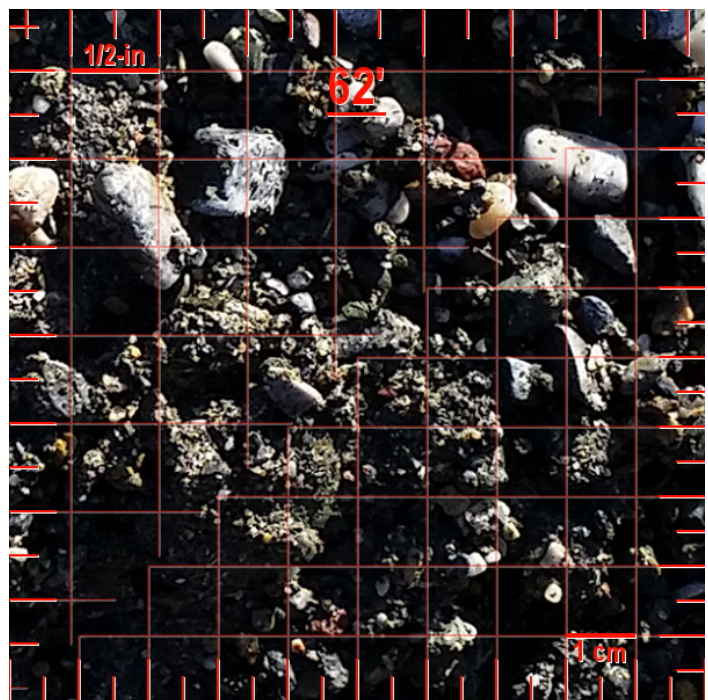
62 ft

Sample: LHC 62 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Sand and gravel

40% passing: 2.4 mm / 95.1 thou of an inch
Comments: 47.4% Gravel – 51.6% Sand – 1.0% Silt



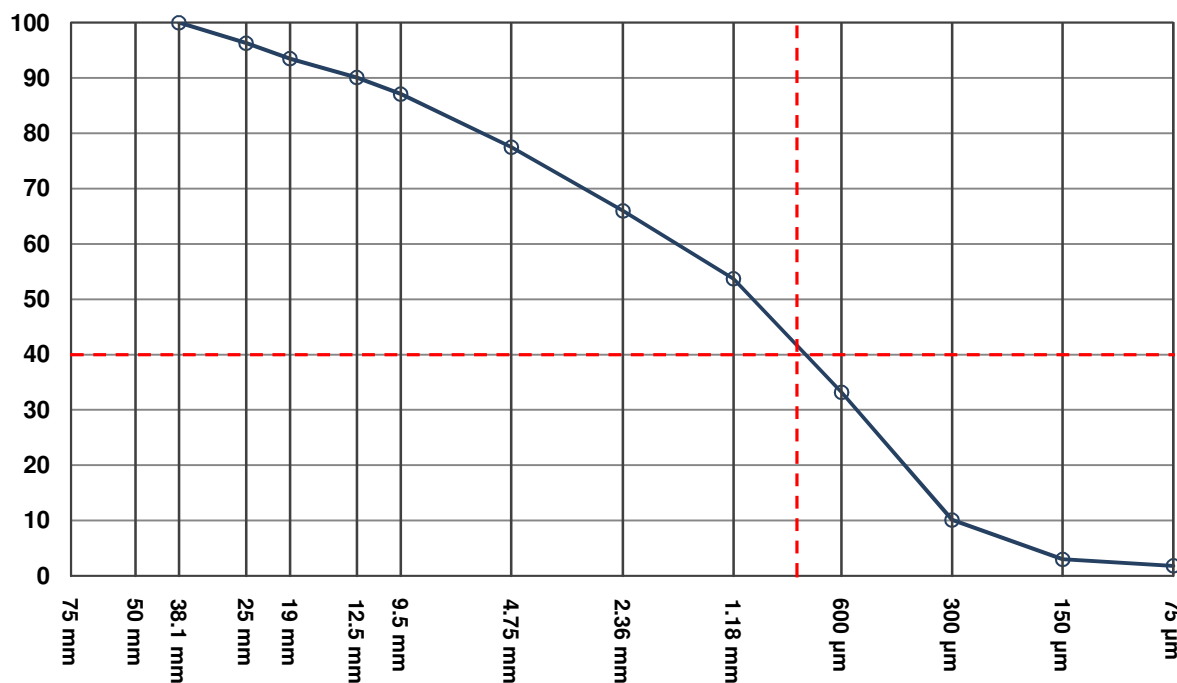
	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	100.0
	25 mm	89.5
	19 mm	81.6
	12.5 mm	74.9
Sand Sizes and Fine	9.5 mm	68.7
	4.75 mm	52.6
	2.36 mm	39.7
	1.18 mm	27.3
	600 µm	14.3
	300 µm	4.2
	150 µm	1.5
	75 µm	1.0



