

File: 2007261

November 22, 2020

Mayne Island Housing Society
Mayne Island BC

Attention: Deborah Goldman

Re: Assessment of Pumping Test on Well WID 43943 for Proposed Affordable Housing Project, Mayne Island

Further to the desktop assessment completed in September 2020 by Hy-Geo Consulting (Kohut, 2020), Red Williams Well Drilling & Pump Installations Ltd., constructed bedrock well WID 43943 on the property to provide the water supply for your proposed affordable housing project along Village Bay Road on Mayne Island. This report summarizes the results of pump testing the well and monitoring potential effects on neighbouring wells and surface water supplies. Previous information on the hydrogeological setting of the property is provided in the September desktop report (Kohut, 2020).

WELL WID 43943

WELL WID 43943 was constructed on September 29, 2020 to a depth of 140 feet (42.67 m) at a location approximately 50 m from the western boundary of the subject property (Figure 1). A copy of the well record for the well is provided in Appendix A. The well was completed in fractured brown to grey sandstone encountering a major water-bearing fracture zone from 106 to 111 feet (32.32 to 33.83m) below ground yielding 20+ USgpm as reported by the driller. The well was subsequently lined with 4 inch diameter slotted PVC casing from 6 to 106 feet (1.83 to 32.31m) as chunks of rock were reported coming from the major fracture zone. Lithology of the drilling record indicates the well was drilled into the Geoffrey Formation comprised mainly of sandstone (Muller and Jeletzky, 1970).

NEIGHBOURING WELLS and SPRINGS

Figure 1 shows the location of reported water wells and springs in and within the vicinity of the property. Wells currently within the Ministry of Environment's WELLS database (Province of British Columbia, 2020a and 2020b) are identified with a Ministry well tag number (WTN) that is a unique computer generated identification number. In recent years, the Ministry has also provided well identification plate (WID) numbers to well drillers for attaching to the casing of new wells for identification in the field.

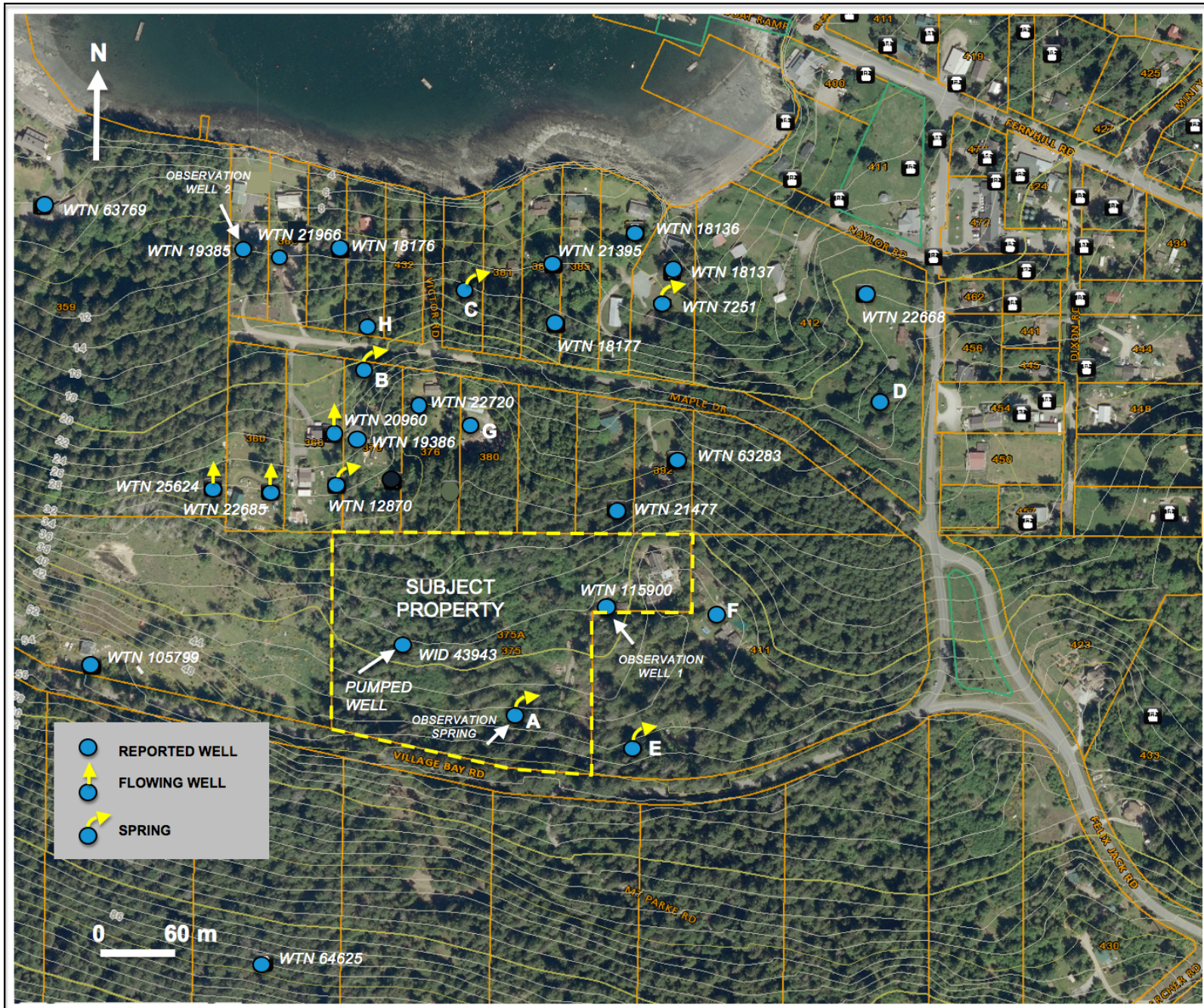


Figure 1. Location of reported wells and springs in and within the vicinity of the subject property. Basemap from CRD (2020).

On October 4, 2020 a field survey was carried out to verify the locations of reported wells and identify any unmapped wells in the region surrounding well WID 43943. Table 1 provides an updated listing and locations of the closest wells and springs to the property. Since historic reporting of water wells to the province was voluntary prior to 2016, it is possible that additional wells may be situated in the region. As access to all properties was not possible during the field survey the listing in Table 1 is not considered entirely complete.

REGIONAL WATER LEVEL FLUCTUATIONS

From historic observation well data in the Gulf Islands, groundwater levels in bedrock wells generally rise and fall with the seasons, in response to available precipitation, becoming highest during the late fall and winter months. Water levels then normally decline during the dry summer months reaching seasonal lows in the late fall months (Kohut *et al.*, 1984).

Figure 2 shows the historic range of annual water level fluctuations for provincial Observation Well 125 on Mayne Island and the water level trend in the fall of 2020 just prior to the pumping test of well WID 43943. At the end of September 2020 groundwater levels in the observation well were declining after spiking in September due to major rain events and were just above the median levels for this time of year. The variation in water level for this particular well, however has been less than 1 m over the past 49 years. As well WID 43943 is situated in a regional groundwater discharge area, the natural seasonal water level fluctuations are not anticipated to be large.

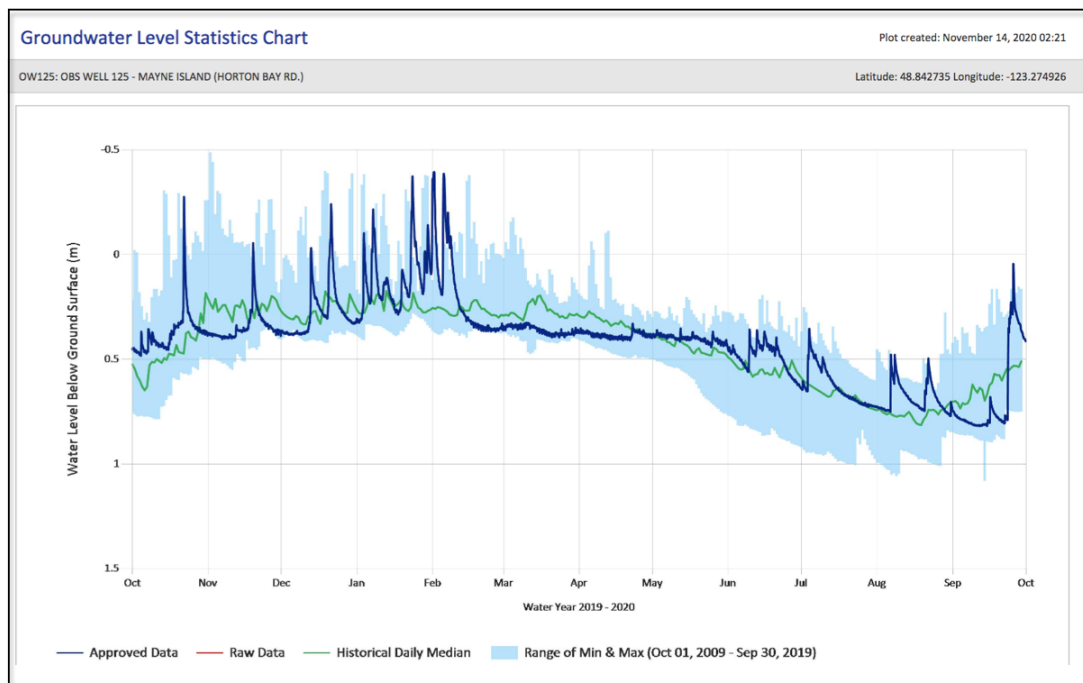


Figure 2. Groundwater level trend in 2019 - 2020 compared to historic maximum, minimum and median data for Observation Well 125, Mayne Island. Adapted from Province of British Columbia (2020c).

Table 1. Summary of reported wells and springs in and within the vicinity of the subject property.

| Well Tag Number or Site | Well ID Plate | Finished Well Depth (ft) | Finished Well Depth (m) | Diameter (in) | Water Depth (ft) | Water Depth (m) | Bedrock Depth (ft) | Bedrock Depth (m) | Well Yield (Usgpm) | Well Yield (L/m) | Comments |
|-------------------------|---------------|--------------------------|-------------------------|---------------|------------------|-----------------|--------------------|-------------------|--------------------|------------------|--|
| A | | | | | | | | | | | licensed spring, field location verified |
| B | | | | | | | | | | | licensed spring, field location verified |
| C | | | | | | | | | | | licensed spring, field location verified |
| D | | | | | | | | | | | reported well |
| E | | | | | | | | | | | reported spring by landowner |
| F | | | | | | | | | | | reported well by landowner and field location verified |
| G | | | | | | | | | | | well Oct. 4/20 field location verified |
| H | | | | | | | | | | | well Oct. 4/20 field location verified |
| 7251 | | 10 | 3.0 | | 7 | 2.1 | | | | | spring, sandstone |
| 12870 | | 4 | 1.2 | | Flows | Flows | | | 0.35 | 1.32 | spring |
| 18136 | | 50 | 15.2 | | 6 | 1.8 | 10 | 3.0 | 1.5 | 5.68 | shale and sandstone |
| 18137 | | 50 | 15.2 | | 8.5 | 2.6 | 8 | 2.4 | 1 | 3.79 | shale and sandstone |
| 18176 | | 90 | 27.4 | | 26 | 7.9 | 8 | 2.4 | 1 | 3.79 | sandstone and shale |
| 18177 | | 50 | 15.2 | | 8 | 2.4 | 8 | 2.4 | 1 | 3.79 | sandstone and shale |
| 19385 | | 75 | 22.9 | | 19 | 5.8 | 9 | 2.7 | 1.5 | 5.68 | hard grey sandstone, field location verified |
| 19386 | | 73 | 22.2 | | 19.5 | 5.9 | 3 | 0.9 | 10 | 37.85 | sandstone and shale, field location verified |
| 20960 | | 88 | 26.8 | | Flows | Flows | 26 | 7.9 | 2 | 7.57 | hard grey sandstone |
| 21395 | | 120 | 36.6 | | 26 | 7.9 | 3 | 0.9 | 5 | 18.93 | sandstone and shale |
| 21477 | | 110 | 33.5 | | 28 | 8.5 | 0 | 0.0 | 2 | 7.57 | shaley sandstone |
| 21966 | | 93 | 28.3 | | 14 | 4.3 | 8 | 2.4 | 5 | 18.93 | shale and sandstone, field location verified |
| 22668 | | 60 | 18.3 | | | | 23 | 7.0 | 15 | 56.78 | sandstone |
| 22685 | | 85 | 25.9 | | 4 | 1.2 | 17 | 5.2 | 5.5 | 20.82 | basalt? reported to flow |
| 22720 | | 70 | 21.3 | | 24 | 7.3 | 0 | 0.0 | 12 | 45.42 | shaley sandstone, field location verified |
| 25624 | | 100 | 30.5 | | 4 | 1.2 | 22 | 6.7 | 6 | 22.71 | basalt? reported to flow |
| 63283 | | 180 | 54.9 | | | | 10 | 3.0 | 25 | 94.64 | sandstone |
| 63769 | | 200 | 61.0 | | | | 8 | 2.4 | 1 | 3.79 | blue shale |
| 64625 | | 300 | 91.4 | | | | 1 | 0.3 | 10 | 37.85 | hard sandstone |
| 105799 | 32143 | 320 | 97.5 | 6.63 | | | 0 | 0.0 | 1.25 | 4.73 | sandstone |
| 115900 | 47026 | 140 | 42.7 | 6 | 26 | 7.9 | 25 | 7.6 | 15 | 56.78 | field location verified |
| | 43943 | 140 | 42.7 | 6 | 25 | 7.6 | 24 | 7.3 | 20+ | 75.70+ | sandstone, fracture 55-57 ft (5 gpm), 106-111 ft (20+ gpm) |

