

File: 2006161

February 9, 2021

Dion Whyte
Director, Small Communities Initiative
New Commons Development

Attention: Dion Whyte

Re: Results of 2020 Pump Testing of Bedrock Well WID 23204 (WTN 91453) at 409 Porlier Pass Road, Galiano Island

Further to the submission of the water licence application for well WID 23204 at the above property, a 72.5 hour pumping test was carried out on the well from October 16 to October 19, 2020 to verify the well performance during the early fall. The well had been previously tested in late November 2018 (Kohut, 2020a).

This report summarizes the results of the latest pump testing and observed interference effects on the closest neighbouring well. Just prior to this, monitoring of water levels in well WID 23204 from July 31 to October 5, 2020 (Kohut, 2020b) showed daily interference effects of about 1 m from neighbouring wells with some periodic effects up to 4 m observed (Figure 1). This report augments the two previous reports by Kohut (2020a and 2020b).

2020 Pumping Test Procedures

The project well WID 23204 was pump tested by Red Williams Well Drilling Ltd., for 72.5 hours from October 16 to October 19, 2020. Pumped water was discharged down slope 61 m (200 feet) away from the wellhead towards the west. Manual water level readings were taken in the project well during the test at prescribed intervals (Ministry of Environment, 2010) and a Heron Instruments Inc., *dipperLog* transducer set in the well recorded water levels at one minute intervals. A Heron Instruments Inc., *barLog* barometric logger was also employed on site during the test.

Water levels in the closest neighbouring well WID 12920 at the *Galiano Housing Society* complex were also monitored manually at periodic intervals during the pumping test and with a Heron Instruments Inc., *dipperLog* transducer set in the well to record water levels at one minute intervals. WID 12920 continued to operate during the pump testing of the project well. Distance between the two wells is approximately 90 m.

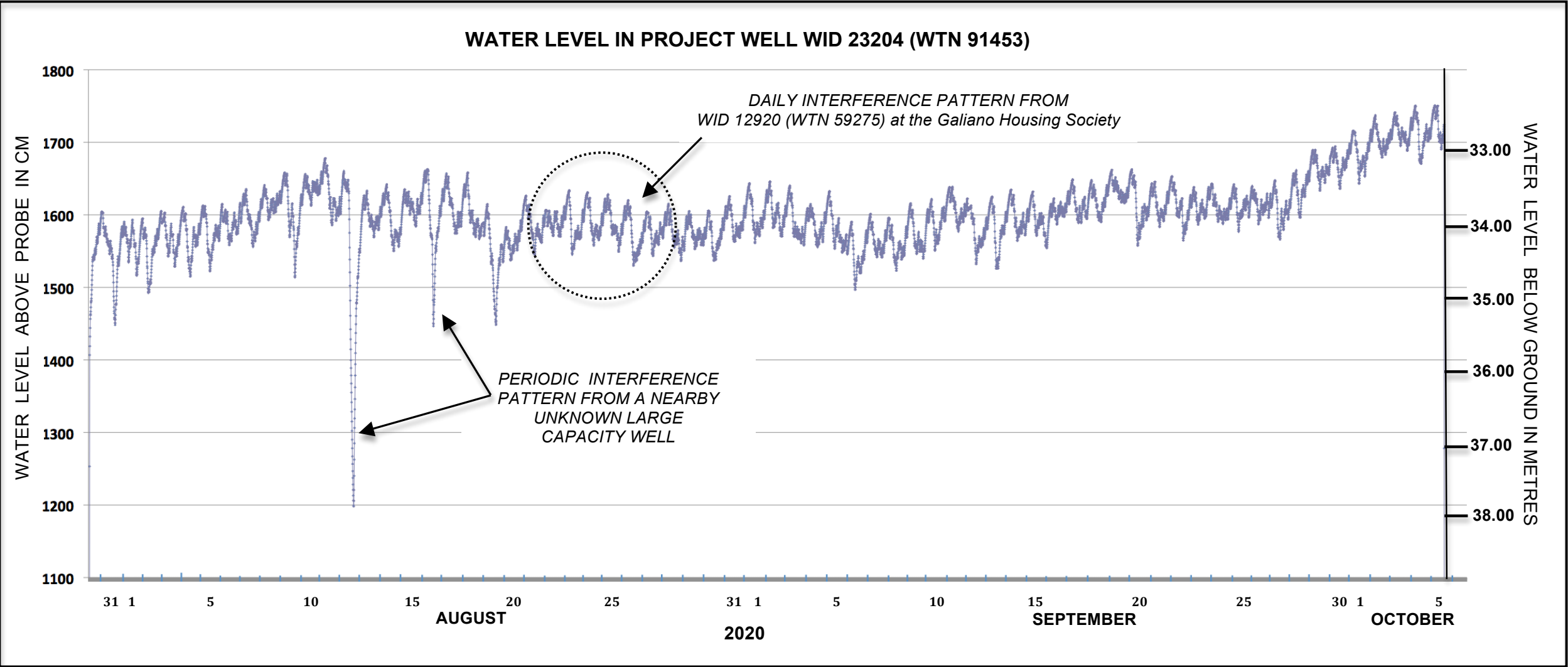


Figure 1. Water level in project well showing daily interference effects, primarily from the neighbouring well at Galiano Housing Society and possibly other wells including periodic major effects from an unknown large capacity well.

Upon pump shutdown, recovery water level were taken manually at prescribed intervals for 6 hours in well WID 23204 and for a further 18 hours with the installed transducer. Recovery in well WID 12920 was measured manually for 6 hours and for a further 18.5 hours with the installed transducer

Water samples were taken from the project well near the end of the test and delivered within 20 hours of sampling with ice packs to the *Bureau Veritas* laboratory in Esquimalt for analysis of chemical and bacteriological parameters. One of the samples was also field filtered by A. Kohut for determination of dissolved metals. All samples were unadulterated and taken from the project well and delivered to the laboratory by A. Kohut.

Precipitation in 2020 as observed at climate station 1015638 on North Pender Island for several months prior to the pumping test was slightly below normal as shown in Table 1. September precipitation, however, was well above normal. Between September 21 and September 24, 53.8 mm of precipitation were recorded that may have contributed to a rising water level trend in WID 23204 beginning September 30 along with reduced water demands in the region (Figure 1). For the ten day period prior to the test, 51.2 mm of precipitation was recorded and during the test 19 mm of precipitation was recorded. The non-pumping water level in WID 23204 at the start of the pumping test was 32.48 m below ground, within the range of water levels (32.5 to 33.0 m) observed at the well on October 5, 2020 (Figure 1). This suggests that the precipitation that occurred in October prior to the test did not have a significant recharge effect on water levels at the well. The non-pumping water level at the start of the 2020 test was also similar to the non-pumping water level of 32.2 m observed in 2018 (Kohut 2020a). Regional water level trend data from the Provincial Observation Well 258 on Galiano Island for September and October 2020 was not available to compare with the above data.

Table 1. Monthly 2020 precipitation data for North Pender climate station (ID.1015638) compared to 1981-2010 normals for Mayne Island.

Month	Precipitation in 2020 (mm)	Monthly Precipitation Normal (mm)	Percent of Normal	Cumulative Percent of Normal
January	191.6	129.9	147.5	147.5
February	74.6	87.7	85.1	122.3
March	38.6	75.4	51.2	104.0
April	29.2	55.3	52.8	95.9
May	50.4	44	114.5	98.0
June	37.8	36.9	102.4	98.2
July	20.3	21.2	95.8	95.8
August	21.3	23.8	89.5	97.8
September	66.2	28	236.4	105.5
October	80.4	79.9	100.6	108.4

Data from Government of Canada (2020a and 2020b).

Prior to the pumping test, the water level trend at Observation Well 258 was average from May to August 2020. Highest recharge levels normally occur from November to May (Figure 2).

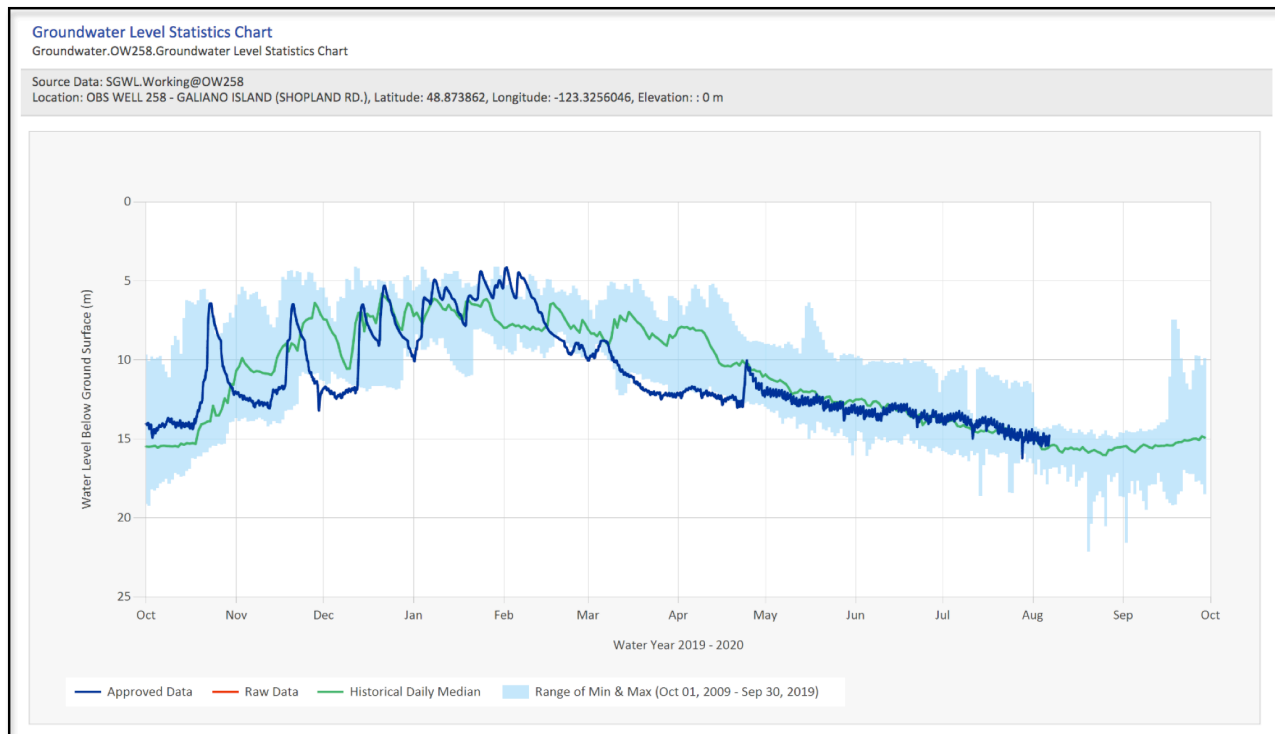


Figure 2. Seasonal water level trends at Observation Well 250, from Province of British Columbia (2020a).

Discussion of Results

Well test data, drawdown and recovery plots for the project well WID 23204 are provided in Appendix A. Appendix B shows the drawdown plots of 2018 and 2020 for comparison. Appendix C contains a copy of the analytical laboratory report from *Bureau Veritas*.