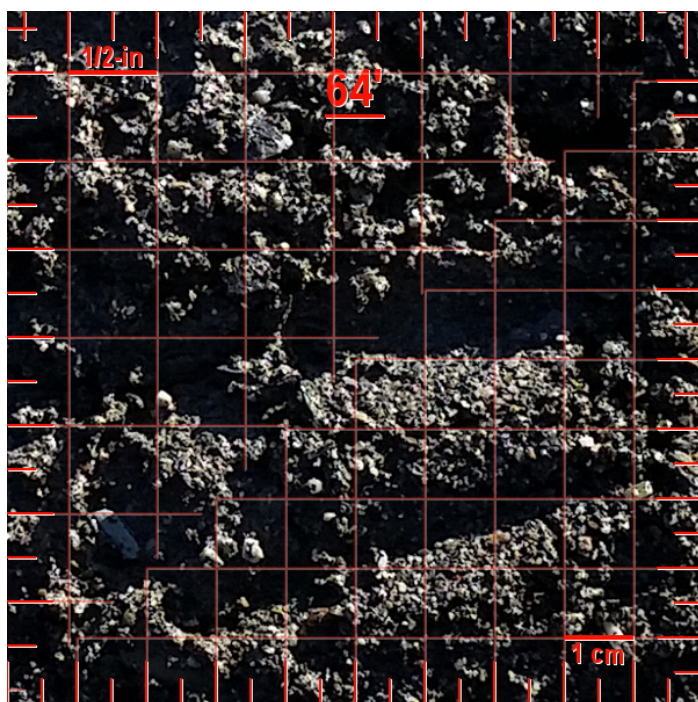
64 ft

Sample: LHC 64 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Gravelly sand, trace silt

40% passing: 0.8 mm / 31.2 thou of an inch
Comments: 22.5% Gravel – 75.7% Sand – 1.8% Silt



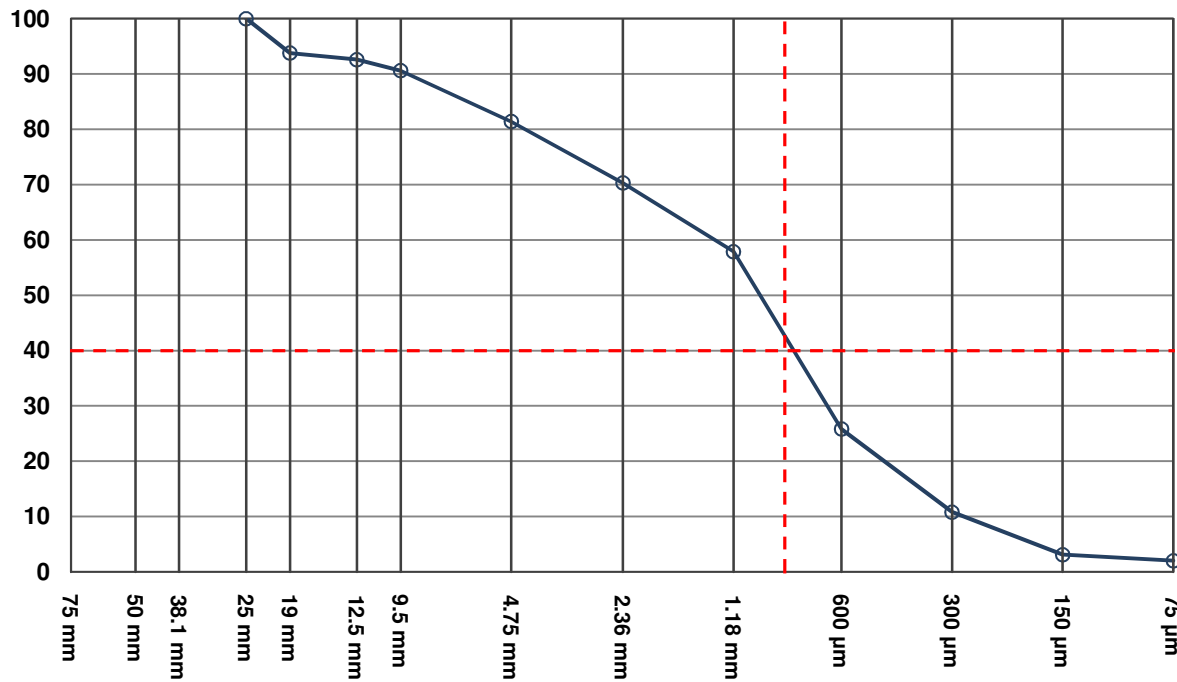
	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	100.0
	25 mm	96.3
	19 mm	93.5
	12.5 mm	90.1
Sand Sizes and Fine	9.5 mm	87.1
	4.75 mm	77.5
	2.36 mm	66.0
	1.18 mm	53.7
	600 µm	33.2
	300 µm	10.1
	150 µm	3.0
	75 µm	2.0