Data from Province of British Columbia (2020a and 2020b), reports of landowners Sept. 14, 2020 and field survey October 4, 2020.

PUMPING TEST OF WID 43943

A minimum 72 hour pumping test is the recommended standard for assessing bedrock wells for community water systems due to uncertainties associated with bedrock aquifers (Ministry of Environment, 2010). The project well WID 43943 was subsequently pump tested by Red Williams Well Drilling & Pump Installations Ltd., at a constant rate of 11.84 L/min (3.13 USgpm) for just over 72 hours from October 3 to October 6, 2020. The potential residential water demand at the proposed facility is estimated to be 7360 L/day, or equivalent to a continuous pumping rate of 5.11 L/min (1.35 US gals/minute) as estimated by Kohut (2020).

Pumped water was discharged 60 m down slope 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 also 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 neighbouring well WTN 115900 and Spring A on the property were also monitored during the pumping test with *dipperLog* transducers. A second observation well WTN 19385 north of Maple Road was also monitored with a *dipperLog* transducer during the test. Photos of the monitoring sites are shown in Appendix B. Upon pump shutdown, recovery water levels in well WID 43943 were manually taken at prescribed intervals for 3.8 hours and for a further 19.5 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 during the months prior to the pumping test was slightly above normal as shown in Table 2. During the ten day period prior to the test, 50.4 mm of rain was recorded at the North Pender Island climate station and during the days of the test 0 mm of rain was recorded. As previously discussed, regional groundwater levels as recorded in Observation Well 125 showed a spike in September 2020.

Table 2. Monthly 2020 precipitation data for North Pender climate station (Climate 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 | 107.6 |
| July | 20.3 | 21.2 | 95.8 | 98.2 |
| August | 21.2 | 23.8 | 89.1 | 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).

PUMP TESTING RESULTS

Well test data, drawdown and recovery plots for the project well are provided in Appendix C. Appendix D contains a copy of the water quality analytical laboratory report from Bureau Veritas.

The pumping test was started at 9:00 am on October 3 and ended at 9:09 am on October 6. Figure 3 shows the drawdown in the project well during pumping. Flow was measured manually using a 5.16 US gallon jug and with a flow meter. The pumping rate was held at a median rate of 11.84 L/min (3.13 USgpm) for the duration of the test varying less than 1 percent at any one measurement time.

Drawdown at the end of the test reached 1.152 m below the initial non-pumping water level of 4.621 m below ground. Only 4.2% of the available drawdown (27.688 m) to the major water bearing fracture at a depth of 32.309 m (106 feet) in the well was utilized during the test. Water level recovery was 96 percent complete 1400 minutes after pump shutdown (Figure B2, Appendix B). Extrapolation of the drawdown in the well to 100 days pumping at 11.84 L/min indicates the water level would reach 2.30 m indicating a relatively high specific capacity of 5.148 L/min/m of drawdown at 100 days. Only 8.4% of the available drawdown in the well would be utilized at that time, providing a large safety factor in the well. Utilization of the well at the estimated demand rate of 5.11 L/min (1.35 US gals/minute) would provide an even higher degree of drawdown safety. Based on these results the minimum long term sustainable yield of the well is the maximum rate at which it was pumped, that is, 11.84 L/min (3.13 USgpm). The well is more than capable of meeting the estimated residential water demand of the housing project with a very large degree of safety. In addition, pumping water levels would not be drawn down below sea level precluding the possibility of sea water intrusion.

No discernible interference was observed in the two observation wells and the spring monitored during the test. (see Figures 4, 5 and 6). A brief discussion on the monitoring results for each of the monitoring sites is provided below. Locations of the monitoring sites are shown in Figure 1. Photos of the monitoring sites are provided in Appendix B,

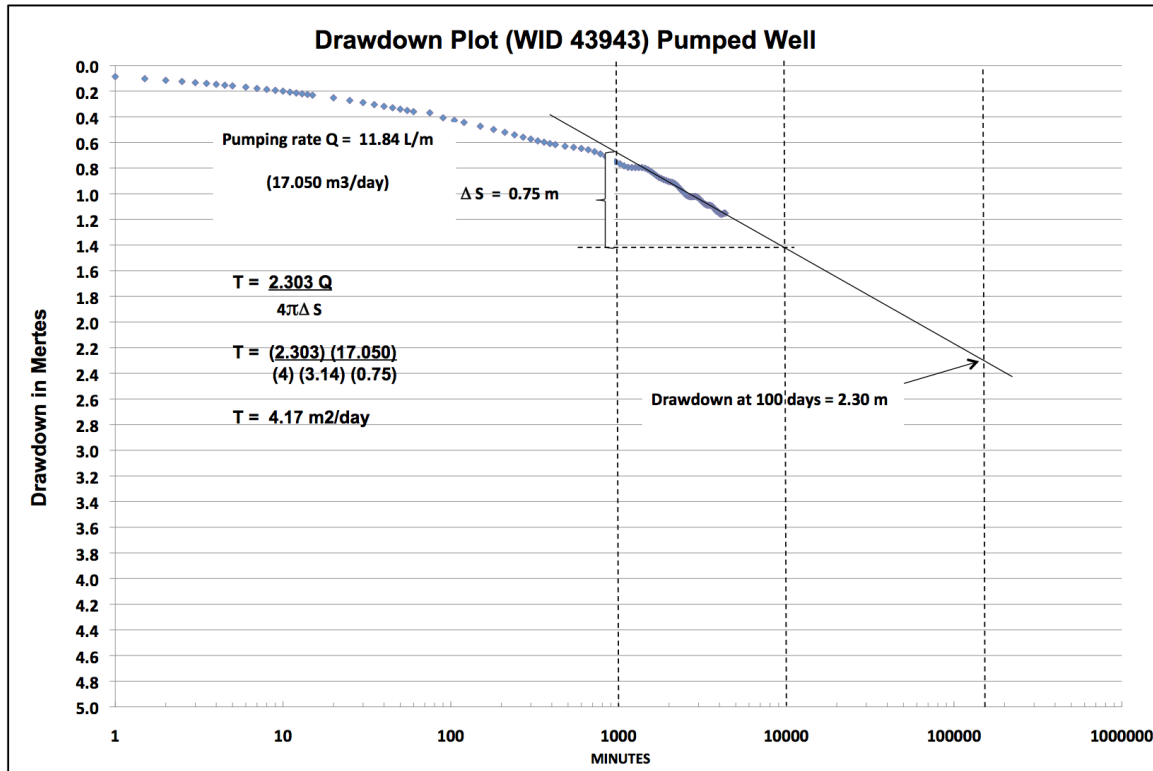


Figure 3. Semi-logarithmic drawdown plot for project well during 72 hour test.

Observation Well 1 (WTN 115900)

Well WTN 115900 is a 140 foot (42.7m) bedrock well situated approximately 150 m northeast of the pumped well WID 43943. A large portable water supply tank was made available to the well owner during the test and the well was not being used. Prior to the test the well was used to fill the water tank. Water level in the monitoring well rose steadily 23.7 cm during the test and continued a rising trend following the test (Figure 4). No discernible water level interference was observed from the pumping well WID 43943.

Observation Well 2 (WTN 19385)

Well WTN 19385 is a 75 foot (22.9) bedrock well completed in hard grey sandstone and situated approximately 350 m northwest of the pumped well WID 43943. Well WTN 19385 continued to operate during the test and shows intermittent drawdown and recovery effects of well WTN 19385 pumping and slight interference effects from neighbouring wells pumping (Figure 5). No discernible water level interference is evident from the test pumping of well WID 43943 during or after the test period.

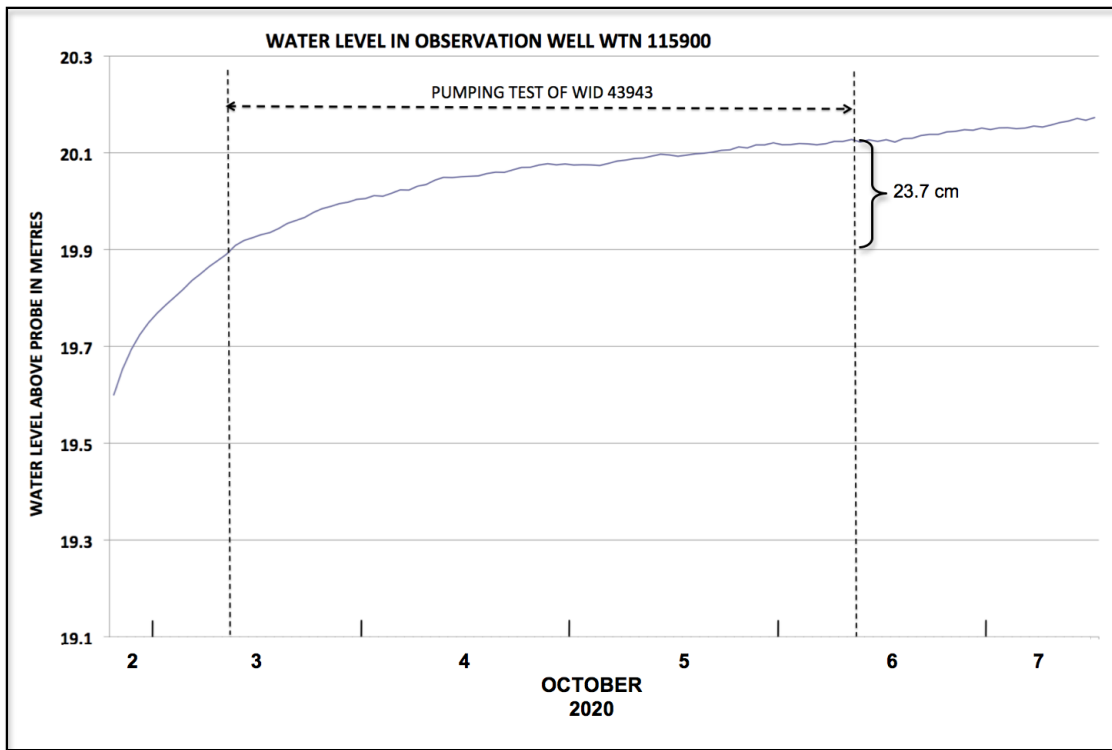


Figure 4. Water levels in observation well (1) WTN 115900 during 72 hour pumping test of project well WID 43943.