Pumping Test

The pumping test was started at 9:00 am on October 16 and ended at 9:28 am on October 19. Figure 3 shows the drawdown in the project well during pumping. Flow was measured manually using a 19.53 L (5.16 US gallon) jug and with a flow meter. The pumping rate was held at an average rate of 12.30 L/min (3.25 USgpm) for the duration of the test varying less than 3.5 percent for the greater portion of the test (Figure 4).

After 6 hours of pumping the water showed signs of stabilizing and then began fluctuating over a range of 1 to 2 metres most likely due to interference effects from neighbouring wells, particularly well WID 12920. Similar effects were noted during the 2018 test (see Appendix B). Near stabilization of water levels in 2020 and in 2018 suggests the capture zone likely encountered a zone of higher hydraulic conductivity.

Drawdown in the project well at the end of the test with interference effects was 16.117 m indicating a specific capacity of 0.202 USgpm per metre of drawdown based on an overall average pumping rate of 12.30L/min (3.25 USgpm). Approximately 50% of the available drawdown (32.14 m) to the major water bearing fracture at a depth of 64.62 m (212 feet) in the well was utilized during the test.

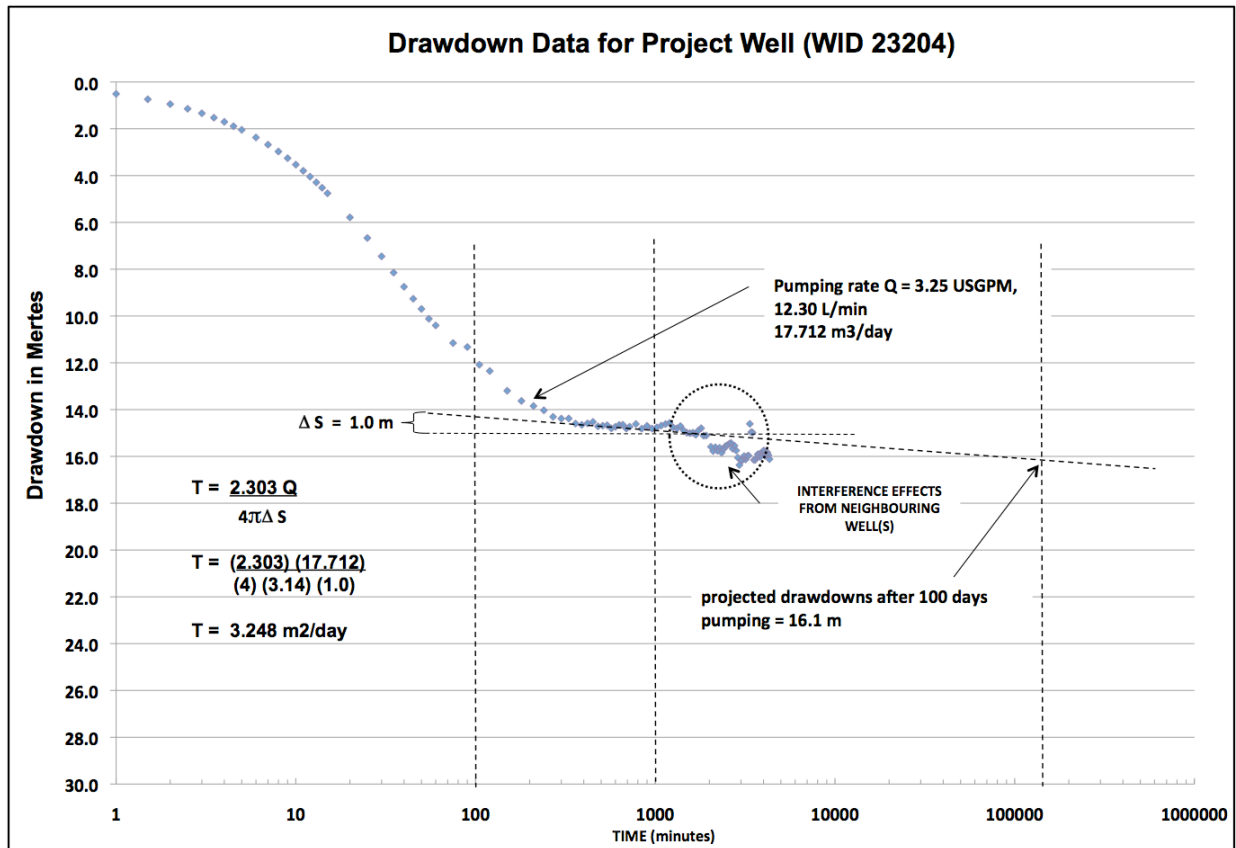


Figure 3. Semi-logarithmic drawdown plot for project well during 72.5 hour test.

Extrapolating the drawdown trend to 100 days pumping *without the interference effects* would result in a 100 day drawdown of 16.1 m. It is evident from these results that the well would be capable of sustaining a long-term yield of 3.25 USgpm with a 50% drawdown safety factor. Transmissivity of the aquifer estimated from the drawdown slope prior to the interference effects was 3.248 m²/day (Figure 3).

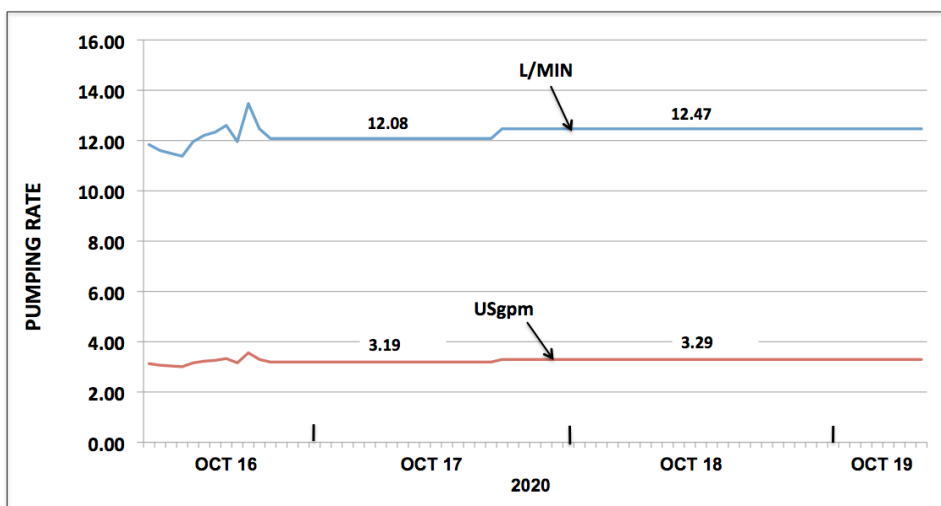


Figure 4. Plot of pumping rate during 72.5 hour test.

Interference of approximately 5.41 m was recorded in the nearby observation well WID 12920 during the test as shown in Figure 5. When pumping, the water level in WID 12920 fluctuated over a range up to 6 metres between pumping cycles.

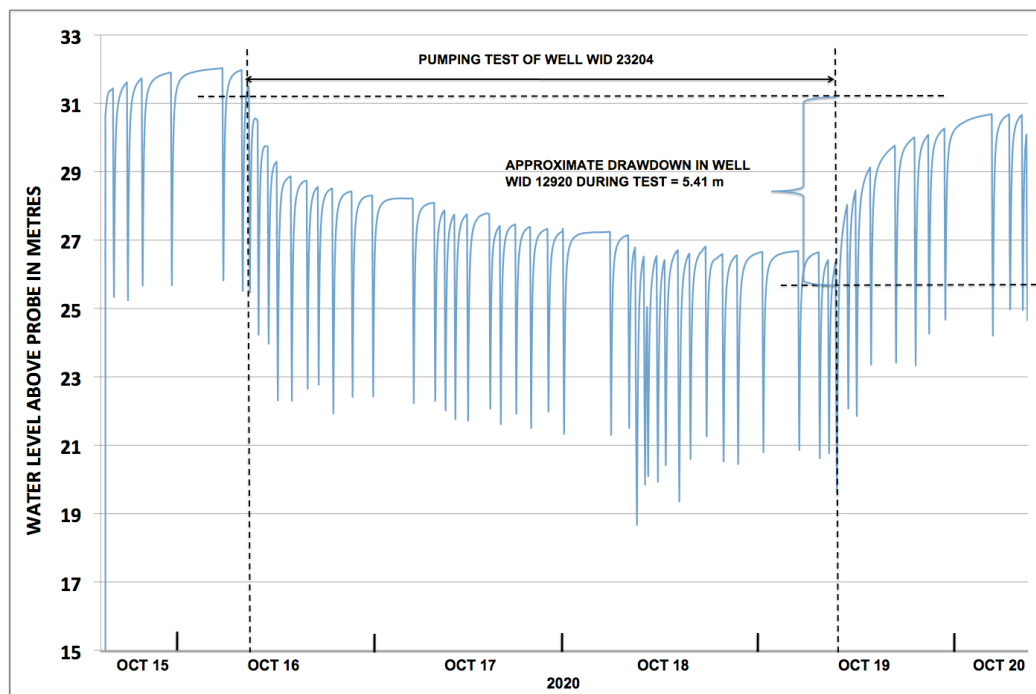


Figure 5. Water level fluctuation in observation well WID 12920 during 72.5 hour pumping test of WID 23204.

Water level recovery in WID 23204 was 94.4 percent complete 360 minutes after pump shutdown (Figure A2, Appendix A).

A distance drawdown plot based on the data from the pumping test (Figure 6) indicates zero drawdown would theoretically occur about 12000 metres from the pumped well after 72 hours pumping at 12.30 L/min considering a transmissivity value of 3.248 m²/day. The probable anisotropic capture zone for the project well WID 23204 at a pumping rate of 12.30 L/min is interpreted to possibly lie along a northwest-southeast trend as shown in Figure 7, possibly coinciding with a longitudinal fault or contact zone in the sedimentary strata. Alternatively the capture could extend in a southwest-northeast zone more normal to the topographic gradient. Given the stabilizing conditions observed during the test it is more likely that the capture zone would widen in an up gradient direction towards the recharge area for the well rather than extending to distances of 12000 m.

At an estimated demand pumping rate of 7.99 L/min (2.11USgpm) the potential interference effects on the neighbouring well, WID 12920, at the *Galiano Housing Society* complex would be close to 3.51 m, thereby reducing the available drawdown of 39.62 m in that well by approximately 8.9%.