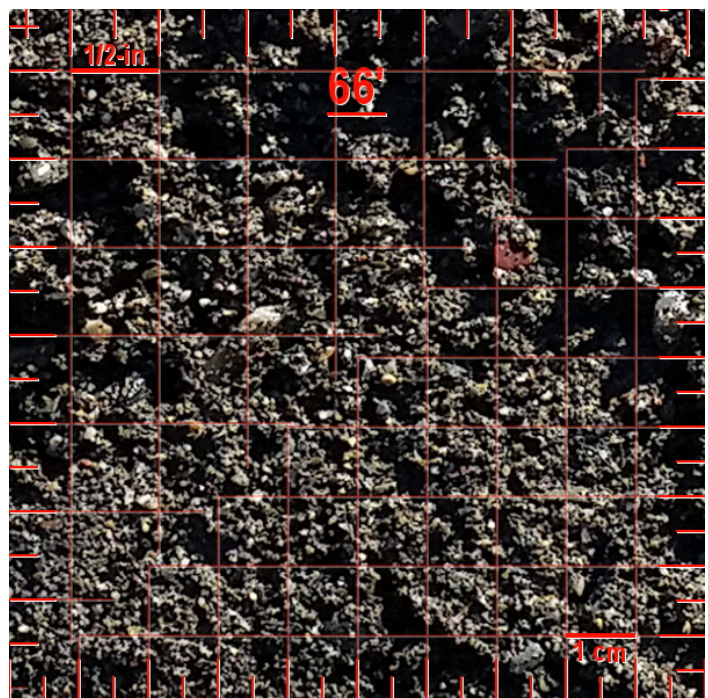
66 ft

Sample: LHC 66 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Sand, some gravel, trace silt

40% passing: 0.9 mm / 33.7 thou of an inch
Comments: 18.6% Gravel – 79.4% Sand – 2.0% Silt



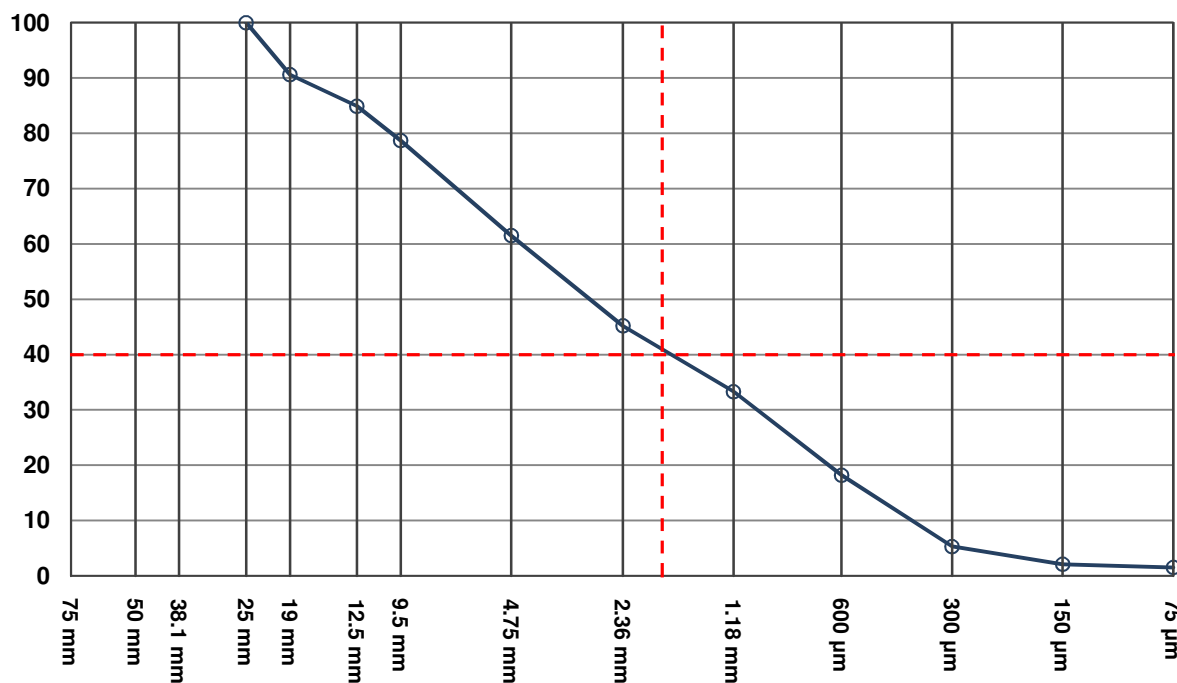
	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	-
	25 mm	100.0
	19 mm	93.8
	12.5 mm	92.6
Sand Sizes and Fine	9.5 mm	90.6
	4.75 mm	81.4
	2.36 mm	70.3
	1.18 mm	57.9
	600 µm	25.8
	300 µm	10.8
	150 µm	3.1
	75 µm	2.0