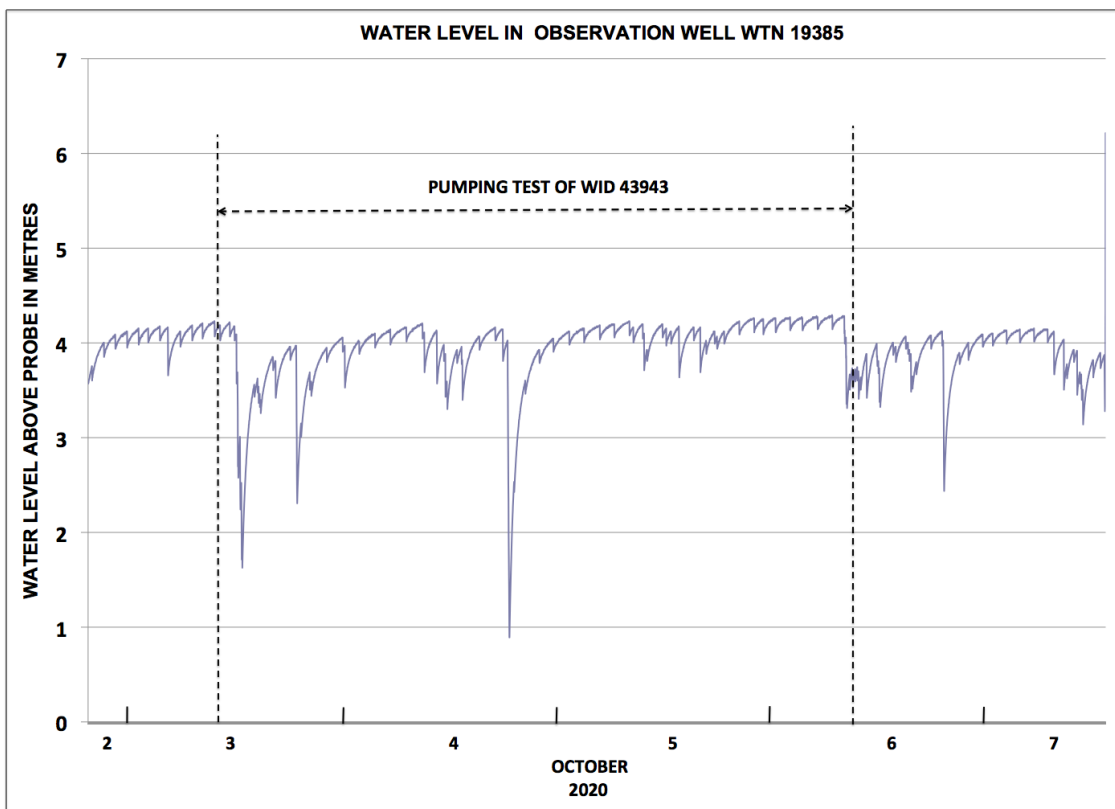


Figure 5. Water level in observation well (2) WTN 19485 during 72 hour pumping test of project well WID 43943.

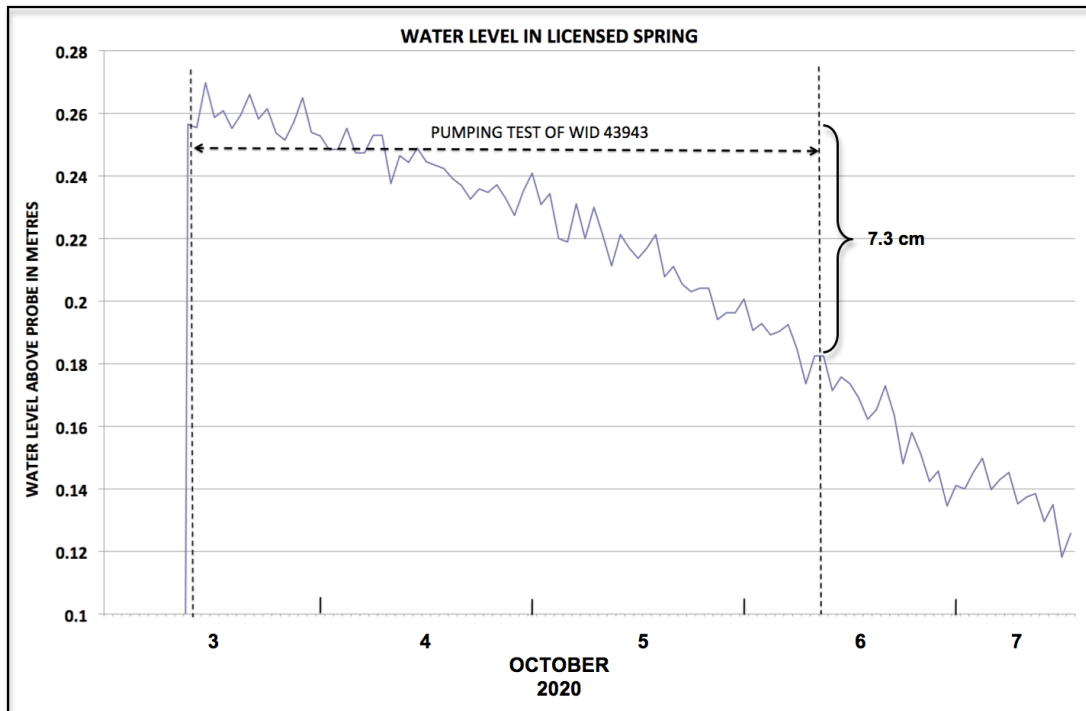


Figure 6. Water level in licensed spring Site A on the property during 72 hour pumping test of project well WID 43943.

Observation Spring Site A

Spring Site A is a concrete lined sump licensed as Dundas Spring (C052832) for 2.273 cubic metres/day. During the pumping test the water level showed an overall decline of 7.3 cm, continuing to decline after the test stopped. This decline is likely due to continued seasonal lowering of shallow groundwater conditions in the unconsolidated deposits and possible interference effects of the neighbouring unlicensed spring Site E to the east (Figure 1). The spring at Site A shows no direct interference from the pumping of WID 43943.

CONCEPTUAL AQUIFER MODEL

Figure 7 essentially represents the conceptual model of a portion of the bedrock Aquifer 619 in the region described previously by Kohut (2020) with recharge taking place on the upland region of Mount Parke with groundwater moving north easterly and discharging at the toe of the slope near an elevation of 50 metres. Groundwater likely moves primarily through a series of interconnected fractures; including faults, joints and bedding plane contacts. The potentiometric (water level) in the aquifer likely mirrors the topography having a similar gradient of about 0.4 .

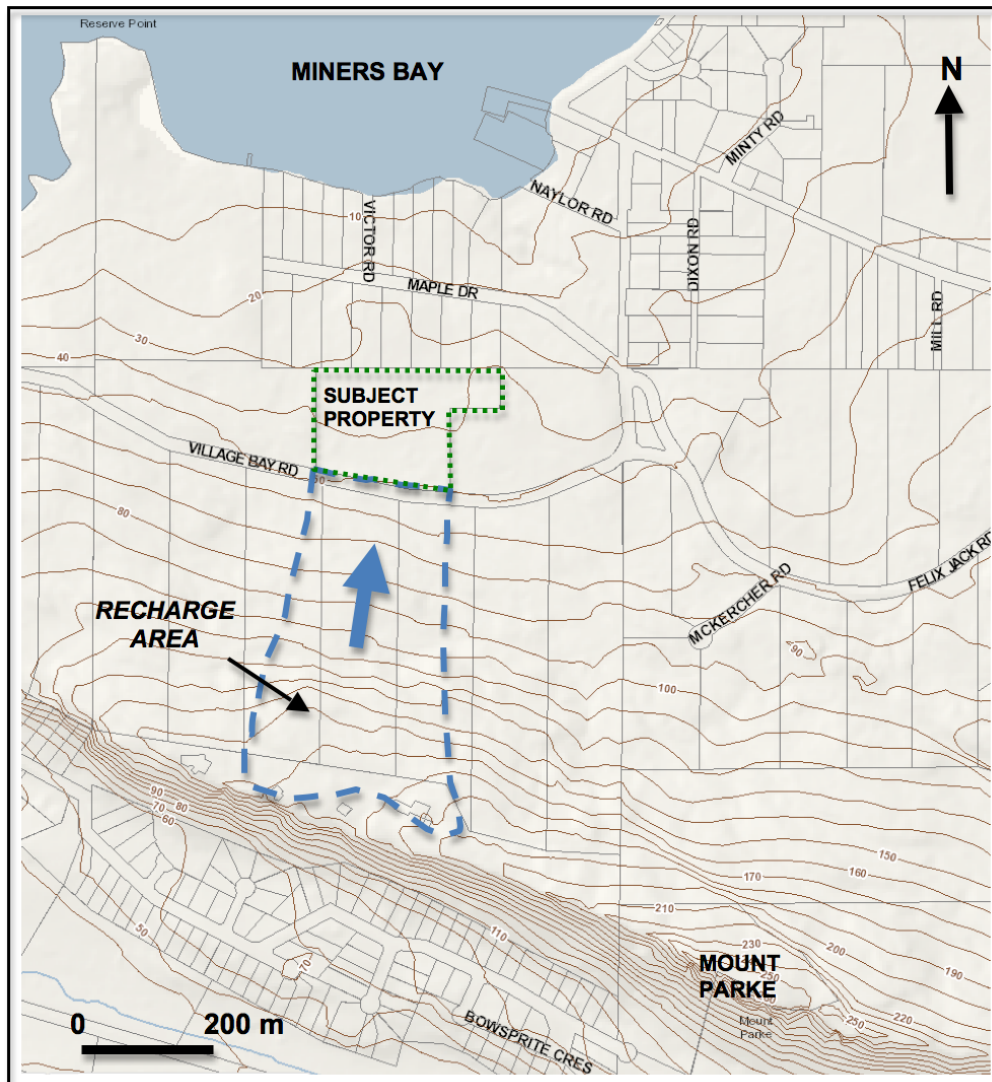


Figure 7. Potential groundwater recharge area in a portion of bedrock Aquifer 619 up gradient of the subject property. Blue arrow indicates inferred direction of groundwater flow. Basemap from Islands Trust (2020); contour interval = 10 m.

Potential Recharge

The potential recharge area situated directly up gradient of the subject property covers an area of approximately 0.123 Km² as determined from the area measurement tool at the Islands Trust *MapIt* website (Islands Trust, 2020). The area lies within the Center1_West 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 9.4 % of annual (1981-2010) normal precipitation. Based on a groundwater recharge rate of 9.4 % of the annual precipitation of 842 mm, the estimated annual water demands of the project of 5.11 L/min, would potentially utilize 28% % of the annual normal recharge and possibly 30% 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).

Groundwater Flow Estimate

Based on the aquifer transmissivity determined from the pumping test of well WID 43943 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 = 200 m, and I = 0.4, and T = 4.17 m²/day would be 333.6 m³/day (61.2 USgpm).

Based on the estimated water demands for the project at 5.11 L/min (1.35 USgpm) only 2.2 % of the groundwater flow through the subject property would be intercepted by pumping of the project well.