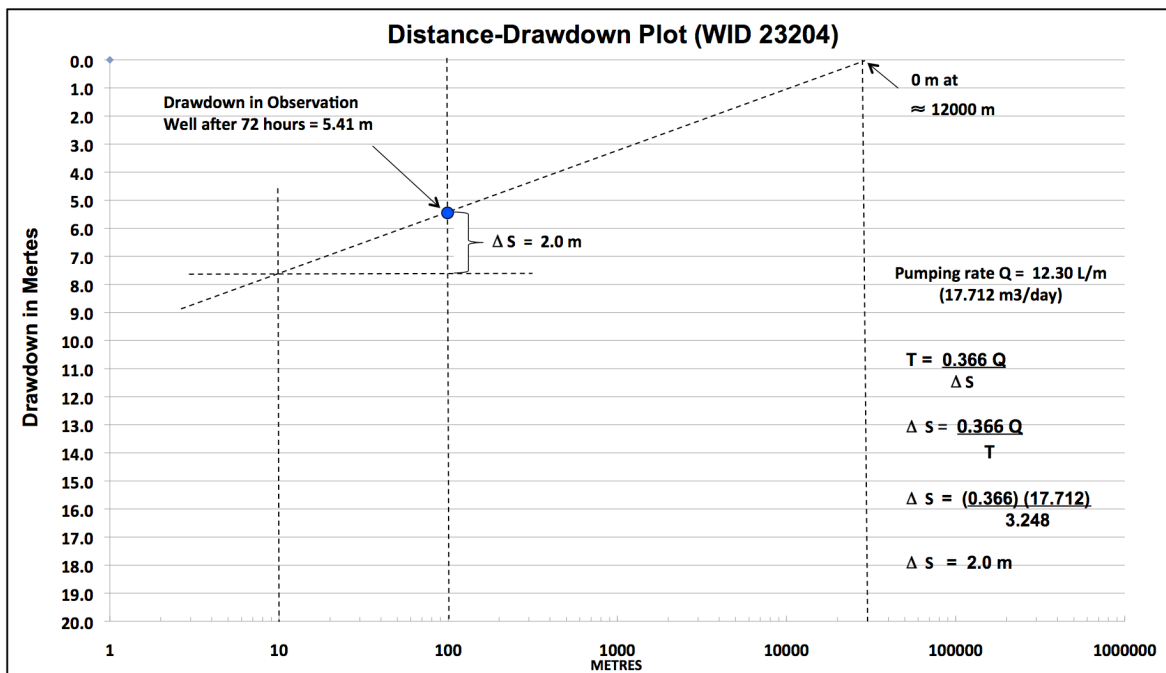


Figure 6. Theoretical distance-drawdown plot based on data from October 2020 pumping test of WID 23204 and observation well WID 12920.

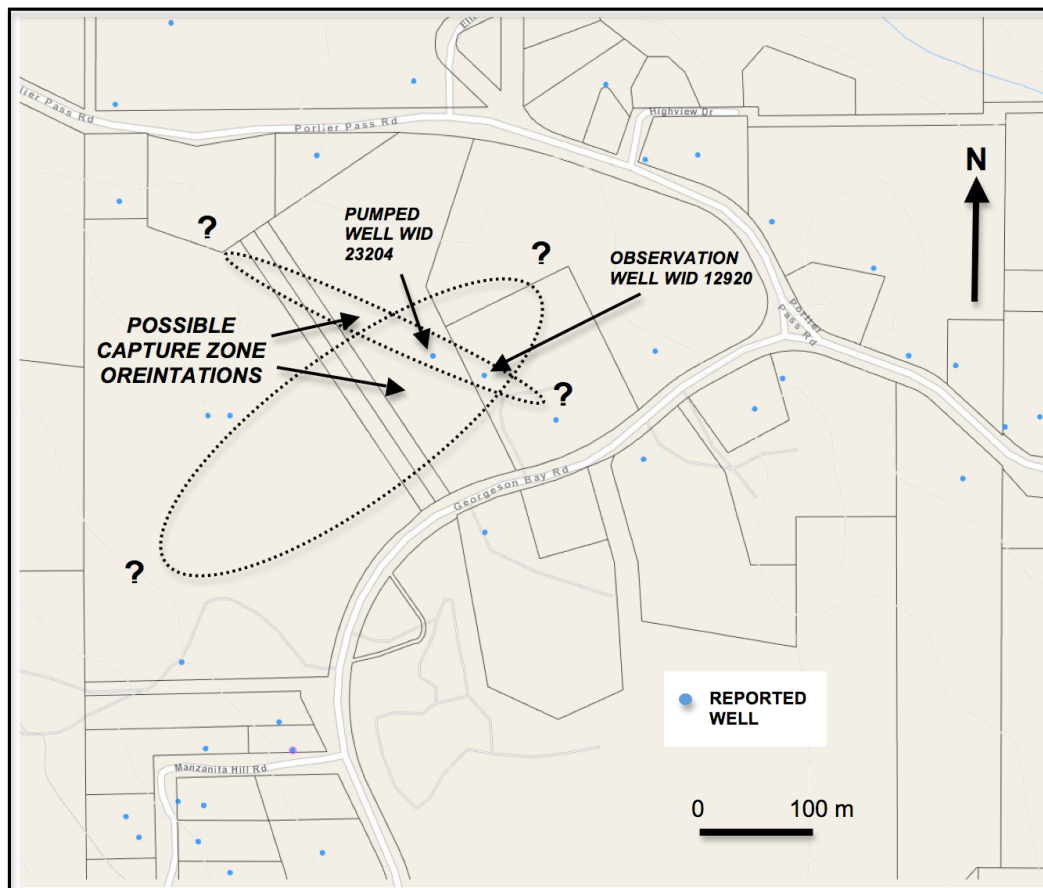


Figure 7. Possible capture zones orientations for pumping of WID 23204. Basemap from Province of British Columbia (2020b).

Conceptual Aquifer Model

Figure 8 represents the conceptual model of a portion of bedrock Aquifer 320 in the region with recharge taking place on the northeast facing slope of the Stockade Hill upland region with groundwater moving northeasterly towards the subject property. Groundwater likely moves primarily through a series of interconnected fractures; including faults, joints and bedding plane contacts. The potentiometric (water level) surface in the aquifer likely mirrors the topography having a similar gradient of about 0.07 upslope of the subject property.

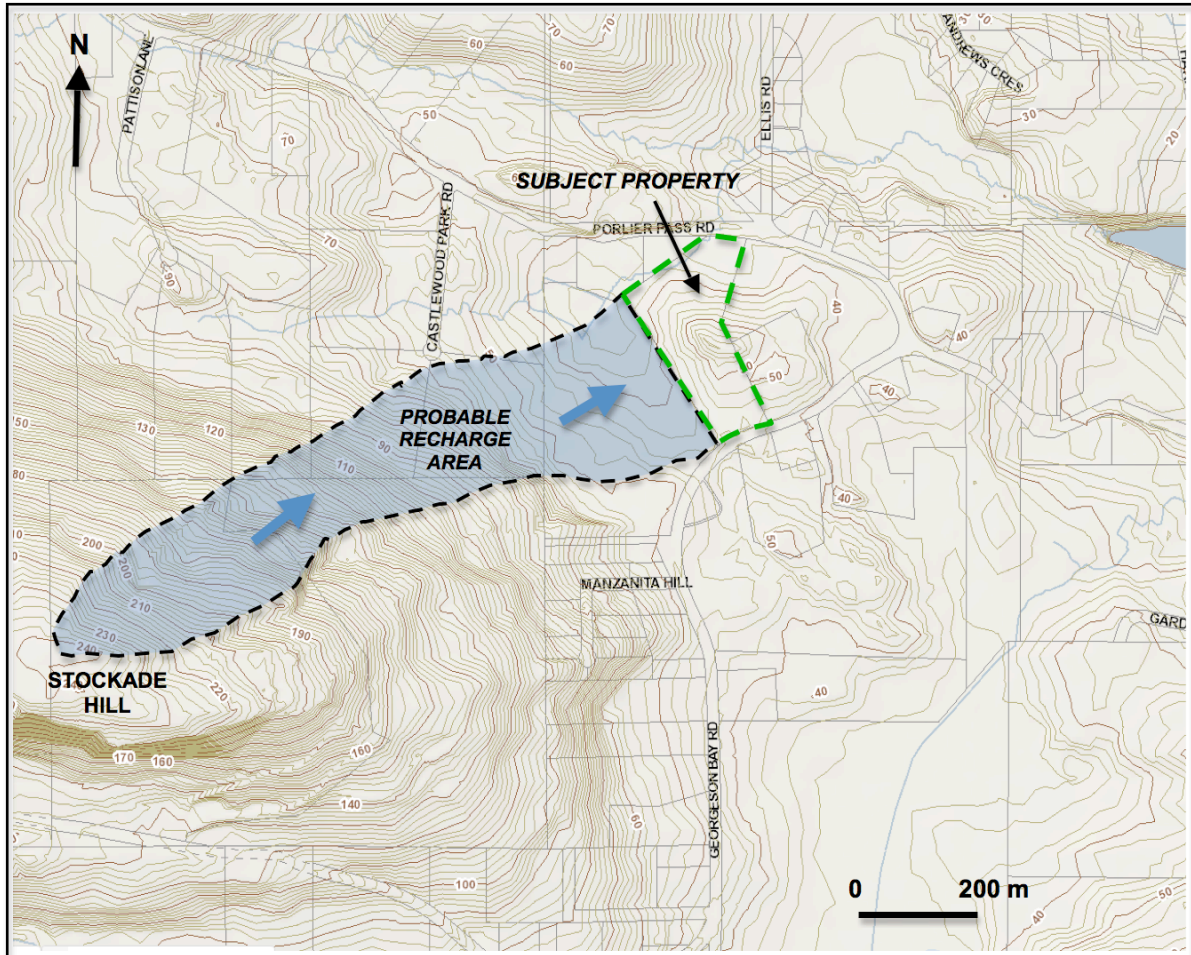


Figure 8. Potential groundwater recharge area in a portion of bedrock Aquifer 320 up gradient of the subject property. Blue arrows indicates inferred direction of groundwater flow. Basemap from Islands Trust (2020); contour interval = 10 m.

Potential Recharge

The potential recharge area situated directly up gradient of the subject property covers an area of approximately 0.257 Km² as determined from the area measurement tool at the Islands Trust *MapIt* website (Islands Trust, 2020). The area lies within the Murchison-Whaler Bay Groundwater Region delineated by GW Solutions Inc., (2020). Recharge potential mapping carried out by GW Solutions Inc., (2020) indicates this region has good recharge potential with recharge estimated at 10.0% of annual (1981-2010) normal

precipitation. Based on a groundwater recharge rate of 10.0% of the annual precipitation of 842 mm, the estimated annual water demands of the project of 7.99 L/min, would potentially utilize 19.4% of the annual normal recharge and possibly 20.7% during a dry year for example such as 2014 with only 788 mm. The dry year figure is based on the Pender Island climate station 1015638 (Government of Canada, 2020b). Recharge figures are equivalent to rates of 10.9 and 10.2 USgpm respectively for a normal and dry year.

Groundwater Flow Estimate

Based on the aquifer transmissivity determined from the pumping test of well WID 23204, an estimate of natural groundwater flow through the subject property can be made using Darcy's Law in the form:

$$Q = T \times I \times L$$

where Q = ground water flow in m³/day,

T = transmissivity in m²/day,

I = hydraulic gradient, and

L = length (aquifer width in m) through which the flow takes place.

In this case, the natural *flow through the aquifer underlying the site area* where L = 300 m, and I = 0.07, and T = 3.25 m²/day would be 68.3 m³/day (12.5 USgpm). This flow estimate value is similar to the recharge figure of 10.9 USgpm for a normal year.