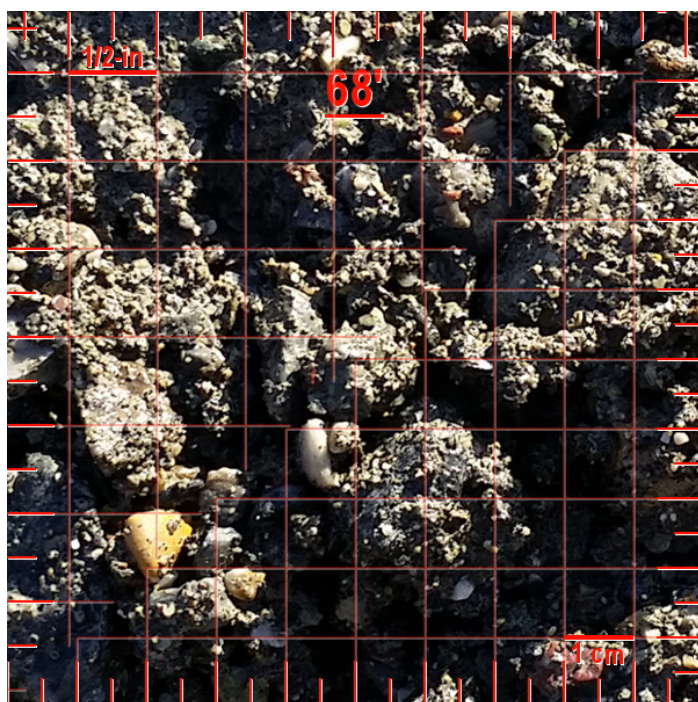
68 ft

Sample: LHC 68 ft
Tested by: Exp Services Inc.
Date sampled: 18-11-2015
Material type: Sand and gravel

40% passing: 1.8 mm / 72.6 thou of an inch
Comments: 38.5% Gravel – 60.0% Sand – 1.5% Silt



	Particle Size	Percent Passing
Gravel Sizes	75 mm	-
	50 mm	-
	38.1 mm	-
	25 mm	100.0
	19 mm	90.6
	12.5 mm	84.9
Sand Sizes and Fine	9.5 mm	78.7
	4.75 mm	61.5
	2.36 mm	45.2
	1.18 mm	33.3
	600 µm	18.2
	300 µm	5.3
	150 µm	2.1
	75 µm	1.5



APPENDIX D

Pumping Test Manual Data

PUMPING TEST DATA – Production Well ID.39845

PROJECT:	Clinton Crystal Bottling Co	REFERENCE POINT:	N/A
PROJECT No.:	1533	GROUND ELEVATION:	914.0 m
DATE:	27-11-2015	PUMP INTAKE DEPTH:	N/A
WELL ID. PLATE No.:	39845	STATIC WATER LEVEL:	10.605 m
WELL REF:	Production well	END PUMPING LEVEL:	12.232 m
PUMPING CONTRACTOR:	N/A	END RECOVERY LEVEL:	10.891 m
CLIENT:	Clinton Crystal Bottling	DEPTH TO SCREEN:	18.300 m

Time	Elapsed Time t [min]	Time since recovery started t' [min]	Ratio t/t'	Water level [m]	Drawdown [m]	Pumping Rate [USgpm]
9:00	0	-	-	10.605	0.000	
	1	-	-	11.590	0.985	300
	2	-	-	11.543	0.938	
	3	-	-	11.551	0.946	170
	4	-	-	11.553	0.948	
	5	-	-	11.560	0.955	
	6	-	-	11.557	0.952	
	7	-	-	11.557	0.952	
	8	-	-	11.560	0.955	
	9	-	-	11.561	0.956	
	10	-	-	11.564	0.959	
	12	-	-	11.566	0.961	
	14	-	-	11.568	0.963	
	16	-	-	11.569	0.964	
	18	-	-	11.570	0.965	
	20	-	-	11.573	0.968	
	25	-	-	11.573	0.968	
	30	-	-	11.575	0.970	
	35	-	-	11.578	0.973	
	40	-	-	11.580	0.975	
	45	-	-	11.585	0.980	
	50	-	-	11.587	0.982	
	60	-	-	11.592	0.987	
	70	-	-	11.597	0.992	
	80	-	-	11.601	0.996	
	90	-	-	11.605	1.000	
	100	-	-	11.608	1.003	
	110	-	-	11.611	1.006	
	120	-	-	11.613	1.008	
	150	-	-	11.625	1.020	
	180	-	-	11.637	1.032	
	210	-	-	11.645	1.040	
	240	-	-	11.654	1.049	
	270	-	-	11.658	1.053	
	300	-	-	11.840	1.235	200
	330	-	-	11.846	1.241	