There are some 22 other land parcels directly down gradient and above the subject property that potentially may 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 32120 m³/year. With the proposed potential annual use of the project well at 5.11 L/min (2685 m³/year), future demand could approach a total of 34850 m³/year or 17.52 USgpm. This would be equivalent to 28.6 % of the natural flow through the aquifer underlying the site area.

WATER QUALITY RESULTS

Laboratory results of the October 6, 2020 sampling as shown in Table 3, indicate that the water quality of the project well met or exceeded the *Guidelines for Canadian Drinking Water* (Health Canada, 2019) for all parameters except for dissolved manganese at 349 µg/L. The water is low in overall mineralization (TDS = 190 mg/L), with low total sodium (42.1 mg/L), low chloride (7.8 mg/L) and no detectable coliform or E.coli bacteria. Elevated manganese at or above 20 µg/L can cause staining of laundry and bathroom fixtures. Elevated levels of manganese are also a health concern when levels exceed the Maximum Acceptable Concentration (MAC) of 120 µg/L as this effects neurological development and behaviour and found to cause deficits in memory, attention, and motor skills. Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk (Health Canada, 2019). Levels of the elevated constituents can be treated with an appropriately designed and maintained point-of-entry (POE) water treatment system.

Table 3. Summary of water quality analyses.

| Parameters/Site and Sampling Date | WELL WID 43943 Mayne Housing Oct 6/20 | | WELL WID 43943 Mayne Housing Oct 6/20 | Canadian DWGuideline 2019 | Units |
|--|---|-------------------------|---|---------------------------|-----------|
| PHYSICAL TESTS | | | | | |
| True Colour | <5.0 | | | < or =15 | TCU |
| Conductivity | 760 | | | | µS/cm |
| Total Hardness (CaCO ₃) | 95.7 | Dissolved Hardness | 97.9 | | mg/L |
| pH | 7.87 | | | 7.0-10.5 | pH units |
| Total Dissolved solids (TDS) | 190 | | | < or = 500 | mg/L |
| Turbidity | 0.13 | | | <1.0 | NTU |
| ANIONS | | | | | |
| Alkalinity (Total as CaCO ₃) | 170 | | | | mg/L |
| Alkalinity (PP as CaCO ₃) | <1.0 | | | | mg/L |
| Bicarbonate | 210 | | | | mg/L |
| Carbonate | <1.0 | | | | mg/L |
| Hydroxide | <1.0 | | | | mg/L |
| Chloride | 7.8 | | | < or = 250 | mg/L |
| Fluoride | 0.093 | | | 1.5 | mg/L |
| Nitrate (N) | <0.020 | | | 10 | mg/L |
| Nitrite (N) | <0.0050 | | | 1 | mg/L |
| Total Organic Nitrogen (N) | 0.038 | | | | mg/L |
| Total Ammonia (N) | 0.029 | | | | mg/L |
| Nitrate plus Nitrite (N) | <0.020 | | | | mg/L |
| Total Nitrogen (N) | 0.067 | | | | mg/L |
| Total Organic Carbon (C) | 0.61 | | | | mg/L |
| Total Phosphorus (P) | | | | | mg/L |
| Total Sulphide | <0.0018 | | | 0.05 | mg/L |
| Sulphide (as H ₂ S) | <0.0020 | | | 0.05 | mg/L |
| Sulphate | 12 | | | < or =500 | mg/L |
| TOTAL METALS | | DISSOLVED METALS | | | |
| Aluminum | <3.0 | | <3.0 | | µg/L |
| Antimony | 0.59 | | 0.56 | 6 | µg/L |
| Arsenic | 0.44 | | 0.43 | 10 | µg/L |
| Barium | 1.1 | | 1.2 | 1000 | µg/L |
| Beryllium | <0.10 | | <0.10 | | µg/L |
| Boron | <50 | | <50 | 5000 | µg/L |
| Cadmium | <0.010 | | <0.010 | 5 | µg/L |
| Chromium | <1.0 | | <1.0 | 50 | µg/L |
| Cobalt | <0.20 | | <0.20 | | µg/L |
| Copper | 0.99 | | 0.93 | < or =1000 | µg/L |
| Iron | 24.9 | | 22.1 | < or = 300 | µg/L |
| Lead | <0.20 | | <0.20 | 10 | µg/L |
| Manganese | 344 | | 349 | < or = 20 | µg/L |
| Mercury | <0.0019 | | | 1 | µg/L |
| Molybdenum | <1.0 | | <1.0 | | µg/L |
| Nickel | <1.0 | | <1.0 | | µg/L |
| Selenium | 0.36 | | 0.38 | 50 | µg/L |
| Silicon | 9650 | | 9640 | | µg/L |
| Silver | <0.020 | | <0.020 | | µg/L |
| Strontium | 158 | | 154 | | µg/L |
| Thallium | <0.010 | | <0.010 | | µg/L |
| Tin | <5.0 | | <5.0 | | µg/L |
| Titanium | <5.0 | | <5.0 | | µg/L |
| Uranium | 0.23 | | 0.23 | | µg/L |
| Vanadium | <5.0 | | <5.0 | | µg/L |
| Zinc | <5.0 | | <5.0 | < or = 5000 | µg/L |
| Zirconium | <0.10 | | <0.10 | | µg/L |
| Calcium | 26.2 | | 26 | | mg/L |
| Magnesium | 7.35 | | 7.99 | | mg/L |
| Potassium | 0.227 | | 0.239 | | mg/L |
| Sodium | 42.1 | | 46.0 | < or = 200 | mg/L |
| Sulphur | 3.7 | | 3.8 | | mg/L |
| MICROBIOLOGICAL | | | | | |
| Total coliforms | 0 | | | ND | CFU/100mL |
| Escherichia coli (E. coli) | 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.

CONCLUSIONS

The following conclusions on the available water quantity and water quality of well WID 43943 that was constructed for the proposed affordable housing project on Mayne can be made:

1. The new Well WID 43943 was drilled on the subject property by Red Williams on September 29, 2020 and completed to a depth of 140 feet (42.67 m) in fractured sandstone. The drilling encountered a major water-bearing fracture zone at a depth of 106 to 111 feet (32.31 to 33.83 m) that produced 20 USgpm (75.7 L/min) on preliminary testing.
2. The well was pump tested for 72 hours between October 3 and October 6, 2020 by Red Williams Well Drilling Ltd., at a constant rate of 11.84 L/min (3.13 USgpm) and water level monitoring was carried out on the nearest neighbouring bedrock well, a licensed spring on the property and on a private bedrock well off Maple Road.
3. Drawdown in the pumped well at the end of the test was only 1.152 m (3.78 feet) below the non pumping water level of 4.621 m (15.16 feet) below ground. Only 4.2 percent of the available drawdown in the well was utilized during the test at the pumping rate of 11.84 L/min (3.13 USgpm). The well is obviously more than capable of supplying the estimated demand of the project at 5.11 L/min (1.35 USgpm) with a very large safety factor. Pumping water levels would not be drawn down below sea level precluding the possibility of sea water intrusion.
4. None of the neighbouring wells or the spring monitored during the test showed any signs of water level interference from the pumped well.
5. Although capable of being pumped at rates far in excess of 11.84 L/min (3.13 USgpm) the safe well yield is determined to be 11.84 L/min (3.13 USgpm) at this time.
6. Water samples collected at the end of the pumping test and submitted for laboratory testing indicate the water is low in overall mineralization (TDS = 190 mg/L), with low total sodium (42.1 mg/L), low chloride (7.8 mg/L) and no detectable coliform or E.coli bacteria. Dissolved manganese was reported at 349 parts per billion (ppb) exceeding the *Canadian Drinking Water Guideline* of 20 and 120 ppb. Manganese is ubiquitous in the groundwater of the Gulf Islands and can be treated with appropriate water treatment equipment.

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 Mayne Island Housing Society 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
Nov 22/20

A circular professional seal for Alan P. Kohut, a Professional Engineer in the Province of British Columbia. The seal contains the text: "PROFESSIONAL PROVINCE OF BRITISH COLUMBIA ENGINEER" around the perimeter, and "A. P. KOHUT #10194" in the center.

Alan P. Kohut PEng.
Principal and Senior Hydrogeologist

HY-GEO CONSULTING

REFERENCES

- CRD. 2020. *CRD Regional Map*. Internet website
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APPENDIX A

Well Record WID 43943



Ministry of Environment

RED WILLIAMS WELL DRILLING LTD. 43943
Well Construction Report 980 PRATT RD
Well Closure Report QUALIKOR BEACH BC
Well Alteration Report V913 IWS
(25) 12 10 5552

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

Owner name: MAYNE ISLAND HOUSING SOCIETY
Mailing address: 518 DALTON DRIVE Town MAYNE ISLAND Prov. B.C. Postal Code V0N 2J2
Well Location (see note 2): Address: Street no. 3715 Street name VILLAGE BAY ROAD Town MAYNE ISLAND
Legal description: Lot B Plan Vp27091 D.L. Block Sec. 7 Twp. Rg. Land District 16
PID: 002-552-256 and Description of well location (attach sketch, if nec.): WITHIN PROPERTY BOUNDARIES
PORTION MAYNE ISLAND
NAD 83: Zone: 10 UTM Easting: 477677.3 m Latitude (see note 4):
UTM Northing: 5410551 m Longitude:
Method of drilling: Air rotary
Orientation of well: Vertical
Class of well: WATER SUPPLY Sub-class of well: DOMESTIC
Water supply wells: indicate intended water use: Private domestic

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

Table with columns: From ft (bgl), To ft (bgl), Surficial Material, Bedrock Material, Colour, Hardness, Water Content, Observations. Includes handwritten data for depths 0-106 ft and observations like 'BROKEN UP', 'FRACTURE/CHUNKS', 'FRACTURE'.

Casing details

Table with columns: From ft (bgl), To ft (bgl), Dia in, Casing Material/Open Hole, Wall Thickness in, Drive Shoe. Includes handwritten data for 0-24 ft STEEL and 24-106 ft PVC.

Screen details

Table with columns: From ft (bgl), To ft (bgl), Dia in, Type, Slot Size. Includes handwritten data for 0-24 ft STEEL and 24-106 ft PVC.

Surface seal: Type: BENTONITE Depth: 17' ft
Method of installation: Poured Thickness: 2" in
Backfill: Type: Depth: ft
Liner: PVC Other (specify):
Diameter: in Thickness: in
From: ft (bgl) To: ft (bgl) Perforated: From: ft (bgl) To: ft (bgl)

Intake: Screen Open bottom Uncased hole
Screen type: Telescope Pipe size
Screen material: Stainless steel Plastic Other (specify):
Screen opening: Continuous slot Slotted Perforated pipe
Screen bottom: Ball 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: 3 hrs
Notes:

Final well completion data:

Total depth drilled: 140' ft Finished well depth: 140' ft (bgl)
Final stick up: 31.2' in Depth to bedrock: 24' ft (bgl)
SWL: 25' ft (btoc) Estimated well yield: 20' USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: VERMIN PROOF Well disinfected: Yes No
Where well ID plate is attached: STRAPPED TO CASING

Well yield estimated by:

Pumping Air lifting Bailing Other (specify):
Rate: 20' USgpm Duration: 3 hrs
SWL before test: 25' ft (btoc) Pumping water level: ft (btoc)

Well closure information:

Reason for closure:
Method of closure: Poured Pumped
Sealant material: Backfill material:
Details of closure (see note 16):

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): TRAVIS JOHNSON
Registration no. (see note 20): WD 06041901
Consultant (if applicable, name and company):

Date of work (YYYY/MM/DD):

Started: 2020/09/29 Completed: 2020/09/29
Comments:

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 PER TRAVIS JOHNSON

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

white: Customer copy
canary: Driller copy
pink: Ministry copy
Sheet 1 of 2



Ministry of Environment

RED WILLIAMS WELL DRILLING LTD.