Based on the estimated water demands for the project at 7.99 L/min (2.11 USgpm) about 16.9% of the groundwater flow through the subject property would be intercepted by pumping of the project well.

There are some 25 other land parcels directly down gradient and above the subject property that potentially could use groundwater for domestic purposes. Assuming a domestic demand of 4000 L/day for two residences per parcel, amounts to a potential future annual demand of 36500 m³/year. With the proposed potential annual use of the project well at 7.99 L/min (4200 m³/year), future demand could approach a total of 40700 m³/year or 20.46 USgpm. This would represent 164% of the natural flow through the aquifer underlying the site area although this does not consider other potential sources of recharge or utilizing aquifer storage at times. While the above figures are hypothetical, the relatively low potential demand of the project well suggests that use of the well would likely have minimal impacts on groundwater availability in the region.

Water Quality Analysis

Results of the 2020 water quality analyses for the project well are shown in Table 2 compared with the 2018 results. Based on the laboratory results of the October 19, 2020 sampling, the water quality of the project well met the *Guidelines for Canadian Drinking Water* (Health Canada, 2019) for all parameters analyzed except for total coliforms at 2 CFU /100mL., and dissolved manganese at 27.7 µg/L. No E. Coli. were detected. The low level of total coliforms reported may be the result of sampling variability and can be effectively eliminated with chlorination or ultraviolet irradiation treatment. Elevated

manganese at or above 20 µg/L can cause staining of laundry and bathroom fixtures. Levels of this constituent may be treated with an appropriately designed and maintained point-of-entry (POE) water treatment system. Overall there is little variation in the observed water quality between 2018 and 2020.

Conclusions

Based on the results of recent retesting well WID 23204 the following conclusions on the available water quantity and water quality can be made:

1. The well was pump tested for 72.5 hours between October 16 and October 19, 2020 by Red Williams Well Drilling Ltd., at a constant rate of 12.30 L/min (3.25 USgpm) and water level monitoring was carried out on the nearest neighbouring bedrock well WID 12920 at the *Galiano Housing Society* complex.
2. Drawdown in the pumped well at the end of the test was 16.117 m below the non pumping water level of 32.480 m below ground, utilizing 50% percent of the available drawdown in the well. The well is more than capable of supplying the estimated demand of the project at 7.99 L/min (2.11 USgpm) with a safety factor > 50%.
3. Although capable of being pumped at rates far in excess of 12.30 L/min (3.25 USgpm) the safe well yield is determined to be 12.30 L/min (3.25 USgpm) at this time.
4. Interference of approximately 5.41 m was recorded in the nearby observation well WID 12920 during the test. At the demand pumping rate of 7.99 L/min (2.11 USgpm) the potential interference effects on the neighbouring well, WID 12920, at the *Galiano Housing Society* complex would be close to 3.51 m, thereby reducing the available drawdown of 39.62 m in that well by approximately 8.9%.
5. Based on the laboratory results of the October 19, 2020 sampling, the water quality of the project well met the *Guidelines for Canadian Drinking Water* (Health Canada, 2019) for all parameters analyzed except for total coliforms at 2 CFU /100mL., and dissolved manganese at 27.7 µg/L. Manganese is ubiquitous in the groundwater of the Gulf Islands and can be treated with appropriate water treatment methods.

Table 2. Summary of water quality analyses.

Parameters/Site and Sampling Date	WELL WID 23204 Nov 26/18	WELL WID 23204 Oct 19/20	WELL WID 23204 Nov 26/18	WELL WID 23204 Oct 19/20	Canadian DW Guideline 2019	Units
PHYSICAL TESTS						
True Colour	<5	5.5			< or =15	TCU
Conductivity	381	380				µS/cm
Total Hardness (CaCO ₃)	63.9	63.7				mg/L
pH	8.07	8.14			7.0-10.5	pH units
Total Dissolved solids (TDS)	244	230			< or = 500	mg/L
Turbidity	0.31	<0.10			<1.0	NTU
DISSOLVED ANIONS						
Alkalinity (Total as CaCO ₃)	167	160				mg/L
Alkalinity (PP as CaCO ₃)	<1.0	<1.0				mg/L
Bicarbonate	204.0	190.0				mg/L
Carbonate	<1.0	<1.0				mg/L
Hydroxide	<1.0	<1.0				mg/L
Dissolved Chloride	21	20			< or = 250	mg/L
Fluoride	0.180	0.17			1.5	mg/L
Nitrate (N)	<0.020	<0.020			10	mg/L
Nitrite (N)	<0.0050	<0.0050			1	mg/L
Total Organic Nitrogen (N)	<0.020	0.058				mg/L
Total Ammonia (N)	0.097	<0.015				mg/L
Nitrate plus Nitrite (N)	<0.020	<0.020				mg/L
Total Nitrogen (N)	0.031	0.058				mg/L
Total Organic Carbon (C)	<0.50	1.7				mg/L
Total Phosphorus (P)						mg/L
Dissolved Sulphate	7.6	9.4			< or =500	mg/L
TOTAL METALS						
DISSOLVED METALS						
Aluminum	27.5	4.1	4.7	3.1		µg/L
Antimony	<0.50	<0.50	<0.50	<0.50	6	µg/L
Arsenic	0.29	0.28	0.28	0.27	10	µg/L
Barium	<1.0	<1.0	<1.0	<1.0	1000	µg/L
Beryllium	<0.10	<0.10	<0.10	<0.10		µg/L
Bismuth	<1.0	<1.0	<1.0	<1.0		µg/L
Boron	115	110	101	105	5000	µg/L
Cadmium	<0.010	<0.010	<0.010	<0.010	5	µg/L
Chromium	1.7	<1.0	<1.0	<1.0	50	µg/L
Cobalt	<0.20	<0.20	<0.20	<0.20		µg/L
Copper	0.92	1.26	0.75	1.01	< or =1000	µg/L
Iron	6.6	<5.0	<5.0	<5.0	< or = 300	µg/L
Lead	0.42	<0.20	0.35	<0.20	10	µg/L
Manganese	31.1	27.5	30.8	27.7	< or = 20	µg/L
Mercury	<0.0020				1	µg/L
Molybdenum	1.1	1.2	1.1	<1.0		µg/L
Nickel	<1.0	<1.0	<1.0	<1.0		µg/L
Selenium	<0.10	<0.10	<0.10	<0.10	50	µg/L
Silicon	8440	8800	8900	8720		µg/L
Silver	<0.020	<0.020	<0.020	<0.020		µg/L
Strontium	74.0	78.0	74.9	76.8		µg/L
Thallium	<0.010	<0.010	<0.010	<0.010		µg/L
Tin	<5.0	<5.0	<5.0	<5.0		µg/L
Titanium	<5.0	<5.0	<5.0	<5.0		µg/L
Uranium	<0.10	<0.10	<0.10	<0.10	20	µg/L
Vanadium	<5.0	<5.0	<5.0	<5.0		µg/L
Zinc	<5.0	<5.0	<5.0	<5.0	< or = 5000	µg/L
Zirconium	<0.10	<0.10	<0.10	<0.10		µg/L
Calcium	21.6	21.6	22.4	21.3		mg/L
Magnesium	2.43	2.37	2.34	2.39		mg/L
Potassium	0.169	0.159	0.169	0.168		mg/L
Sodium	63.0	61.2	59.1	61.8	< or = 200	mg/L
Total Sulphide (as H ₂ S)	<0.0053	<0.0020				mg/L
Total Sulphide	<0.0050	<0.0018				mg/L
Sulphur	<3.0	<3.0	<3.0	3.0		mg/L
MICROBIOLOGICAL						
Heterotrophic Plate Count	6	48				CFU/mL
Iron Bacteria	35000	25				CFU/mL
Sulphate reducing bacteria	<75	<75				CFU/mL
Total Coliforms	1.0	2.0			ND	CFU/100mL
Escherichia Coli (E.Coli)	0	0			ND	CFU/100mL

* Turbidity guideline applies to a surface water source or a groundwater source under the direct influence of surface water.

Red font indicates exceedances.

ND means none detectable.

Recommendations


1. As a precautionary measure against any future potential sources of coliform bacteria, water from the well should be treated with an appropriately designed and maintained ultraviolet irradiation (UV) treatment system.
2. Elevated levels of manganese may be treated with an appropriately designed and maintained point-of-entry (POE) water treatment system including aeration.
3. Further examination of the potential water treatment options for the well water should be considered. Hy-Geo Consulting does not design or install water treatment systems.
4. Consideration should be given to equipping the discharge line from the well with a totalizing water flow meter to monitor and record the well use with time and having a water level sounding tube installed for taking periodic water level measurements in the well.

Closure

This report was prepared in accordance with generally accepted engineering, hydrogeological and consulting practices. It is intended for the prime use of New Commons Development in connection with its purpose as outlined under the scope of work for this project. This report is based on data and information available to the author from various sources at the time of its preparation and the findings of this report may therefore be subject to revision. Data and information supplied by others has not been independently confirmed or verified to be correct or accurate in all cases. Any errors, omissions or issues requiring clarification should be brought to the attention of the author. The author retains full copyright of the material contained in the report. The author and Hy-Geo Consulting accepts no responsibility for damages suffered by any third party as a result of any unauthorized use of this report.

Respectfully submitted,

A.P. Kohut
Feb 9/21

A circular professional seal for the Province of British Columbia. The outer ring contains the text "PROFESSIONAL OF" at the top and "BRITISH COLUMBIA" at the bottom. The inner circle contains the text "A. P. KOHUT" and "#10194" above the word "ENGINEER".

Alan P. Kohut PEng.
Principal and Senior Hydrogeologist

HY-GEO CONSULTING

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APPENDIX A

Pumping Test Data for Well WID 23204

Project: Galiano Green
Client: New Commons Development
Location: Galiano Island
Start Date of Test: October 16/20
Test Conducted by: Red Williams
Pumped Well: WID 23204
Pumping Rate: 12.30 L/min (3.25 Usgpm)
Static Water Level: 33.480 m
Pump Setting: m

Reference: all readings from top of sounding tube

Stick up: 1.0 m
Observation Wells: WID 12920

Pump Start Time: 9:00 AM Oct. 16/20
Pump End Time: 9:28 AM Oct. 19/20
Analysis by: A. Kohut, P.Eng.