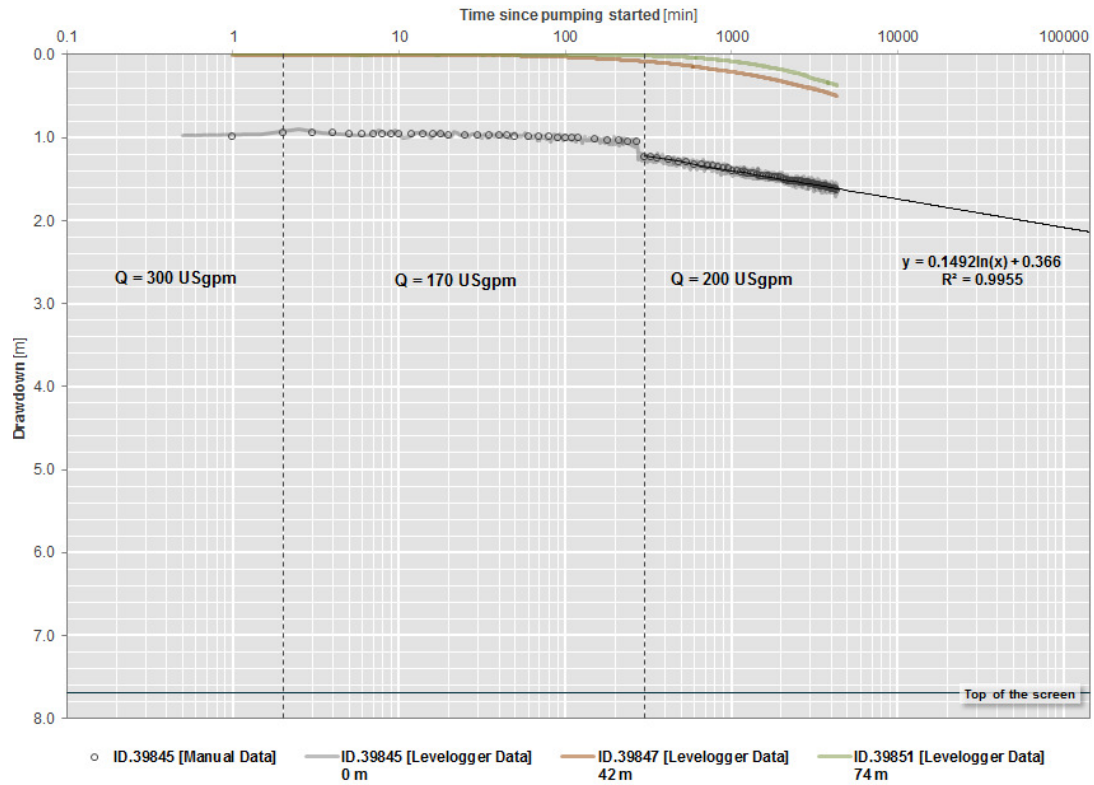
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Continued						
Time	Elapsed Time t [min]	Time since recovery started t' [min]	Ratio t/t'	Water level [m]	Drawdown [m]	Pumping Rate [USgpm]
	360	-	-	11.862	1.257	
	420	-	-	11.877	1.272	
	480	-	-	11.898	1.293	
	540	-	-	11.908	1.303	
	600	-	-	11.934	1.329	
	660	-	-	11.939	1.334	
	720	-	-	11.945	1.340	
	780	-	-	11.954	1.349	
	840	-	-	11.960	1.355	
	900	-	-	11.975	1.370	
	960	-	-	11.982	1.377	
	1020	-	-	12.007	1.402	
	1080	-	-	12.015	1.410	
	1140	-	-	12.024	1.419	
	1200	-	-	12.030	1.425	
	1260	-	-	12.037	1.432	
	1320	-	-	12.045	1.440	
	1380	-	-	12.044	1.439	
	1440	-	-	12.058	1.453	
	1500	-	-	12.063	1.458	
	1560	-	-	12.067	1.462	
	1620	-	-	12.072	1.467	
	1680	-	-	12.065	1.460	
	1740	-	-	12.079	1.474	
	1800	-	-	12.086	1.481	
	1860	-	-	12.087	1.482	
	1920	-	-	12.092	1.487	
	1980	-	-	12.092	1.487	
	2040	-	-	12.093	1.488	
	2100	-	-	12.119	1.514	
	2160	-	-	12.123	1.518	
	2220	-	-	12.125	1.520	
	2280	-	-	12.127	1.522	
	2340	-	-	12.131	1.526	
	2400	-	-	12.135	1.530	
	2460	-	-	12.138	1.533	
	2520	-	-	12.137	1.532	
	2580	-	-	12.139	1.534	
	2640	-	-	12.135	1.530	
	2700	-	-	12.152	1.547	
	2760	-	-	12.151	1.546	
	2820	-	-	12.151	1.546	
	2880	-	-	12.152	1.547	
	2940	-	-	12.152	1.547	
	3000	-	-	12.163	1.558	
Follows on next page						