Well Construction Report 980 PRATT ROAD QUALICORP BEACH B.C. V9K 1W5 (250)248-5552

Ministry Well ID Plate Number: 43943
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: MAYNE ISLAND HOUSING SOCIETY
Mailing address: 518 DALTON DRIVE Town MAYNE ISLAND Prov. B.C. Postal Code V0N 2J2
Well Location (see note 2): Address: Street no. 375 Street name VILLAGE BAY RD. Town MAYNE ISLAND
Legal description: Lot B Plan V1P27091 D.L. Block Sec. 7 Twp. Rg. Land District 16
PID: 002-552-256 and Description of well location (attach sketch, if nec.): WITHIN PROPERTY BOUNDARIES PORTION MAYNE ISLAND
NAD 83: Zone: 10 UTM Easting: 477677.3 m Latitude (see note 4):
UTM Northing: 5410551 m Longitude:
Method of drilling: Air rotary
Orientation of well: Vertical
Class of well: WATER SUPPLY Sub-class of well: DOMESTIC
Water supply wells: indicate intended water use: Private domestic

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

Table with columns: From ft (bgl), To ft (bgl), Surficial Material, Bedrock Material, Colour, Hardness, Water Content, Observations. Includes handwritten data for depths 106-111 and 111-140.

Casing details

Table with columns: From ft (bgl), To ft (bgl), Dia in, Casing Material/Open Hole, Wall Thickness in, Drive Shoe. Includes handwritten data for 0-6' and 6-106'.

Screen details

Table with columns: From ft (bgl), To ft (bgl), Dia in, Type, Slot Size. Includes handwritten data for 0-140'.

Surface seal: Type: BENTONITE Depth: 17' ft
Method of installation: X Poured Thickness: 2" in
Backfill: Type: Depth: ft
Liner: PVC
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: 3 hrs
Notes:

Final well completion data:

Total depth drilled: 140' ft Finished well depth: 140' ft (bgl)
Final stick up: 31.2" in Depth to bedrock: 24' ft (bgl)
SWL: 25' ft (btoc) Estimated well yield: 20+ USgpm
Artesian flow: VERMIN PROOF USgpm, or Artesian pressure: ft
Type of well cap: VERMIN PROOF Well disinfected: X Yes No
Where well ID plate is attached: STRAPPED TO CASING

Well yield estimated by:

Pumping Air lifting Bailing Other (specify):
Rate: 20+ USgpm Duration: 3 hrs
SWL before test: 25' ft (btoc) Pumping water level: ft (btoc)

Well closure information:

Reason for closure:
Method of closure: Poured Pumped
Sealant material: Backfill material:
Details of closure (see note 16):

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): TRAVIS JOHNSON
Registration no. (see note 20): WD 06041901
Consultant (if applicable; name and company):

Date of work (YYYY/MM/DD):

Started: 2020/09/29 Completed: 2020/09/29
Comments:

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: PER TRAVIS JOHNSON

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

white: Customer copy
canary: Driller copy
pink: Ministry copy
Sheet 2 of 2

APPENDIX B



Photo 1, Appendix B. Observation Well 1 (WTN 115900) on subject property.

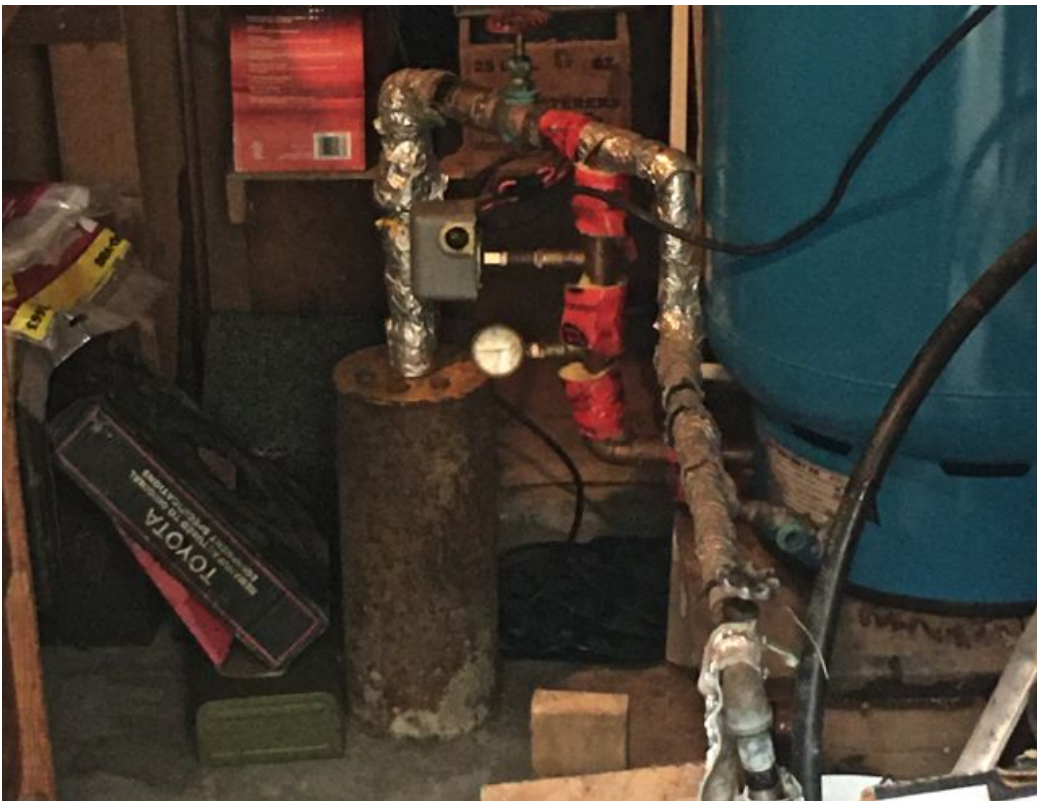


Photo 2, Appendix B. Observation Well 2 (WTN 19385).

APPENDIX B



Photo 3, Appendix B. Spring A on subject property.



Photo 4, Appendix B. Access cover to Spring A on subject property.

APPENDIX C

Pumping Test Data for Well WID 43943

Project: Mayne Island Housing Society
Client: Mayne Island Housing Society
Location: Mayne Island

Start Date of Test: 03-Oct-20
Test Conducted by: Red Williams
Pumped Well: WID 43943
Pumping Rate: 11.84 L/min 3.13 USgpm
Static Water Level: 5.621 m
Pump Setting: 36.576 m

Reference: all readings from top of sounding tube

Stick up: 1.0 m
Observation Wells: WTN 115900
 WTN 19385
 Spring A
Pump Start Time: 9:00 AM Oct. 3/20
Pump End Time: 9:09 AM Oct. 6/20
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 | 5.684 | 0.063 | 4330.5 | 1.5 | 6.730 | 2887.0 | 1.109 |
| 1 | 5.708 | 0.087 | 4331 | 2 | 6.701 | 2165.5 | 1.080 |
| 1.5 | 5.724 | 0.103 | 4331.5 | 2.5 | 6.682 | 1732.6 | 1.061 |
| 2 | 5.737 | 0.116 | 4332 | 3 | 6.669 | 1444.0 | 1.048 |
| 2.5 | 5.746 | 0.125 | 4332.5 | 3.5 | 6.658 | 1237.9 | 1.037 |
| 3 | 5.755 | 0.134 | 4333 | 4 | 6.649 | 1083.3 | 1.028 |
| 3.5 | 5.761 | 0.140 | 4333.5 | 4.5 | 6.641 | 963.0 | 1.020 |
| 4 | 5.768 | 0.147 | 4334 | 5 | 6.635 | 866.8 | 1.014 |
| 4.5 | 5.775 | 0.154 | 4334.5 | 5.5 | 6.629 | 788.1 | 1.008 |
| 5 | 5.780 | 0.159 | 4335 | 6 | 6.623 | 722.5 | 1.002 |
| 6 | 5.790 | 0.169 | 4336 | 7 | 6.613 | 619.4 | 0.992 |
| 7 | 5.800 | 0.179 | 4337 | 8 | 6.604 | 542.1 | 0.983 |
| 8 | 5.808 | 0.187 | 4338 | 9 | 6.596 | 482.0 | 0.975 |
| 9 | 5.815 | 0.194 | 4339 | 10 | 6.590 | 433.9 | 0.969 |
| 10 | 5.821 | 0.200 | 4340 | 11 | 6.582 | 394.5 | 0.961 |
| 11 | 5.829 | 0.208 | 4341 | 12 | 6.576 | 361.8 | 0.955 |
| 12 | 5.836 | 0.215 | 4342 | 13 | 6.570 | 334.0 | 0.949 |
| 13 | 5.842 | 0.221 | 4343 | 14 | 6.565 | 310.2 | 0.944 |
| 14 | 5.847 | 0.226 | 4344 | 15 | 6.560 | 289.6 | 0.939 |
| 15 | 5.853 | 0.232 | 4345 | 16 | 6.555 | 271.6 | 0.934 |
| 20 | 5.873 | 0.252 | 4350 | 21 | 6.533 | 207.1 | 0.912 |
| 25 | 5.894 | 0.273 | 4355 | 26 | 6.512 | 167.5 | 0.891 |
| 30 | 5.910 | 0.289 | 4360 | 31 | 6.500 | 140.6 | 0.879 |
| 35 | 5.926 | 0.305 | 4365 | 36 | 6.486 | 121.3 | 0.865 |
| 40 | 5.940 | 0.319 | 4370 | 41 | 6.473 | 106.6 | 0.852 |
| 45 | 5.951 | 0.330 | 4375 | 46 | 6.462 | 95.1 | 0.841 |
| 50 | 5.962 | 0.341 | 4380 | 51 | 6.452 | 85.9 | 0.831 |
| 55 | 5.972 | 0.351 | 4385 | 56 | 6.442 | 78.3 | 0.821 |
| 60 | 5.981 | 0.360 | 4390 | 61 | 6.434 | 72.0 | 0.813 |
| 75 | 5.990 | 0.369 | 4396 | 67 | 6.423 | 65.6 | 0.802 |
| 90 | 6.029 | 0.408 | 4411 | 81 | 6.396 | 54.5 | 0.775 |
| 105 | 6.049 | 0.428 | 4426 | 96 | 6.383 | 46.1 | 0.762 |
| 120 | 6.065 | 0.444 | 4441 | 111 | 6.370 | 40.0 | 0.749 |
| 150 | 6.095 | 0.474 | 4466 | 126 | 6.353 | 35.4 | 0.732 |
| 180 | 6.120 | 0.499 | 4481 | 141 | 6.343 | 31.8 | 0.722 |
| 210 | 6.142 | 0.521 | 4496 | 156 | 6.328 | 28.8 | 0.707 |
| 240 | 6.162 | 0.541 | 4511 | 171 | 6.322 | 26.4 | 0.701 |
| 270 | 6.180 | 0.559 | 4526 | 186 | 6.312 | 24.3 | 0.691 |
| 300 | 6.195 | 0.574 | 4616 | 231 | 6.280 | 20.0 | 0.659 |
| 330 | 6.209 | 0.588 | 4826 | 441 | 5.988 | 10.9 | 0.367 |
| 360 | 6.219 | 0.598 | 4886 | 501 | 5.975 | 9.8 | 0.354 |
| 390 | 6.230 | 0.609 | 4946 | 561 | 5.957 | 8.8 | 0.336 |
| 420 | 6.238 | 0.617 | 5006 | 621 | 5.944 | 8.1 | 0.323 |
| 480 | 6.251 | 0.630 | 5066 | 681 | 5.931 | 7.4 | 0.310 |
| 540 | 6.259 | 0.638 | 5126 | 741 | 5.923 | 6.9 | 0.302 |
| 600 | 6.268 | 0.647 | 5186 | 801 | 5.917 | 6.5 | 0.296 |
| 660 | 6.278 | 0.657 | 5246 | 861 | 5.917 | 6.1 | 0.296 |
| 720 | 6.293 | 0.672 | 5306 | 921 | 5.919 | 5.8 | 0.298 |