Drawdown Data:

Recovery Data:

Time (minutes)	Water Level (m)	Drawdown (m)	Time t (minutes)	Time t' (minutes)	Water Level (m)	t/t'	Residual Drawdown (m)
0.5	33.762	0.282	4350.5	0.5	49.328	8701.0	15.85
1	33.990	0.510	4351	1	49.070	4351.0	15.59
1.5	34.220	0.740	4351.5	1.5	48.832	2901.0	15.35
2	34.427	0.947	4352	2	48.605	2176.0	15.13
2.5	34.626	1.146	4352.5	2.5	48.405	1741.0	14.93
3	34.818	1.338	4353	3	48.197	1451.0	14.72
3.5	35.007	1.527	4353.5	3.5	47.985	1243.9	14.51
4	35.185	1.705	4354	4	47.810	1088.5	14.33
4.5	35.370	1.890	4354.5	4.5	47.618	967.7	14.14
5	35.526	2.046	4355	5	47.439	871.0	13.96
6	35.852	2.372	4356	6	47.080	726.0	13.60
7	36.159	2.679	4357	7	46.757	622.4	13.28
8	36.452	2.972	4358	8	46.438	544.8	12.96
9	36.736	3.256	4359	9	46.147	484.3	12.67
10	37.012	3.532	4360	10	45.865	436.0	12.39
11	37.276	3.796	4361	11	45.613	396.5	12.13
12	37.527	4.047	4362	12	45.336	363.5	11.86
13	37.771	4.291	4363	13	45.090	335.6	11.61
14	38.001	4.521	4364	14	44.861	311.7	11.38
15	38.238	4.758	4365	15	44.635	291.0	11.16
20	39.267	5.787	4370	20	43.628	218.5	10.15
25	40.147	6.667	4375	25	42.772	175.0	9.29
30	40.932	7.452	4380	30	42.102	146.0	8.62
35	41.628	8.148	4385	35	41.590	125.3	8.11
40	42.232	8.752	4390	40	41.121	109.8	7.64
45	42.743	9.263	4395	45	40.760	97.7	7.28
50	43.179	9.699	4400	50	40.400	88.0	6.92
55	43.599	10.119	4405	55	39.609	80.1	6.13
60	43.884	10.404	4410	60	39.746	73.5	6.27
75	44.635	11.155	4425	75	38.941	59.0	5.46
90	44.806	11.326	4440	90	38.337	49.3	4.86
105	45.562	12.082	4455	105	37.841	42.4	4.36
120	45.832	12.352	4470	120	37.540	37.3	4.06
150	46.675	13.195	4500	150	37.121	30.0	3.64
180	47.109	13.629	4530	180	36.769	25.2	3.29
210	47.325	13.845	4560	210	36.555	21.7	3.08
240	47.510	14.030	4590	240	36.195	19.1	2.72
270	47.788	14.308	4620	270	36.885	17.1	3.41
300	47.863	14.383	4650	300	35.839	15.5	2.36
330	47.860	14.380	4680	330	35.685	14.2	2.21
360	48.076	14.596	4710	360	35.458	13.1	1.98
390	48.132	14.652					
420	48.069	14.589					
450	48.004	14.524					
480	48.195	14.715					
510	48.168	14.688					
540	48.147	14.667					
570	48.285	14.805					

Time (minutes)	Water Level (m)	Drawdown (m)	Time t (minutes)	Time t' (minutes)	Water Level (m)	t/t'	Residual Drawdown (m)
600	48.217	14.737					
630	48.134	14.654					
660	48.124	14.644					
690	48.291	14.811					
720	48.212	14.732					
780	48.095	14.615					
840	48.297	14.817					
900	48.176	14.696					
960	48.292	14.812					
1020	48.240	14.760					
1080	48.162	14.682					
1140	48.097	14.617					
1200	48.050	14.570					
1260	48.245	14.765					
1320	48.282	14.802					
1380	48.184	14.704					
1440	48.375	14.895					
1500	48.471	14.991					
1560	48.490	15.010					
1620	48.468	14.988					
1680	48.555	15.075					
1740	48.369	14.889					
1800	48.275	14.795					
1860	48.594	15.114					
1920	48.587	15.107					
2040	49.069	15.589					
2100	49.252	15.772					
2160	49.088	15.608					
2220	49.241	15.761					
2280	49.112	15.632					
2340	49.318	15.838					
2400	49.167	15.687					
2460	49.041	15.561					
2520	48.997	15.517					
2580	48.943	15.463					
2640	48.905	15.425					
2700	49.155	15.675					
2760	49.025	15.545					
2820	49.227	15.747					
2880	49.533	16.053					
2940	49.849	16.369					
3000	49.645	16.165					
3060	49.631	16.151					
3120	49.465	15.985					
3180	49.609	16.129					
3240	49.475	15.995					
3300	49.445	15.965					
3360	48.089	14.609					
3420	48.445	14.965					
3480	48.464	14.984					
3540	49.632	16.152					
3600	49.624	16.144					
3660	49.570	16.090					
3720	49.393	15.913					
3780	49.383	15.903					
3840	49.501	16.021					
3900	49.360	15.880					
3960	49.265	15.785					
4020	49.230	15.750					
4080	49.452	15.972					
4140	49.316	15.836					
4200	49.310	15.830					
4260	49.420	15.940					
4320	49.597	16.117					

APPENDIX A

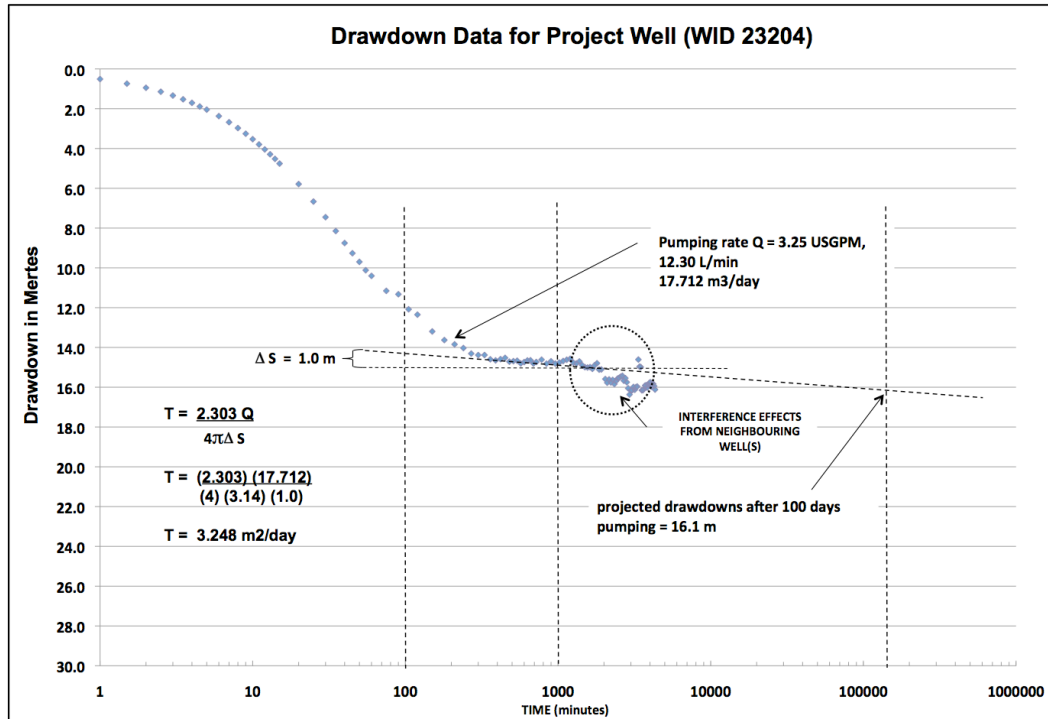


Figure A1, Appendix A. Semi-logarithmic drawdown plot for project well during 72.5 hour test, in October 2020.

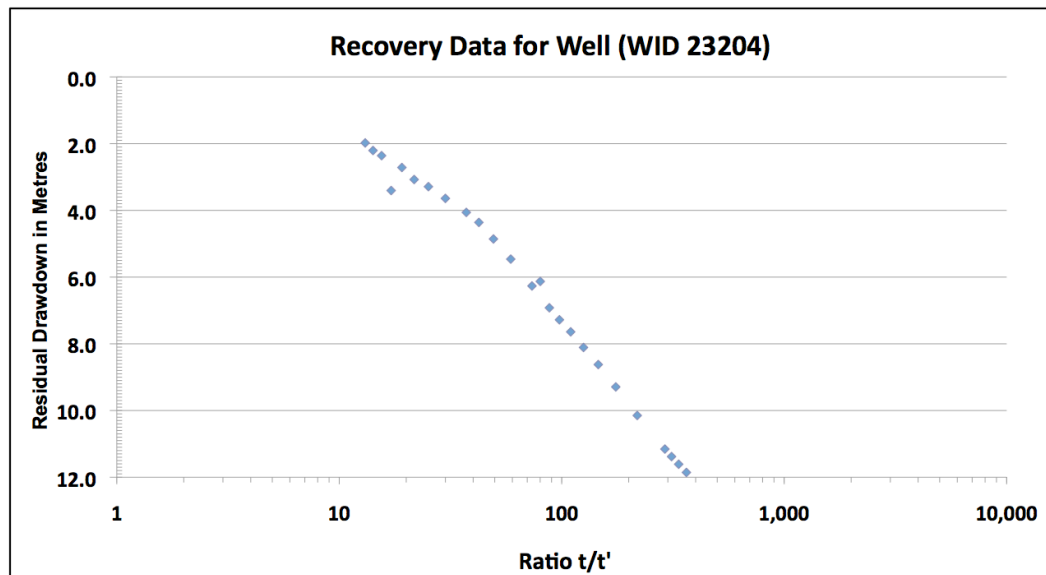


Figure A2, Appendix A. Semi-logarithmic recovery plot for project well after 72.5 hour test in October 2020.

APPENDIX B

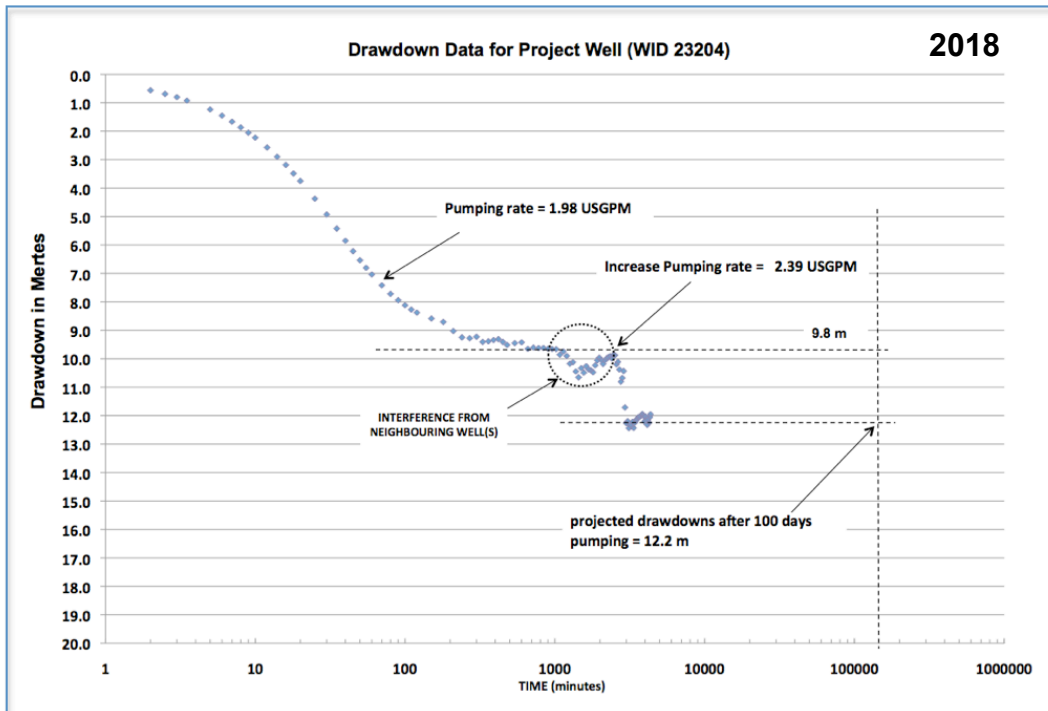


Figure B1, Appendix B. Semi-logarithmic drawdown plot for project well during 72.5 hour test in November 2018.