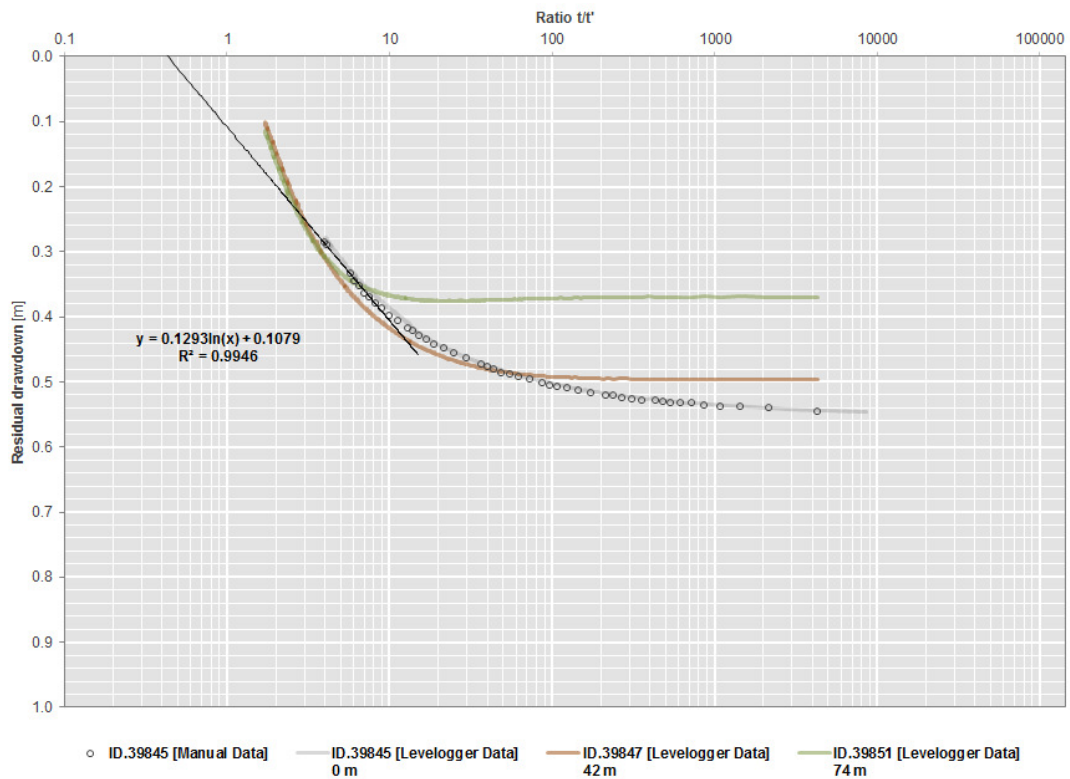
Continued						
Time	Elapsed Time t [min]	Time since recovery started t' [min]	Ratio t/t'	Water level [m]	Drawdown [m]	Pumping Rate [USgpm]
9:00	3060	-	-	12.168	1.563	
	3120	-	-	12.169	1.564	
	3180	-	-	12.170	1.565	
	3240	-	-	12.179	1.574	
	3300	-	-	12.181	1.576	
	3360	-	-	12.182	1.577	
	3420	-	-	12.186	1.581	
	3480	-	-	12.188	1.583	
	3540	-	-	12.190	1.585	
	3600	-	-	12.193	1.588	
	3660	-	-	12.198	1.593	
	3720	-	-	12.199	1.594	
	3780	-	-	12.205	1.600	
	3840	-	-	12.211	1.606	
	3900	-	-	12.213	1.608	
	3960	-	-	12.214	1.609	
	4020	-	-	12.219	1.614	
	4080	-	-	12.219	1.614	
	4140	-	-	12.223	1.618	
	4200	-	-	12.226	1.621	
	4260	-	-	12.221	1.616	
	4320	-	-	12.232	1.627	
End of pumping - Beginning of recovery						
	4321	1	4321.0	11.151	0.546	0
	4322	2	2161.0	11.145	0.540	
	4323	3	1441.0	11.143	0.538	
	4324	4	1081.0	11.143	0.538	
	4325	5	865.0	11.141	0.536	
	4326	6	721.0	11.137	0.532	
	4327	7	618.1	11.137	0.532	
	4328	8	541.0	11.137	0.532	
	4329	9	481.0	11.135	0.530	
	4330	10	433.0	11.134	0.529	
	4332	12	361.0	11.133	0.528	
	4334	14	309.6	11.132	0.527	
	4336	16	271.0	11.130	0.525	
	4338	18	241.0	11.127	0.522	
	4340	20	217.0	11.127	0.522	
	4345	25	173.8	11.123	0.518	
	4350	30	145.0	11.118	0.513	
	4355	35	124.4	11.114	0.509	
	4360	40	109.0	11.113	0.508	
	4365	45	97.0	11.111	0.506	
	4370	50	87.4	11.107	0.502	
	4380	60	73.0	11.102	0.497	
Follows on next page						