| Time (minutes) | Water Level (m) | Drawdown (m) | Time t (minutes) | Time t' (minutes) | Water Level (m) | t/t' | Residual Drawdown (m) |
|-------------------|--------------------|-----------------|---------------------|----------------------|--------------------|------|-----------------------------|
| 780 | 6.310 | 0.689 | 5366 | 981 | 5.921 | 5.5 | 0.300 |
| 840 | 6.331 | 0.710 | 5426 | 1041 | 5.921 | 5.2 | 0.300 |
| 900 | 6.353 | 0.732 | 5486 | 1101 | 5.921 | 5.0 | 0.300 |
| 960 | 6.371 | 0.750 | 5546 | 1161 | 5.915 | 4.8 | 0.294 |
| 1020 | 6.388 | 0.767 | 5606 | 1221 | 5.908 | 4.6 | 0.287 |
| 1080 | 6.404 | 0.783 | 5666 | 1281 | 5.898 | 4.4 | 0.277 |
| 1140 | 6.415 | 0.794 | 5726 | 1341 | 5.883 | 4.3 | 0.262 |
| 1200 | 6.417 | 0.796 | 5786 | 1401 | 5.871 | 4.1 | 0.250 |
| 1260 | 6.417 | 0.796 | | | | | |
| 1320 | 6.417 | 0.796 | | | | | |
| 1380 | 6.417 | 0.796 | | Data from transducer | | | |
| 1440 | 6.422 | 0.801 | | | | | |
| 1500 | 6.433 | 0.812 | | | | | |
| 1560 | 6.447 | 0.826 | | | | | |
| 1620 | 6.463 | 0.842 | | | | | |
| 1680 | 6.479 | 0.858 | | | | | |
| 1740 | 6.494 | 0.873 | | | | | |
| 1800 | 6.502 | 0.881 | | | | | |
| 1860 | 6.511 | 0.890 | | | | | |
| 1920 | 6.518 | 0.897 | | | | | |
| 1980 | 6.525 | 0.904 | | | | | |
| 2040 | 6.529 | 0.908 | | | | | |
| 2100 | 6.533 | 0.912 | | | | | |
| 2160 | 6.541 | 0.920 | | | | | |
| 2220 | 6.553 | 0.932 | | | | | |
| 2280 | 6.569 | 0.948 | | | | | |
| 2340 | 6.586 | 0.965 | | | | | |
| 2400 | 6.601 | 0.980 | | | | | |
| 2460 | 6.615 | 0.994 | | | | | |
| 2520 | 6.630 | 1.009 | | | | | |
| 2580 | 6.638 | 1.017 | | | | | |
| 2640 | 6.643 | 1.022 | | | | | |
| 2700 | 6.645 | 1.024 | | | | | |
| 2760 | 6.644 | 1.023 | | | | | |
| 2820 | 6.643 | 1.022 | | | | | |
| 2880 | 6.642 | 1.021 | | | | | |
| 2940 | 6.648 | 1.027 | | | | | |
| 3000 | 6.654 | 1.033 | | | | | |
| 3060 | 6.665 | 1.044 | | | | | |
| 3120 | 6.678 | 1.057 | | | | | |
| 3180 | 6.688 | 1.067 | | | | | |
| 3240 | 6.698 | 1.077 | | | | | |
| 3300 | 6.704 | 1.083 | | | | | |
| 3360 | 6.709 | 1.088 | | | | | |
| 3420 | 6.711 | 1.090 | | | | | |
| 3480 | 6.710 | 1.089 | | | | | |
| 3540 | 6.713 | 1.092 | | | | | |
| 3600 | 6.717 | 1.096 | | | | | |
| 3660 | 6.724 | 1.103 | | | | | |
| 3720 | 6.735 | 1.114 | | | | | |
| 3780 | 6.749 | 1.128 | | | | | |
| 3840 | 6.758 | 1.137 | | | | | |
| 3900 | 6.758 | 1.137 | | | | | |
| 3960 | 6.770 | 1.149 | | | | | |
| 4020 | 6.777 | 1.156 | | | | | |
| 4080 | 6.780 | 1.159 | | | | | |
| 4140 | 6.780 | 1.159 | | | | | |
| 4200 | 6.777 | 1.156 | | | | | |
| 4260 | 6.772 | 1.151 | | | | | |
| 4320 | 6.772 | 1.151 | | | | | |
| 4329 | 6.773 | 1.152 | | | | | |

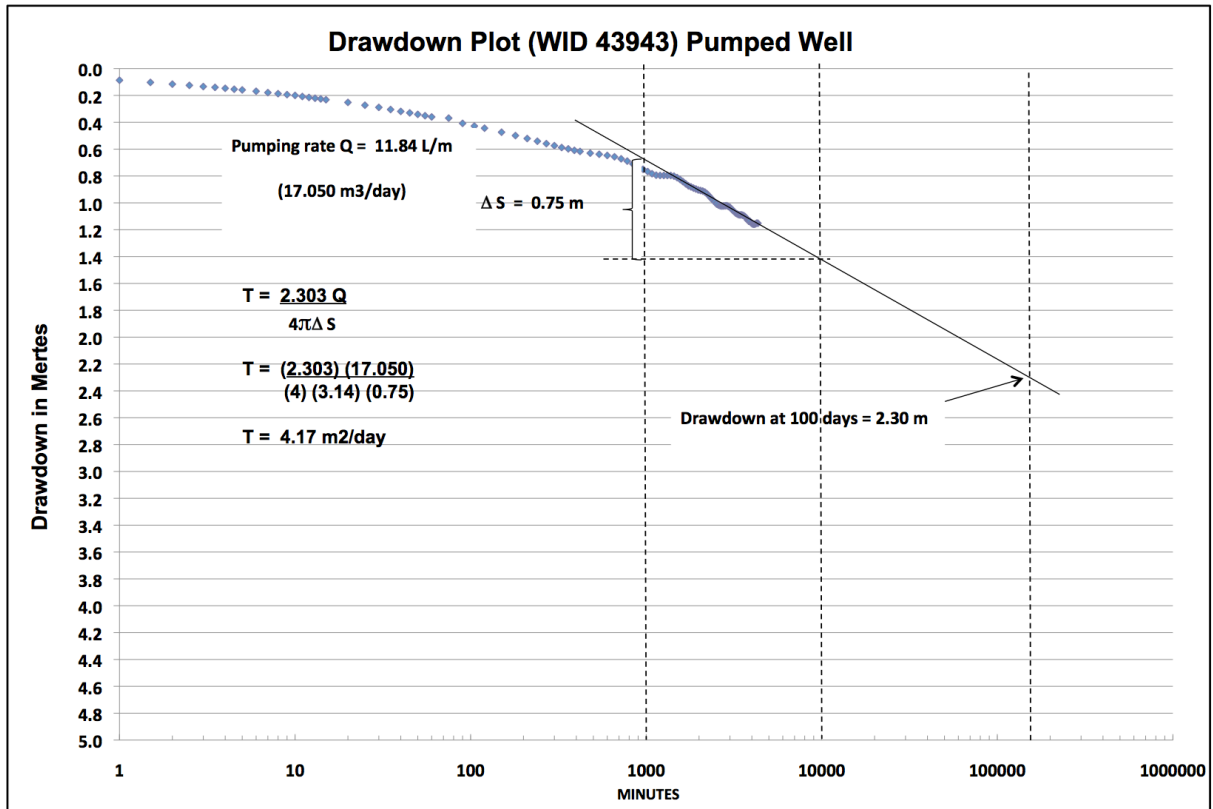


Figure 1, Appendix C. Semi-logarithmic drawdown plot for project well during 72 hour test.

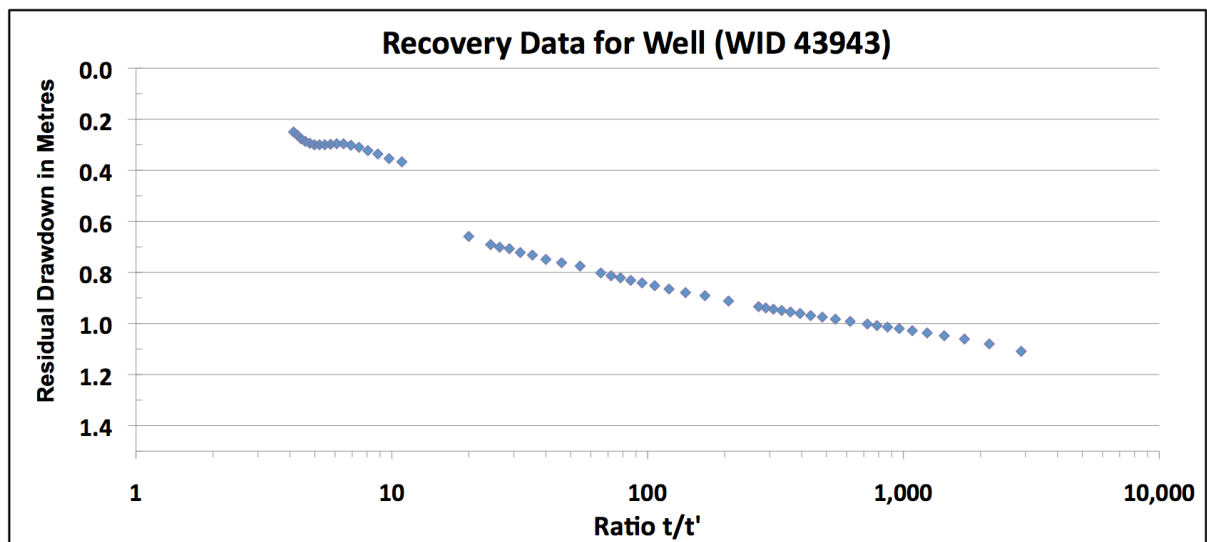


Figure 2, Appendix C. Semi-logarithmic recovery plot for project well.