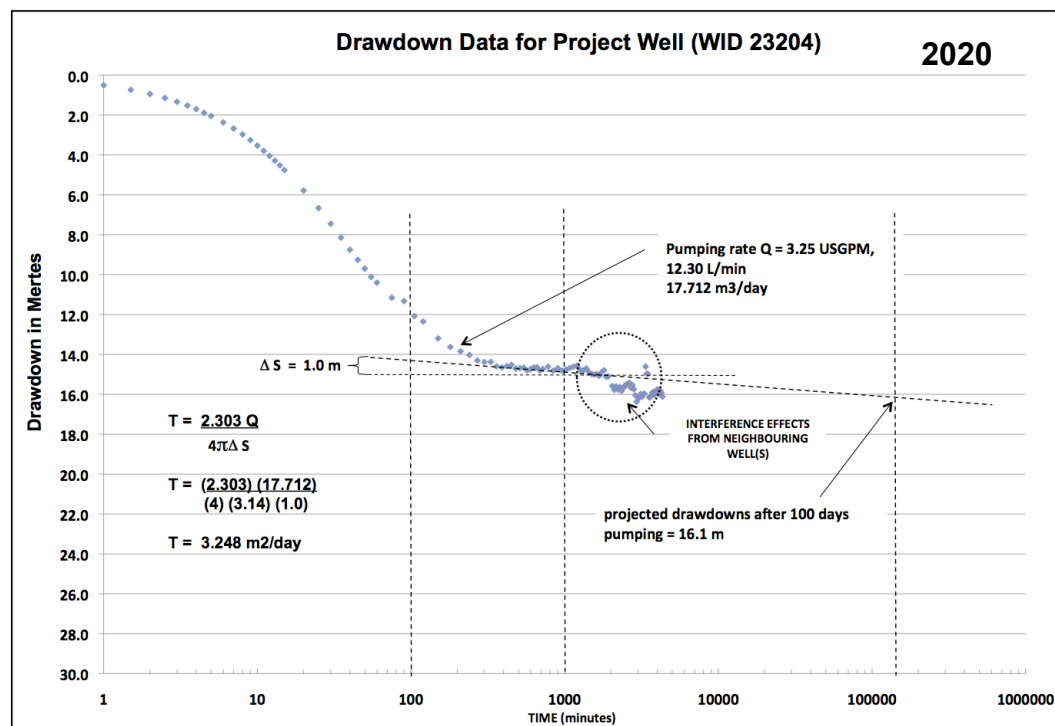


Figure B1, Appendix B. Semi-logarithmic drawdown plot for project well during 72.5 hour test in October 2020.

APPENDIX C

Water Quality Laboratory Analyses

WID 23204

Your Project #: GALIANO HOUSING
Your C.O.C. #: WI023961

Attention: AL KOHUT

HY-GEO CONSULTING
CLIENT #5948 - inactive
1041 LABURNUM RD
VICTORIA, BC
Canada V8Z 2M9

Report Date: 2020/11/02
Report #: R2950385
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C076611

Received: 2020/10/19, 13:55

Sample Matrix: Drinking Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH (1)	1	N/A	2020/10/21	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry (1)	1	N/A	2020/10/20	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO ₄ -E m
Colour (True) by Kone Lab (1)	1	N/A	2020/10/21	BBY6SOP-00057	SM 23 2120 C m
Conductivity @25C (1)	1	N/A	2020/10/21	BBY6SOP-00026	SM 23 2510 B m
Fluoride (1)	1	N/A	2020/10/27	BBY6SOP-00048	SM 23 4500-F C m
Sulphide (as H ₂ S) (2)	1	N/A	2020/10/23		Auto Calc
Hardness Total (calculated as CaCO ₃) (1, 3)	1	N/A	2020/10/27	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO ₃) (1)	1	N/A	2020/10/21	BBY WI-00033	Auto Calc
Mercury (Total) by CV (1)	1	2020/10/21	2020/10/21	AB SOP-00084	BCMOE BCLM Oct2013 m
Heterotrophic Plate Count (MF) in Water (1)	1	N/A	2020/10/20	BBY4SOP-00003	SM 23 9215
Iron Related Bacteria (1, 4)	1	N/A	2020/10/20	BBY4SOP-00004	BI BART User Manual
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	1	N/A	2020/10/21	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved) (1)	1	N/A	2020/10/20	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	1	N/A	2020/10/27	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total) (1)	1	N/A	2020/10/26	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total) (1)	1	N/A	2020/10/23	BBY6SOP-00016	SM 23 4500-N C m
Ammonia-N (Total) (1)	1	N/A	2020/10/23	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N) (1)	1	N/A	2020/10/20	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrite (N) by CFA (1)	1	N/A	2020/10/20	BBY6SOP-00010	SM 23 4500-NO ₃ - I m
Nitrogen - Nitrate (as N) (1)	1	N/A	2020/10/21	BBY WI-00033	Auto Calc
Nitrogen (Tot. Organic) Calculation (1)	1	N/A	2020/10/24	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals (1)	1	N/A	2020/10/19	BBY7 WI-00004	SM 23 3030B m
pH @25°C (1, 5)	1	N/A	2020/10/21	BBY6SOP-00026	SM 23 4500-H+ B m
Sat. pH and Langelier Index (@ 4.4C) (1)	1	N/A	2020/10/23	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C) (1)	1	N/A	2020/10/23	BBY WI-00033	Auto Calc
Total Sulphide (2)	1	N/A	2020/10/23	AB SOP-00080	SM 23 4500 S2-A D Fm
Sulphate Reducing Bacteria (1, 4)	1	N/A	2020/10/20	BBY4SOP-00004	BI BART User Manual
Total Dissolved Solids (Filt. Residue) (1)	1	2020/10/20	2020/10/21	BBY6SOP-00033	SM 23 2540 C m
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2020/10/20	BBY4SOP-00143	Merck KGaA Version 1

Your Project #: GALIANO HOUSING
Your C.O.C. #: WI023961

Attention: AL KOHUT

HY-GEO CONSULTING
CLIENT #5948 - inactive
1041 LABURNUM RD
VICTORIA, BC
Canada V8Z 2M9

Report Date: 2020/11/02

Report #: R2950385

Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C076611

Received: 2020/10/19, 13:55

Sample Matrix: Drinking Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbon (Total Organic) (2, 6)	1	N/A	2020/10/30	AB SOP-00087	MMCW 119 1996 m
Turbidity (1)	1	N/A	2020/10/20	BBY6SOP-00027	SM 23 2130 B m
UV absorbance @254nm-Unfiltered (2)	1	N/A	2020/10/23	CAL SOP-00274	SM 23 5910B m
UV transmittance @254nm-Unfiltered (2)	1	N/A	2020/10/23		Auto-Calc

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by BV Labs Vancouver

(2) This test was performed by BV Labs Calgary Environmental

(3) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).

(4) Presence/Absence Method. Number is an estimate.

(5) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas Laboratories endeavours to analyze samples as soon as possible after receipt.

(6) TOC present in the sample should be considered as non-purgeable TOC.



Your Project #: GALIANO HOUSING
Your C.O.C. #: WI023961

Attention: AL KOHUT

HY-GEO CONSULTING
CLIENT #5948 - inactive
1041 LABURNUM RD
VICTORIA, BC
Canada V8Z 2M9

Report Date: 2020/11/02
Report #: R2950385
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C076611

Received: 2020/10/19, 13:55

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bvlabs.com
Phone# (833) 282-5227

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs - Partial/Rush Results



BUREAU
VERITAS

BV Labs Job #: C076611
Report Date: 2020/11/02

HY-GEO CONSULTING
Client Project #: GALIANO HOUSING

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

BV Labs ID		YR4034		
Sampling Date		2020/10/19 09:15		
COC Number		WI023961		
	UNITS	PORLIER WELL	RDL	QC Batch
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD		ONSITE
Transmittance at 254nm	%T/cm	91.5	N/A	A054870
MISCELLANEOUS				
UV absorbance (254nm)	AU/cm	0.039	0.010	A062483
RDL = Reportable Detection Limit N/A = Not Applicable				

BV Labs - Partial/Rush Results



BUREAU
VERITAS

BV Labs Job #: C076611
Report Date: 2020/11/02

HY-GEO CONSULTING
Client Project #: GALIANO HOUSING

VIHA PKG, WELLS/SPRINGS - BURNABY (DRINKING WATER)

BV Labs ID					YR4034		
Sampling Date					2020/10/19 09:15		
COC Number					WI023961		
	UNITS	MAC	AO	OG	PORLIER WELL	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	<0.0050	0.0050	A056396
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	63.7	0.50	A054247
Nitrate (N)	mg/L	10	-	-	<0.020	0.020	A054310
Total Organic Nitrogen (N)	mg/L	-	-	-	0.058	0.020	A054739
Sulphide (as H2S)	mg/L	-	0.05	-	<0.0020	0.0020	A053746
Misc. Inorganics							
Conductivity	uS/cm	-	-	-	380	2.0	A059425
pH	pH	-	-	7.0:10.5	8.14	N/A	A059423
Total Organic Carbon (C)	mg/L	-	-	-	1.7	0.50	A070962
Total Dissolved Solids	mg/L	-	-	-	230	10	A055905
Anions							
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<1.0	1.0	A059424
Alkalinity (Total as CaCO3)	mg/L	-	-	-	160	1.0	A059424
Bicarbonate (HCO3)	mg/L	-	-	-	190	1.0	A059424
Carbonate (CO3)	mg/L	-	-	-	<1.0	1.0	A059424
Dissolved Fluoride (F)	mg/L	1.5	-	-	0.17	0.050	A068005
Hydroxide (OH)	mg/L	-	-	-	<1.0	1.0	A059424
Total Sulphide	mg/L	-	0.05	-	<0.0018	0.0018	A062155
Dissolved Chloride (Cl)	mg/L	-	250	-	20	1.0	A056582
Dissolved Sulphate (SO4)	mg/L	-	500	-	9.4	1.0	A056582
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	5.5	5.0	A056570
Nutrients							
Total Ammonia (N)	mg/L	-	-	-	<0.015	0.015	A062405
Nitrate plus Nitrite (N)	mg/L	-	-	-	<0.020	0.020	A056389
Total Nitrogen (N)	mg/L	-	-	-	0.058	0.020	A061590
Physical Properties							
Turbidity	NTU	see remark	see remark	see remark	<0.10	0.10	A056387
Elements							
Total Mercury (Hg)	ug/L	1	-	-	<0.0019	0.0019	A057914
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BV Labs Job #: C076611
Report Date: 2020/11/02

HY-GEO CONSULTING
Client Project #: GALIANO HOUSING

VIHA PKG, WELLS/SPRINGS - BURNABY (DRINKING WATER)