Continued						
Time	Elapsed Time t [min]	Time since recovery started t' [min]	Ratio t/t'	Water level [m]	Drawdown [m]	Pumping Rate [USgpm]
	4390	70	62.7	11.098	0.493	
	4400	80	55.0	11.094	0.489	
	4410	90	49.0	11.091	0.486	
	4420	100	44.2	11.086	0.481	
	4430	110	40.3	11.083	0.478	
	4440	120	37.0	11.079	0.474	
	4470	150	29.8	11.069	0.464	
	4500	180	25.0	11.061	0.456	
	4530	210	21.6	11.053	0.448	
	4560	240	19.0	11.048	0.443	
	4590	270	17.0	11.040	0.435	
	4620	300	15.4	11.034	0.429	
	4650	330	14.1	11.027	0.422	
	4680	360	13.0	11.023	0.418	
	4740	420	11.3	11.011	0.406	
	4800	480	10.0	11.003	0.398	
	4860	540	9.0	10.992	0.387	
	4920	600	8.2	10.985	0.380	
	4980	660	7.5	10.975	0.370	
	5040	720	7.0	10.969	0.364	
	5100	780	6.5	10.957	0.352	
	5160	840	6.1	10.950	0.345	
	5220	900	5.8	10.939	0.334	
	5700	1380	4.1	10.895	0.290	
	5760	1440	4.0	10.891	0.286	
END OF TEST						

GRAPH 1: Drawdown vs. Time
Production Well ID.39845



GRAPH 2: Residual drawdown vs. ratio t/t'
Production Well ID.39845



APPENDIX E

Water Quality Results



CASH CLIENT - KAMLOOPS
Ian Chadwick
Unit 204 1139 12th St
Kamloops BC V2B 7Z2
ATTN: EHD Consulting

Date: 09-DEC-15
PO No.:
WO No.: L1708191
Project Ref: CRYSTAL CLINTON BOTTLING LTD
Sample ID: CRYSTAL CLINTON BOTTLING LTD
Sampled By: Lloyd Ingram
Date Collected: 30-NOV-15
Lab Sample ID: L1708191-1
Matrix: Water

PAGE 1 of 4

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Physical Tests						
Colour, True	<5.0		CU			01-DEC-15
Conductivity	1420		uS/cm			01-DEC-15
Hardness (as CaCO ₃)	770		mg/L		500	03-DEC-15
Langelier Index Temperature	8.3		C			03-DEC-15
Langelier Index	0.67		none			07-DEC-15
pH	8.04		pH		6.5-8.5	01-DEC-15
Total Dissolved Solids	882		mg/L		500	02-DEC-15
Transmittance, UV (254 nm)	95.7		% T			01-DEC-15
Turbidity	0.11		NTU	0.1		01-DEC-15
Anions and Nutrients						
Alkalinity, Bicarbonate (as CaCO ₃)	390		mg/L			01-DEC-15
Alkalinity, Carbonate (as CaCO ₃)	<1.0		mg/L			01-DEC-15
Alkalinity, Hydroxide (as CaCO ₃)	<1.0		mg/L			01-DEC-15
Alkalinity, Total (as CaCO ₃)	390		mg/L			01-DEC-15
Ammonia, Total (as N)	0.0191		mg/L			05-DEC-15
Bromide (Br)	<0.25	DLDS	mg/L			01-DEC-15
Chloride (Cl)	86.6		mg/L		250	01-DEC-15
Fluoride (F)	0.23		mg/L	1.5		01-DEC-15
Nitrate (as N)	0.309		mg/L	10		01-DEC-15
Nitrite (as N)	0.0197		mg/L	1		01-DEC-15
Total Kjeldahl Nitrogen	0.122		mg/L			03-DEC-15
Total Organic Nitrogen	0.103		mg/L			07-DEC-15
Phosphorus (P)-Total	0.0429		mg/L			02-DEC-15
Sulfate (SO ₄)	300		mg/L		500	01-DEC-15
Sulphide as S	<0.020		mg/L		0.05	01-DEC-15
Anion Sum	16.5		meq/L			07-DEC-15
Cation Sum	17.4		meq/L			07-DEC-15
Cation - Anion Balance	2.5		%			07-DEC-15
Cyanides						
Cyanide, Total	<0.0050		mg/L	0.2		02-DEC-15
Organic / Inorganic Carbon						
Total Organic Carbon	1.55		mg/L			01-DEC-15
Bacteriological Tests						
E. coli	<1		CFU/100mL	0		30-NOV-15
Background colonies	<1		CFU/100mL			30-NOV-15
Coliform Bacteria - Total	<1		CFU/100mL	0		30-NOV-15
Total Metals						
Aluminum (Al)-Total	<0.010		mg/L		0.1	02-DEC-15
Antimony (Sb)-Total	<0.00050		mg/L	0.006		02-DEC-15
Arsenic (As)-Total	0.00106		mg/L	0.01		02-DEC-15
Barium (Ba)-Total	0.017		mg/L	1		02-DEC-15

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CASH CLIENT - KAMLOOPS
Ian Chadwick
Unit 204 1139 12th St
Kamloops BC V2B 7Z2
ATTN: EHD Consulting

Date: 09-DEC-15
PO No.:
WO No.: L1708191
Project Ref: CRYSTAL CLINTON BOTTLING LTD
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Sampled By: Lloyd Ingram
Date Collected: 30-NOV-15
Lab Sample ID: L1708191-1
Matrix: Water