APPENDIX D

Laboratory Water Quality Analyses

WID 43943



Your Project #: MAYNE HOUSING
Your C.O.C. #: WI023249

Attention: AL KOHUT

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

Report Date: 2020/10/21
Report #: R2945545
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C072986

Received: 2020/10/06, 13:45

Sample Matrix: Drinking Water
Samples Received: 1

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|--|----------|----------------|---------------|----------------------------------|----------------------|
| Alkalinity @25C (pp, total), CO3,HCO3,OH | 1 | N/A | 2020/10/08 | BBY6SOP-00026 | SM 23 2320 B m |
| Chloride/Sulphate by Auto Colourimetry | 1 | N/A | 2020/10/08 | BBY6SOP-00011 / BBY6SOP-00017 | SM23-4500-Cl/SO4-E m |
| Colour (True) by Kone Lab | 1 | N/A | 2020/10/08 | BBY6SOP-00057 | SM 23 2120 C m |
| Conductivity @25C | 1 | N/A | 2020/10/08 | BBY6SOP-00026 | SM 23 2510 B m |
| Fluoride | 1 | N/A | 2020/10/08 | BBY6SOP-00048 | SM 23 4500-F C m |
| Sulphide (as H2S) (1) | 1 | N/A | 2020/10/13 | | Auto Calc |
| Hardness Total (calculated as CaCO3) (3) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Hardness (calculated as CaCO3) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Mercury (Total) by CV | 1 | 2020/10/07 | 2020/10/08 | AB SOP-00084 | BCMOE BCLM Oct2013 m |
| Heterotropic Plate Count (MF) in Water | 1 | N/A | 2020/10/07 | BBY4SOP-00003 | SM 23 9215 |
| Iron Related Bacteria (4) | 1 | N/A | 2020/10/07 | BBY4SOP-00004 | BI BART User Manual |
| Na, K, Ca, Mg, S by CRC ICPMS (diss.) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Elements by CRC ICPMS (dissolved) | 1 | N/A | 2020/10/08 | BBY7SOP-00002 | EPA 6020b R2 m |
| Na, K, Ca, Mg, S by CRC ICPMS (total) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Elements by CRC ICPMS (total) | 1 | N/A | 2020/10/09 | BBY7SOP-00003 / BBY7SOP-00002 | EPA 6020b R2 m |
| Nitrogen (Total) | 1 | N/A | 2020/10/21 | BBY6SOP-00016 | SM 23 4500-N C m |
| Ammonia-N (Total) | 1 | N/A | 2020/10/09 | BBY6SOP-00009 | EPA 350.1 m |
| Nitrate + Nitrite (N) | 1 | N/A | 2020/10/20 | BBY6SOP-00010 | SM 23 4500-NO3- I m |
| Nitrite (N) by CFA | 1 | N/A | 2020/10/07 | BBY6SOP-00010 | SM 23 4500-NO3- I m |
| Nitrogen - Nitrate (as N) | 1 | N/A | 2020/10/08 | BBY WI-00033 | Auto Calc |
| Nitrogen (Tot. Organic) Calculation | 1 | N/A | 2020/10/10 | BBY WI-00033 | Auto Calc |
| Filter and HNO3 Preserve for Metals | 1 | N/A | 2020/10/06 | BBY7 WI-00004 | SM 23 3030B m |
| pH @25°C (5) | 1 | N/A | 2020/10/08 | BBY6SOP-00026 | SM 23 4500-H+ B m |
| Sat. pH and Langelier Index (@ 4.4C) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Sat. pH and Langelier Index (@ 60C) | 1 | N/A | 2020/10/09 | BBY WI-00033 | Auto Calc |
| Total Sulphide (1) | 1 | N/A | 2020/10/13 | AB SOP-00080 | SM 23 4500 S2-A D Fm |
| Sulphate Reducing Bacteria (4) | 1 | N/A | 2020/10/07 | BBY4SOP-00004 | BI BART User Manual |
| Total Dissolved Solids (Filt. Residue) | 1 | 2020/10/13 | 2020/10/14 | BBY6SOP-00033 | SM 23 2540 C m |
| Total Coliform & E.Coli by MF-Chromocult | 1 | N/A | 2020/10/07 | BBY4SOP-00143 | Merck KGaA Version 1 |



Your Project #: MAYNE HOUSING
 Your C.O.C. #: WI023249

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

Report Date: 2020/10/21
 Report #: R2945545
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C072986
Received: 2020/10/06, 13:45

Sample Matrix: Drinking Water
 # Samples Received: 1

| Analyses | Quantity | Date | Date | Laboratory Method | Analytical Method |
|-------------------------------|----------|------------|------------|-------------------|-------------------|
| | | Extracted | Analyzed | | |
| Carbon (Total Organic) (1, 6) | 1 | N/A | 2020/10/19 | AB SOP-00087 | MMCW 119 1996 m |
| Turbidity | 1 | N/A | 2020/10/08 | BBY6SOP-00027 | SM 23 2130 B m |
| UV Transmittance (2) | 1 | 2020/10/13 | 2020/10/13 | CAM SOP-00459 | SM 23 5910 m |

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.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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 Calgary Environmental
- (2) This test was performed by BV Labs Ontario (From Burnaby)
- (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 #: MAYNE HOUSING
Your C.O.C. #: WI023249

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

Report Date: 2020/10/21
Report #: R2945545
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C072986
Received: 2020/10/06, 13:45

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# (604) 734 7276

=====

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.



**BUREAU
VERITAS**

BV Labs Job #: C072986

Report Date: 2020/10/21

HY-GEO CONSULTING

Client Project #: MAYNE HOUSING

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

| | | | |
|------------------------------|--------------|-------------------------------|-----------------|
| BV Labs ID | | YP1509 | |
| Sampling Date | | 2020/10/06 08:15 | |
| COC Number | | WI023249 | |
| | UNITS | MAYNE HOUSING WELL | QC Batch |
| Calculated Parameters | | | |
| Filter and HNO3 Preservation | N/A | FIELD | ONSITE |



BUREAU
VERITAS

BV Labs Job #: C072986
Report Date: 2020/10/21

HY-GEO CONSULTING
Client Project #: MAYNE HOUSING

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

| BV Labs ID | | | | | YP1509 | | |
|----------------------------------|---------------------------------|------------|------------|------------|-----------------------|--------|----------|
| Sampling Date | | | | | 2020/10/06 08:15 | | |
| COC Number | | | | | WI023249 | | |
| | UNITS | MAC | AO | OG | MAYNE HOUSING WELL | RDL | QC Batch |
| ANIONS | | | | | | | |
| Nitrite (N) | mg/L | 1 | - | - | <0.0050 | 0.0050 | A037484 |
| Calculated Parameters | | | | | | | |
| Total Hardness (CaCO3) | mg/L | - | - | - | 95.7 | 0.50 | A033569 |
| Nitrate (N) | mg/L | 10 | - | - | <0.020 | 0.020 | A034240 |
| Total Organic Nitrogen (N) | mg/L | - | - | - | 0.038 | 0.020 | A035387 |
| Sulphide (as H2S) | mg/L | - | 0.05 | - | <0.0020 | 0.0020 | A034996 |
| Misc. Inorganics | | | | | | | |
| Conductivity | uS/cm | - | - | - | 760 | 2.0 | A037336 |
| pH | pH | - | - | 7.0:10.5 | 7.87 | N/A | A037325 |
| Total Organic Carbon (C) | mg/L | - | - | - | 0.61 | 0.50 | A053827 |
| Total Dissolved Solids | mg/L | - | - | - | 190 | 10 | A044840 |
| Anions | | | | | | | |
| Alkalinity (PP as CaCO3) | mg/L | - | - | - | <1.0 | 1.0 | A037334 |
| Alkalinity (Total as CaCO3) | mg/L | - | - | - | 170 | 1.0 | A037334 |
| Bicarbonate (HCO3) | mg/L | - | - | - | 210 | 1.0 | A037334 |
| Carbonate (CO3) | mg/L | - | - | - | <1.0 | 1.0 | A037334 |
| Dissolved Fluoride (F) | mg/L | 1.5 | - | - | 0.093 | 0.050 | A038894 |
| Hydroxide (OH) | mg/L | - | - | - | <1.0 | 1.0 | A037334 |
| Total Sulphide | mg/L | - | 0.05 | - | <0.0018 | 0.0018 | A044460 |
| Dissolved Chloride (Cl) | mg/L | - | 250 | - | 7.8 | 1.0 | A038584 |
| Dissolved Sulphate (SO4) | mg/L | - | 500 | - | 12 | 1.0 | A038584 |
| MISCELLANEOUS | | | | | | | |
| True Colour | Col. Unit | - | 15 | - | <5.0 | 5.0 | A039946 |
| Transmittance at 254nm | %T/cm | - | - | - | 97 | N/A | A044956 |
| Nutrients | | | | | | | |
| Total Ammonia (N) | mg/L | - | - | - | 0.029 | 0.015 | A042255 |
| Nitrate plus Nitrite (N) | mg/L | - | - | - | <0.020 | 0.020 | A056389 |
| Total Nitrogen (N) | mg/L | - | - | - | 0.067 | 0.020 | A054864 |
| Physical Properties | | | | | | | |
| Turbidity | NTU | see remark | see remark | see remark | 0.13 | 0.10 | A039683 |
| 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 #: C072986
Report Date: 2020/10/21

HY-GEO CONSULTING
Client Project #: MAYNE HOUSING

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

| BV Labs ID | | | | | YP1509 | | |
|----------------------------------|---------------------------------|------|------|-----|-----------------------|--------|----------|
| Sampling Date | | | | | 2020/10/06 08:15 | | |
| COC Number | | | | | WI023249 | | |
| | UNITS | MAC | AO | OG | MAYNE HOUSING WELL | RDL | QC Batch |
| Elements | | | | | | | |
| Total Mercury (Hg) | ug/L | 1 | - | - | <0.0019 | 0.0019 | A037114 |
| Total Metals by ICPMS | | | | | | | |
| Total Aluminum (Al) | ug/L | - | - | 100 | <3.0 | 3.0 | A039393 |
| Total Antimony (Sb) | ug/L | 6 | - | - | 0.59 | 0.50 | A039393 |
| Total Arsenic (As) | ug/L | 10 | - | - | 0.44 | 0.10 | A039393 |
| Total Barium (Ba) | ug/L | 2000 | - | - | 1.1 | 1.0 | A039393 |
| Total Beryllium (Be) | ug/L | - | - | - | <0.10 | 0.10 | A039393 |
| Total Bismuth (Bi) | ug/L | - | - | - | <1.0 | 1.0 | A039393 |
| Total Boron (B) | ug/L | 5000 | - | - | <50 | 50 | A039393 |
| Total Cadmium (Cd) | ug/L | 7 | - | - | <0.010 | 0.010 | A039393 |
| Total Chromium (Cr) | ug/L | 50 | - | - | <1.0 | 1.0 | A039393 |
| Total Cobalt (Co) | ug/L | - | - | - | <0.20 | 0.20 | A039393 |
| Total Copper (Cu) | ug/L | 2000 | 1000 | - | 0.99 | 0.20 | A039393 |
| Total Iron (Fe) | ug/L | - | 300 | - | 24.9 | 5.0 | A039393 |
| Total Lead (Pb) | ug/L | 5 | - | - | <0.20 | 0.20 | A039393 |
| Total Manganese (Mn) | ug/L | 120 | 20 | - | 344 | 1.0 | A039393 |
| Total Molybdenum (Mo) | ug/L | - | - | - | <1.0 | 1.0 | A039393 |
| Total Nickel (Ni) | ug/L | - | - | - | <1.0 | 1.0 | A039393 |
| Total Selenium (Se) | ug/L | 50 | - | - | 0.36 | 0.10 | A039393 |
| Total Silicon (Si) | ug/L | - | - | - | 9650 | 100 | A039393 |
| Total Silver (Ag) | ug/L | - | - | - | <0.020 | 0.020 | A039393 |
| Total Strontium (Sr) | ug/L | 7000 | - | - | 158 | 1.0 | A039393 |
| Total Thallium (Tl) | ug/L | - | - | - | <0.010 | 0.010 | A039393 |
| Total Tin (Sn) | ug/L | - | - | - | <5.0 | 5.0 | A039393 |
| Total Titanium (Ti) | ug/L | - | - | - | <5.0 | 5.0 | A039393 |
| Total Uranium (U) | ug/L | 20 | - | - | 0.23 | 0.10 | A039393 |
| Total Vanadium (V) | ug/L | - | - | - | <5.0 | 5.0 | A039393 |
| Total Zinc (Zn) | ug/L | - | 5000 | - | <5.0 | 5.0 | A039393 |
| Total Zirconium (Zr) | ug/L | - | - | - | <0.10 | 0.10 | A039393 |
| Total Calcium (Ca) | mg/L | - | - | - | 26.2 | 0.050 | A034254 |
| Total Magnesium (Mg) | mg/L | - | - | - | 7.35 | 0.050 | A034254 |
| Total Potassium (K) | mg/L | - | - | - | 0.227 | 0.050 | A034254 |
| Total Sodium (Na) | mg/L | - | 200 | - | 42.1 | 0.050 | A034254 |
| 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 | | | | | YP1509 | | |
| Sampling Date | | | | | 2020/10/06 08:15 | | |
| COC Number | | | | | WI023249 | | |
| | UNITS | MAC | AO | OG | MAYNE HOUSING WELL | RDL | QC Batch |
| Total Sulphur (S) | mg/L | - | - | - | 3.7 | 3.0 | A034254 |
| Microbiological Param. | | | | | | | |
| Heterotrophic Plate Count | CFU/mL | - | - | - | 18 | 1 | A037327 |
| Iron Bacteria | CFU/mL | - | - | - | 150 | 25 | A037324 |
| Sulphate reducing bacteria | CFU/mL | - | - | - | <75 | 75 | A037326 |
| Total Coliforms | CFU/100mL | 0 | - | - | 0 | N/A | A037315 |
| E. coli | CFU/100mL | 0 | - | - | 0 | N/A | A037315 |
| Calculated Parameters | | | | | | | |
| Langelier Index (@ 4.4C) | N/A | - | - | - | -0.404 | N/A | A035390 |
| Langelier Index (@ 60C) | N/A | - | - | - | 0.637 | N/A | A035392 |
| Saturation pH (@ 4.4C) | N/A | - | - | - | 8.27 | N/A | A035390 |
| Saturation pH (@ 60C) | N/A | - | - | - | 7.23 | N/A | A035392 |
| 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 #: C072986
Report Date: 2020/10/21