BV Labs ID					YR4034		
Sampling Date					2020/10/19 09:15		
COC Number					WI023961		
	UNITS	MAC	AO	OG	PORLIER WELL	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	4.1	3.0	A065479
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	A065479
Total Arsenic (As)	ug/L	10	-	-	0.28	0.10	A065479
Total Barium (Ba)	ug/L	2000	-	-	<1.0	1.0	A065479
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	A065479
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	A065479
Total Boron (B)	ug/L	5000	-	-	110	50	A065479
Total Cadmium (Cd)	ug/L	7	-	-	<0.010	0.010	A065479
Total Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	A065479
Total Cobalt (Co)	ug/L	-	-	-	<0.20	0.20	A065479
Total Copper (Cu)	ug/L	2000	1000	-	1.26	0.20	A065479
Total Iron (Fe)	ug/L	-	300	-	<5.0	5.0	A065479
Total Lead (Pb)	ug/L	5	-	-	<0.20	0.20	A065479
Total Manganese (Mn)	ug/L	120	20	-	27.5	1.0	A065479
Total Molybdenum (Mo)	ug/L	-	-	-	1.2	1.0	A065479
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	A065479
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	A065479
Total Silicon (Si)	ug/L	-	-	-	8800	100	A065479
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	A065479
Total Strontium (Sr)	ug/L	7000	-	-	78.0	1.0	A065479
Total Thallium (Tl)	ug/L	-	-	-	<0.010	0.010	A065479
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	A065479
Total Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	A065479
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	A065479
Total Vanadium (V)	ug/L	-	-	-	<5.0	5.0	A065479
Total Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	A065479
Total Zirconium (Zr)	ug/L	-	-	-	<0.10	0.10	A065479
Total Calcium (Ca)	mg/L	-	-	-	21.6	0.050	A054354
Total Magnesium (Mg)	mg/L	-	-	-	2.37	0.050	A054354
Total Potassium (K)	mg/L	-	-	-	0.159	0.050	A054354
Total Sodium (Na)	mg/L	-	200	-	61.2	0.050	A054354
Total Sulphur (S)	mg/L	-	-	-	<3.0	3.0	A054354
Microbiological Param.							
Heterotrophic Plate Count	CFU/mL	-	-	-	48	1	A056059
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



VIHA PKG, WELLS/SPRINGS - BURNABY (DRINKING WATER)

BV Labs ID					YR4034		
Sampling Date					2020/10/19 09:15		
COC Number					WI023961		
	UNITS	MAC	AO	OG	PORLIER WELL	RDL	QC Batch
Iron Bacteria	CFU/mL	-	-	-	25	25	A056075
Sulphate reducing bacteria	CFU/mL	-	-	-	<75	75	A056076
Total Coliforms	CFU/100mL	0	-	-	2.0	N/A	A056074
E. coli	CFU/100mL	0	-	-	0	N/A	A056074
Calculated Parameters							
Langelier Index (@ 4.4C)	N/A	-	-	-	-0.263	N/A	A054740
Langelier Index (@ 60C)	N/A	-	-	-	0.778	N/A	A054741
Saturation pH (@ 4.4C)	N/A	-	-	-	8.40	N/A	A054740
Saturation pH (@ 60C)	N/A	-	-	-	7.36	N/A	A054741
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
N/A = Not Applicable							



BUREAU
VERITAS

BV Labs Job #: C076611
Report Date: 2020/11/02

HY-GEO CONSULTING
Client Project #: GALIANO HOUSING

CSR DISSOLVED METALS (NO CV-HG) IN WATER

BV Labs ID					YR4034		
Sampling Date					2020/10/19 09:15		
COC Number					WI023961		
	UNITS	MAC	AO	OG	PORLIER WELL	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	-	-	-	63.1	0.50	A053458
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	-	-	100	3.1	3.0	A056428
Dissolved Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	A056428
Dissolved Arsenic (As)	ug/L	10	-	-	0.27	0.10	A056428
Dissolved Barium (Ba)	ug/L	2000	-	-	<1.0	1.0	A056428
Dissolved Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	A056428
Dissolved Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	A056428
Dissolved Boron (B)	ug/L	5000	-	-	105	50	A056428
Dissolved Cadmium (Cd)	ug/L	7	-	-	<0.010	0.010	A056428
Dissolved Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	A056428
Dissolved Cobalt (Co)	ug/L	-	-	-	<0.20	0.20	A056428
Dissolved Copper (Cu)	ug/L	2000	1000	-	1.01	0.20	A056428
Dissolved Iron (Fe)	ug/L	-	300	-	<5.0	5.0	A056428
Dissolved Lead (Pb)	ug/L	5	-	-	<0.20	0.20	A056428
Dissolved Lithium (Li)	ug/L	-	-	-	12.9	2.0	A056428
Dissolved Manganese (Mn)	ug/L	120	20	-	27.7	1.0	A056428
Dissolved Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	A056428
Dissolved Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	A056428
Dissolved Selenium (Se)	ug/L	50	-	-	<0.10	0.10	A056428
Dissolved Silicon (Si)	ug/L	-	-	-	8720	100	A056428
Dissolved Silver (Ag)	ug/L	-	-	-	<0.020	0.020	A056428
Dissolved Strontium (Sr)	ug/L	7000	-	-	76.8	1.0	A056428
Dissolved Thallium (Tl)	ug/L	-	-	-	<0.010	0.010	A056428
Dissolved Tin (Sn)	ug/L	-	-	-	<5.0	5.0	A056428
Dissolved Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	A056428
Dissolved Uranium (U)	ug/L	20	-	-	<0.10	0.10	A056428
Dissolved Vanadium (V)	ug/L	-	-	-	<5.0	5.0	A056428
Dissolved Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	A056428
Dissolved Zirconium (Zr)	ug/L	-	-	-	<0.10	0.10	A056428
Dissolved Calcium (Ca)	mg/L	-	-	-	21.3	0.050	A054249
Dissolved Magnesium (Mg)	mg/L	-	-	-	2.39	0.050	A054249
Dissolved Potassium (K)	mg/L	-	-	-	0.168	0.050	A054249
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



CSR DISSOLVED METALS (NO CV-HG) IN WATER

BV Labs ID					YR4034		
Sampling Date					2020/10/19 09:15		
COC Number					WI023961		
	UNITS	MAC	AO	OG	PORLIER WELL	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	-	200	-	61.8	0.050	A054249
Dissolved Sulphur (S)	mg/L	-	-	-	3.0	3.0	A054249
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							



GENERAL COMMENTS

Sample YR4034 [PORLIER WELL] : Sample was analyzed past recommended hold time for Heterotropic Plate Count (MF) in Water. Sample was analyzed past recommended hold time for Iron Related Bacteria. Sample was analyzed past recommended hold time for Sulphate Reducing Bacteria. MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, September 2020.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG)
It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:

1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.
4. To ensure effectiveness of disinfection and for good operation of the distribution system, it is recommended that water entering the distribution system have turbidity levels of 1.0 NTU or less.

Measurement of Uncertainty has not been accounted for when stating conformity to the selected criteria, where applicable.

Results relate only to the items tested.

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BV Labs Job #: C076611

Report Date: 2020/11/02

QUALITY ASSURANCE REPORT

HY-GEO CONSULTING

Client Project #: GALIANO HOUSING

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A055905	Total Dissolved Solids	2020/10/21	99	80 - 120	102	80 - 120	<10	mg/L	NC	20
A056387	Turbidity	2020/10/20			99	80 - 120	<0.10	NTU	NC	20
A056389	Nitrate plus Nitrite (N)	2020/10/20	104	80 - 120	107	80 - 120	<0.020	mg/L	0.66	25
A056396	Nitrite (N)	2020/10/20	56 (1)	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20
A056428	Dissolved Aluminum (Al)	2020/10/20	103	80 - 120	104	80 - 120	<3.0	ug/L		
A056428	Dissolved Antimony (Sb)	2020/10/20	111	80 - 120	105	80 - 120	<0.50	ug/L		
A056428	Dissolved Arsenic (As)	2020/10/20	107	80 - 120	101	80 - 120	<0.10	ug/L		
A056428	Dissolved Barium (Ba)	2020/10/20	109	80 - 120	101	80 - 120	<1.0	ug/L		
A056428	Dissolved Beryllium (Be)	2020/10/20	107	80 - 120	99	80 - 120	<0.10	ug/L		
A056428	Dissolved Bismuth (Bi)	2020/10/20	92	80 - 120	98	80 - 120	<1.0	ug/L		
A056428	Dissolved Boron (B)	2020/10/20	108	80 - 120	101	80 - 120	<50	ug/L		
A056428	Dissolved Cadmium (Cd)	2020/10/20	107	80 - 120	103	80 - 120	<0.010	ug/L		
A056428	Dissolved Chromium (Cr)	2020/10/20	102	80 - 120	100	80 - 120	<1.0	ug/L		
A056428	Dissolved Cobalt (Co)	2020/10/20	98	80 - 120	97	80 - 120	<0.20	ug/L		
A056428	Dissolved Copper (Cu)	2020/10/20	NC	80 - 120	99	80 - 120	<0.20	ug/L		
A056428	Dissolved Iron (Fe)	2020/10/20	99	80 - 120	94	80 - 120	<5.0	ug/L	TBA	20
A056428	Dissolved Lead (Pb)	2020/10/20	106	80 - 120	102	80 - 120	<0.20	ug/L		
A056428	Dissolved Lithium (Li)	2020/10/20	100	80 - 120	94	80 - 120	<2.0	ug/L		
A056428	Dissolved Manganese (Mn)	2020/10/20	101	80 - 120	100	80 - 120	<1.0	ug/L	TBA	20
A056428	Dissolved Molybdenum (Mo)	2020/10/20	109	80 - 120	107	80 - 120	<1.0	ug/L		
A056428	Dissolved Nickel (Ni)	2020/10/20	98	80 - 120	100	80 - 120	<1.0	ug/L		
A056428	Dissolved Selenium (Se)	2020/10/20	110	80 - 120	102	80 - 120	<0.10	ug/L		
A056428	Dissolved Silicon (Si)	2020/10/20	NC	80 - 120	98	80 - 120	<100	ug/L		
A056428	Dissolved Silver (Ag)	2020/10/20	89	80 - 120	101	80 - 120	<0.020	ug/L		
A056428	Dissolved Strontium (Sr)	2020/10/20	NC	80 - 120	100	80 - 120	<1.0	ug/L		
A056428	Dissolved Thallium (Tl)	2020/10/20	105	80 - 120	99	80 - 120	<0.010	ug/L		
A056428	Dissolved Tin (Sn)	2020/10/20	109	80 - 120	102	80 - 120	<5.0	ug/L		
A056428	Dissolved Titanium (Ti)	2020/10/20	107	80 - 120	105	80 - 120	<5.0	ug/L		
A056428	Dissolved Uranium (U)	2020/10/20	109	80 - 120	105	80 - 120	<0.10	ug/L		
A056428	Dissolved Vanadium (V)	2020/10/20	105	80 - 120	101	80 - 120	<5.0	ug/L		
A056428	Dissolved Zinc (Zn)	2020/10/20	NC	80 - 120	104	80 - 120	<5.0	ug/L		
A056428	Dissolved Zirconium (Zr)	2020/10/20	120	80 - 120	103	80 - 120	<0.10	ug/L		
A056570	True Colour	2020/10/21			96	80 - 120	<5.0	Col. Unit	NC	20