PAGE 2 of 4

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Beryllium (Be)-Total	<0.0050		mg/L			02-DEC-15
Bismuth (Bi)-Total	<0.20		mg/L			02-DEC-15
Boron (B)-Total	<0.10		mg/L	5		02-DEC-15
Cadmium (Cd)-Total	<0.00020		mg/L	0.005		02-DEC-15
Calcium (Ca)-Total	60.4		mg/L			02-DEC-15
Chromium (Cr)-Total	<0.0020		mg/L	0.05		02-DEC-15
Cobalt (Co)-Total	<0.010		mg/L			02-DEC-15
Copper (Cu)-Total	0.0019		mg/L		1.0	02-DEC-15
Iron (Fe)-Total	<0.030		mg/L		0.3	02-DEC-15
Lead (Pb)-Total	<0.00050		mg/L	0.01		02-DEC-15
Lithium (Li)-Total	0.010		mg/L			02-DEC-15
Magnesium (Mg)-Total	150		mg/L			02-DEC-15
Manganese (Mn)-Total	0.455		mg/L		0.05	02-DEC-15
Mercury (Hg)-Total	<0.00020		mg/L	0.001		02-DEC-15
Molybdenum (Mo)-Total	<0.030		mg/L			02-DEC-15
Nickel (Ni)-Total	<0.050		mg/L			02-DEC-15
Phosphorus (P)-Total	<0.30		mg/L			02-DEC-15
Potassium (K)-Total	5.47		mg/L			02-DEC-15
Selenium (Se)-Total	0.0079		mg/L	0.05		02-DEC-15
Silicon (Si)-Total	14.5		mg/L			02-DEC-15
Silver (Ag)-Total	<0.010		mg/L			02-DEC-15
Sodium (Na)-Total	42.1		mg/L		200	02-DEC-15
Strontium (Sr)-Total	0.199		mg/L			02-DEC-15
Thallium (Tl)-Total	<0.20		mg/L			02-DEC-15
Tin (Sn)-Total	<0.030		mg/L			02-DEC-15
Titanium (Ti)-Total	<0.010		mg/L			02-DEC-15
Uranium (U)-Total	0.00288		mg/L	0.02		02-DEC-15
Vanadium (V)-Total	<0.030		mg/L			02-DEC-15
Zinc (Zn)-Total	0.0104		mg/L		5.0	02-DEC-15

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CASH CLIENT - KAMLOOPS
Ian Chadwick
Unit 204 1139 12th St
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Date: 09-DEC-15
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Matrix: Water

PAGE 3 of 4

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated OCTOBER 2014 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by  Amanda Lampreau Account Manager						

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter rationing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure of capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Page 4 of 1

Report To Company: <u>EHD Consulting P. Eng.</u> Contact: <u>Ian Chadwick</u> Address: <u>Unit 304 1139 125t Kamloops ac v28 722</u> Phone: <u>250 434 4519</u>		Report Format / Distribution Select Report Format: ☒ PDF ☐ EXCEL ☐ EDD (ODATA) Quality Control (QC) Report with Report: ☐ Yes ☐ No Criteria on Report - provide details below if box checked Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX Email 1 or Fax: <u>Ehdconsulting@shaw.ca</u> Email 2:	
Invoice To Same as Report To: ☒ Yes ☐ No Copy of Invoice with Report: ☒ Yes ☐ No		Invoice Distribution Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX Email 1 or Fax:	
Company: Project Information ALS Quote #: <u>17108191</u> Job #: <u>17108191</u> PO / A/E: <u>17108191</u> Location: <u>Crystal Clinton Bottling Ltd.</u>		Approval: Approved (ID# 5016, 201325) by <u>ALS Contact: 05 not signed yet</u> GL Account: <u>05 not signed yet</u> Activity Code: <u>05 not signed yet</u> Location: <u>21A rd 406/072</u>	
ALS Lab Work Order # (lab use only) <u>17108191</u>		ALS Contact: Date: <u>30.11.15</u> Time: <u>8:45am</u>	
ALS Sample # (lab use only) Sample Identification and/or Coordinates (This description will appear on the report) <u>Crystal Clinton Bottling Ltd.</u>		Sample Type <u>Well tag # 39845 8' well</u> <u>Water temp 8.3 C</u>	
Drinking Water (DW) Samples (client use) Are samples taken from a Regulated DW System? ☐ Yes ☒ No Are samples for human drinking water use? ☒ Yes ☐ No		Special Instructions / Specify Criteria to add on report (client use) <u>Paid in full by cheque.</u>	
Released by: <u>[Signature]</u> Date: <u>Nov. 10.15</u> Time: <u>10:20am</u>		Received by: <u>[Signature]</u> Date: <u>30-Nov-15</u> Time: <u>10:20</u>	
SHIPMENT RELEASE (client use) Date: <u>Nov. 10.15</u> Time: <u>10:20am</u>		INITIAL SHIPMENT RECEPTION (lab use only) Date: <u>30-Nov-15</u> Time: <u>10:20</u>	
WHITE - LABORATORY COPY Yellow - CLIENT COPY		WHITE - LABORATORY COPY Yellow - CLIENT COPY	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY by the use of this form the user acknowledges and agrees with the terms and conditions as specified on the back page of the white - report copy.
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.