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VERITAS

BV Labs Job #: C076611

Report Date: 2020/11/02

QUALITY ASSURANCE REPORT(CONT'D)

HY-GEO CONSULTING

Client Project #: GALIANO HOUSING

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A056582	Dissolved Chloride (Cl)	2020/10/20	NC	80 - 120	104	80 - 120	<1.0	mg/L	2.9	20
A056582	Dissolved Sulphate (SO4)	2020/10/20	NC	80 - 120	99	80 - 120	<1.0	mg/L	NC	20
A057914	Total Mercury (Hg)	2020/10/21	82	80 - 120	95	80 - 120	<0.0019	ug/L	NC	20
A059423	pH	2020/10/21			101	97 - 103			0.59	N/A
A059424	Alkalinity (PP as CaCO3)	2020/10/21					<1.0	mg/L	NC	20
A059424	Alkalinity (Total as CaCO3)	2020/10/21	100	80 - 120	89	80 - 120	<1.0	mg/L	0.056	20
A059424	Bicarbonate (HCO3)	2020/10/21					<1.0	mg/L	0.056	20
A059424	Carbonate (CO3)	2020/10/21					<1.0	mg/L	NC	20
A059424	Hydroxide (OH)	2020/10/21					<1.0	mg/L	NC	20
A059425	Conductivity	2020/10/21			99	80 - 120	<2.0	uS/cm		
A061590	Total Nitrogen (N)	2020/10/23	NC	80 - 120	105	80 - 120	<0.020	mg/L	1.8	20
A062155	Total Sulphide	2020/10/23	82	80 - 120	92	80 - 120	<0.0018	mg/L	19	20
A062405	Total Ammonia (N)	2020/10/23	98	80 - 120	98	80 - 120	<0.015	mg/L	0.90	20
A062483	UV absorbance (254nm)	2020/10/23			101	N/A	<0.010	AU/cm	0.51	20
A065479	Total Aluminum (Al)	2020/10/26	104	80 - 120	103	80 - 120	<3.0	ug/L	4.3	20
A065479	Total Antimony (Sb)	2020/10/26	105	80 - 120	104	80 - 120	<0.50	ug/L	NC	20
A065479	Total Arsenic (As)	2020/10/26	104	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
A065479	Total Barium (Ba)	2020/10/26	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.34	20
A065479	Total Beryllium (Be)	2020/10/26	104	80 - 120	107	80 - 120	<0.10	ug/L	NC	20
A065479	Total Bismuth (Bi)	2020/10/26	96	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
A065479	Total Boron (B)	2020/10/26	107	80 - 120	112	80 - 120	<50	ug/L	1.5	20
A065479	Total Cadmium (Cd)	2020/10/26	102	80 - 120	103	80 - 120	<0.010	ug/L	NC	20
A065479	Total Chromium (Cr)	2020/10/26	97	80 - 120	98	80 - 120	<1.0	ug/L	NC	20
A065479	Total Cobalt (Co)	2020/10/26	101	80 - 120	103	80 - 120	<0.20	ug/L	NC	20
A065479	Total Copper (Cu)	2020/10/26	92	80 - 120	97	80 - 120	<0.20	ug/L	0.092	20
A065479	Total Iron (Fe)	2020/10/26	101	80 - 120	99	80 - 120	<5.0	ug/L	4.6	20
A065479	Total Lead (Pb)	2020/10/26	104	80 - 120	103	80 - 120	<0.20	ug/L	0.24	20
A065479	Total Manganese (Mn)	2020/10/26	105	80 - 120	100	80 - 120	<1.0	ug/L	0.16	20
A065479	Total Molybdenum (Mo)	2020/10/26	110	80 - 120	107	80 - 120	<1.0	ug/L	NC	20
A065479	Total Nickel (Ni)	2020/10/26	98	80 - 120	102	80 - 120	<1.0	ug/L	NC	20
A065479	Total Selenium (Se)	2020/10/26	99	80 - 120	105	80 - 120	<0.10	ug/L	NC	20
A065479	Total Silicon (Si)	2020/10/26	NC	80 - 120	100	80 - 120	<100	ug/L	4.4	20
A065479	Total Silver (Ag)	2020/10/26	100	80 - 120	103	80 - 120	<0.020	ug/L	NC	20



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VERITAS

BV Labs Job #: C076611

Report Date: 2020/11/02

QUALITY ASSURANCE REPORT(CONT'D)

HY-GEO CONSULTING

Client Project #: GALIANO HOUSING

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A065479	Total Strontium (Sr)	2020/10/26	NC	80 - 120	99	80 - 120	<1.0	ug/L	0.17	20
A065479	Total Thallium (Tl)	2020/10/26	100	80 - 120	102	80 - 120	<0.010	ug/L	NC	20
A065479	Total Tin (Sn)	2020/10/26	103	80 - 120	103	80 - 120	<5.0	ug/L	NC	20
A065479	Total Titanium (Ti)	2020/10/26	105	80 - 120	104	80 - 120	<5.0	ug/L	NC	20
A065479	Total Uranium (U)	2020/10/26	108	80 - 120	105	80 - 120	<0.10	ug/L	NC	20
A065479	Total Vanadium (V)	2020/10/26	99	80 - 120	97	80 - 120	<5.0	ug/L	NC	20
A065479	Total Zinc (Zn)	2020/10/26	NC	80 - 120	109	80 - 120	<5.0	ug/L	0.099	20
A065479	Total Zirconium (Zr)	2020/10/26	108	80 - 120	102	80 - 120	<0.10	ug/L	NC	20
A068005	Dissolved Fluoride (F)	2020/10/27	101	80 - 120	106	80 - 120	<0.050	mg/L	NC	20
A070962	Total Organic Carbon (C)	2020/10/30	91	80 - 120	103	80 - 120	<0.50	mg/L	NC	20

N/A = Not Applicable

TBA = Result to follow

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



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BV Labs Job #: C076611
Report Date: 2020/11/02

HY-GEO CONSULTING
Client Project #: GALIANO HOUSING

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Laura Martin, Project Submissions Support

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs - Partial/Rush Results

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Victoria: Unit 1, 851 Viewfield Rd, Victoria, BC V8A 4V2 Ph: (250) 385-6112 Toll Free: (833) 282-5227
 Courtenay: 2755 B Moray Ave, Courtenay, BC V9N 8M9 Ph: (250) 338-7786 Toll Free: (833) 282-5227

WI 023961

DRINKING WATER SUBMISSION
CHAIN OF CUSTODY RECORD

BV Job #:

Company (Invoicing): HY-GEO CONSULTING
 Company (Reporting): HY-GEO CONSULTING
 Contact Name: ALAN KOHUT
 Mailing Address: 4470 ARSEN'S PL
VICTORIA BC
 Phone #: 250 744 7859
 E-mail: apkohut@telus.net
 After Hours Contact #: 250 477 3418

VANCOUVER ISLAND HEALTH
 AUTHORITY
 Medical Health Officer: 1.800.204.6166
 Drinking Water Officer: 250.755.6215

Payment Received: Yes ☐ No ☐

All information on this form must be completed before testing can commence.

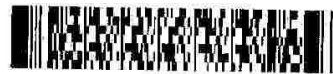
If your drinking water source services two or more homes, we strongly recommend that you contact local health authorities to find out how the Drinking Water Protection Act applies to this system. Please be aware that, in this situation, we are legally obligated to report results directly to local health authorities.

Sample Collection

For determining drinking water quality, samples should be representative of the water that will be consumed; therefore, we suggest sampling at the kitchen tap. However, other sampling locations may be used to determine pre-treatment water quality or for troubleshooting purposes.

1. Remove aerator/screen from faucet.
2. Let the water run for 5 minutes.
3. Label the bottle with your name, date and time you are taking the sample.
4. Fill all bottle(s) provided. Take care not to touch the inside of the bottle or underside of cap.
5. Cap the sample and place it in fridge or small cooler with icepack.

Remember: It is important that you do not contaminate the sample as you handle the container. Wash your hands before you start and be careful not to touch the rim of the bottle or the inside of the cap.



C076611_COC

☒ Regular Turnaround Time (TAT)
 (5 days for most tests) ☐ RUSH Please contact the lab
 Surcharges will be applied

Project Name: GALIANO HOUSING Date Required: _____

SPECIAL INSTRUCTIONS:

Return Cooler ☐ Ship Sample Bottles (please specify) ☐

Sample Identification (Sample Location &/or Description)		Sample Location (eg. Tap, Wellhead)	Date/Time Sampled (24hr)	PLEASE CIRCLE				ANALYSIS REQUESTED PLEASE SELECT BELOW				Report Current Drinking Water Criteria
				Samples from a Drinking Water Source? Y/N	Does source supply multiple households? Y/N	Are individuals drinking this water? Y/N	Are you on a boil water advisory? Y/N	Drinking Water Scan	Home Safety Scan	Total Metals Scan including Hardness & Hg	Total Coliform and E. Coli	
1	PORLIER WELL	WELL	2020/10/19 0915	Y	Y	Y	Y	Y	Y	Y	Y	X
2				Y	Y	Y	Y					X
3				Y	Y	Y	Y					X
4				Y	Y	Y	Y					X
5				Y	Y	Y	Y					X

1. Samples should arrive at the laboratories (Courtenay or Victoria) within 24 hrs of sampling. Ship samples between Monday and Thursday to avoid lab scheduling conflicts.
2. The sample should be kept cool during transit (<8°C - refrigerated or packed on ice).
3. Fill out the Chain of Custody (COC) form beside these instructions and submit with the sample. Incomplete or missing COC's will result in delays impacting turnaround time and the lab's ability to proceed with time sensitive tests.
4. Delivery Options:
 Personally deliver samples to Courtenay or Victoria (Samples will be forwarded to Burnaby on your behalf unless analysis is completed locally in Courtenay. Please consider sample hold times.)
 Overnight shipping to Burnaby: If you ship a sample on the same day that it was collected you can use an overnight courier.
 Same day shipping: Available in some areas. Please contact the lab for details.

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas Laboratories' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms available at <http://www.bvlab.com/terms-and-conditions>

Print name and sign			Print name and sign			Laboratory Use Only		
Relinquished By:	Date (yy/mm/dd):	Time (24 hr):	Received by:	Date (yy/mm/dd):	Time (24 hr):	Time Sensitive	Temperatures on Receipt (°C):	Custody Seal
<u>A.P. Kohut</u>	<u>20/10/19</u>	<u>1355</u>	<u>[Signature]</u>	<u>20/10/19</u>	<u>1355</u>	<input type="checkbox"/>	A) <u>13</u> B) <u>12</u> C) <u>13</u>	Present?
							Just sampled & rec'd on ice	Intact?

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS AND SAMPLES ANALYZED OUTSIDE REGULATORY HOLD TIMES.

BBV FCD-00077/14

COC-1035