HY-GEO CONSULTING
Client Project #: MAYNE HOUSING

CSR DISSOLVED METALS (NO CV-HG) IN WATER

| BV Labs ID | | | | | YP1509 | | |
|----------------------------------|---------------------------------|------|------|-----|-----------------------|-------|----------|
| Sampling Date | | | | | 2020/10/06 08:15 | | |
| COC Number | | | | | WI023249 | | |
| | UNITS | MAC | AO | OG | MAYNE HOUSING WELL | RDL | QC Batch |
| Calculated Parameters | | | | | | | |
| Dissolved Hardness (CaCO3) | mg/L | - | - | - | 97.9 | 0.50 | A034641 |
| Dissolved Metals by ICPMS | | | | | | | |
| Dissolved Aluminum (Al) | ug/L | - | - | 100 | <3.0 | 3.0 | A037100 |
| Dissolved Antimony (Sb) | ug/L | 6 | - | - | 0.56 | 0.50 | A037100 |
| Dissolved Arsenic (As) | ug/L | 10 | - | - | 0.43 | 0.10 | A037100 |
| Dissolved Barium (Ba) | ug/L | 2000 | - | - | 1.2 | 1.0 | A037100 |
| Dissolved Beryllium (Be) | ug/L | - | - | - | <0.10 | 0.10 | A037100 |
| Dissolved Bismuth (Bi) | ug/L | - | - | - | <1.0 | 1.0 | A037100 |
| Dissolved Boron (B) | ug/L | 5000 | - | - | <50 | 50 | A037100 |
| Dissolved Cadmium (Cd) | ug/L | 7 | - | - | <0.010 | 0.010 | A037100 |
| Dissolved Chromium (Cr) | ug/L | 50 | - | - | <1.0 | 1.0 | A037100 |
| Dissolved Cobalt (Co) | ug/L | - | - | - | <0.20 | 0.20 | A037100 |
| Dissolved Copper (Cu) | ug/L | 2000 | 1000 | - | 0.93 | 0.20 | A037100 |
| Dissolved Iron (Fe) | ug/L | - | 300 | - | 22.1 | 5.0 | A037100 |
| Dissolved Lead (Pb) | ug/L | 5 | - | - | <0.20 | 0.20 | A037100 |
| Dissolved Lithium (Li) | ug/L | - | - | - | 8.9 | 2.0 | A037100 |
| Dissolved Manganese (Mn) | ug/L | 120 | 20 | - | 349 | 1.0 | A037100 |
| Dissolved Molybdenum (Mo) | ug/L | - | - | - | <1.0 | 1.0 | A037100 |
| Dissolved Nickel (Ni) | ug/L | - | - | - | <1.0 | 1.0 | A037100 |
| Dissolved Selenium (Se) | ug/L | 50 | - | - | 0.38 | 0.10 | A037100 |
| Dissolved Silicon (Si) | ug/L | - | - | - | 9640 | 100 | A037100 |
| Dissolved Silver (Ag) | ug/L | - | - | - | <0.020 | 0.020 | A037100 |
| Dissolved Strontium (Sr) | ug/L | 7000 | - | - | 154 | 1.0 | A037100 |
| Dissolved Thallium (Tl) | ug/L | - | - | - | <0.010 | 0.010 | A037100 |
| Dissolved Tin (Sn) | ug/L | - | - | - | <5.0 | 5.0 | A037100 |
| Dissolved Titanium (Ti) | ug/L | - | - | - | <5.0 | 5.0 | A037100 |
| Dissolved Uranium (U) | ug/L | 20 | - | - | 0.23 | 0.10 | A037100 |
| Dissolved Vanadium (V) | ug/L | - | - | - | <5.0 | 5.0 | A037100 |
| Dissolved Zinc (Zn) | ug/L | - | 5000 | - | <5.0 | 5.0 | A037100 |
| Dissolved Zirconium (Zr) | ug/L | - | - | - | <0.10 | 0.10 | A037100 |
| Dissolved Calcium (Ca) | mg/L | - | - | - | 26.0 | 0.050 | A034643 |
| Dissolved Magnesium (Mg) | mg/L | - | - | - | 7.99 | 0.050 | A034643 |
| No Fill | No Exceedance | | | | | | |
| Grey | Exceeds 1 criteria policy/level | | | | | | |
| Black | Exceeds both criteria/levels | | | | | | |
| RDL = Reportable Detection Limit | | | | | | | |



BUREAU
VERITAS

BV Labs Job #: C072986
Report Date: 2020/10/21

HY-GEO CONSULTING
Client Project #: MAYNE HOUSING

CSR DISSOLVED METALS (NO CV-HG) IN WATER

| | | | | | | | |
|----------------------------------|---------------------------------|------------|-----------|-----------|-------------------------------|------------|-----------------|
| BV Labs ID | | | | | YP1509 | | |
| Sampling Date | | | | | 2020/10/06 08:15 | | |
| COC Number | | | | | WI023249 | | |
| | UNITS | MAC | AO | OG | MAYNE HOUSING WELL | RDL | QC Batch |
| Dissolved Potassium (K) | mg/L | - | - | - | 0.239 | 0.050 | A034643 |
| Dissolved Sodium (Na) | mg/L | - | 200 | - | 46.0 | 0.050 | A034643 |
| Dissolved Sulphur (S) | mg/L | - | - | - | 3.8 | 3.0 | A034643 |
| No Fill | No Exceedance | | | | | | |
| Grey | Exceeds 1 criteria policy/level | | | | | | |
| Black | Exceeds both criteria/levels | | | | | | |
| RDL = Reportable Detection Limit | | | | | | | |



GENERAL COMMENTS

Sample YP1509 [MAYNE HOUSING 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. Sample was analyzed past method specific hold time for Total Coliform & E.Coli by MF-Chromocult. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

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.



BUREAU
VERITAS

BV Labs Job #: C072986

Report Date: 2020/10/21

QUALITY ASSURANCE REPORT

HY-GEO CONSULTING

Client Project #: MAYNE HOUSING

| QC Batch | Parameter | Date | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|----------|-----------------------------|------------|--------------|-----------|--------------|-----------|--------------|-------|-----------|-----------|
| | | | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| A037100 | Dissolved Aluminum (Al) | 2020/10/08 | 102 | 80 - 120 | 99 | 80 - 120 | <3.0 | ug/L | 1.1 | 20 |
| A037100 | Dissolved Antimony (Sb) | 2020/10/08 | 104 | 80 - 120 | 100 | 80 - 120 | <0.50 | ug/L | NC | 20 |
| A037100 | Dissolved Arsenic (As) | 2020/10/08 | 104 | 80 - 120 | 97 | 80 - 120 | <0.10 | ug/L | 8.0 | 20 |
| A037100 | Dissolved Barium (Ba) | 2020/10/08 | NC | 80 - 120 | 100 | 80 - 120 | <1.0 | ug/L | 0.18 | 20 |
| A037100 | Dissolved Beryllium (Be) | 2020/10/08 | 103 | 80 - 120 | 101 | 80 - 120 | <0.10 | ug/L | NC | 20 |
| A037100 | Dissolved Bismuth (Bi) | 2020/10/08 | 95 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | NC | 20 |
| A037100 | Dissolved Boron (B) | 2020/10/08 | 102 | 80 - 120 | 102 | 80 - 120 | <50 | ug/L | 1.1 | 20 |
| A037100 | Dissolved Cadmium (Cd) | 2020/10/08 | 100 | 80 - 120 | 98 | 80 - 120 | <0.010 | ug/L | NC | 20 |
| A037100 | Dissolved Chromium (Cr) | 2020/10/08 | 100 | 80 - 120 | 97 | 80 - 120 | <1.0 | ug/L | NC | 20 |
| A037100 | Dissolved Cobalt (Co) | 2020/10/08 | 99 | 80 - 120 | 98 | 80 - 120 | <0.20 | ug/L | NC | 20 |
| A037100 | Dissolved Copper (Cu) | 2020/10/08 | 94 | 80 - 120 | 96 | 80 - 120 | <0.20 | ug/L | 3.3 | 20 |
| A037100 | Dissolved Iron (Fe) | 2020/10/08 | 101 | 80 - 120 | 98 | 80 - 120 | <5.0 | ug/L | 3.2 | 20 |
| A037100 | Dissolved Lead (Pb) | 2020/10/08 | 100 | 80 - 120 | 99 | 80 - 120 | <0.20 | ug/L | NC | 20 |
| A037100 | Dissolved Lithium (Li) | 2020/10/08 | 95 | 80 - 120 | 97 | 80 - 120 | <2.0 | ug/L | 1.2 | 20 |
| A037100 | Dissolved Manganese (Mn) | 2020/10/08 | 101 | 80 - 120 | 98 | 80 - 120 | <1.0 | ug/L | 0.74 | 20 |
| A037100 | Dissolved Molybdenum (Mo) | 2020/10/08 | NC | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | 0.65 | 20 |
| A037100 | Dissolved Nickel (Ni) | 2020/10/08 | 96 | 80 - 120 | 97 | 80 - 120 | <1.0 | ug/L | 1.0 | 20 |
| A037100 | Dissolved Selenium (Se) | 2020/10/08 | 105 | 80 - 120 | 100 | 80 - 120 | <0.10 | ug/L | 1.0 | 20 |
| A037100 | Dissolved Silicon (Si) | 2020/10/08 | 103 | 80 - 120 | 100 | 80 - 120 | <100 | ug/L | 0.0031 | 20 |
| A037100 | Dissolved Silver (Ag) | 2020/10/08 | 98 | 80 - 120 | 95 | 80 - 120 | <0.020 | ug/L | NC | 20 |
| A037100 | Dissolved Strontium (Sr) | 2020/10/08 | NC | 80 - 120 | 97 | 80 - 120 | <1.0 | ug/L | 0.079 | 20 |
| A037100 | Dissolved Thallium (Tl) | 2020/10/08 | 99 | 80 - 120 | 99 | 80 - 120 | <0.010 | ug/L | NC | 20 |
| A037100 | Dissolved Tin (Sn) | 2020/10/08 | 100 | 80 - 120 | 98 | 80 - 120 | <5.0 | ug/L | NC | 20 |
| A037100 | Dissolved Titanium (Ti) | 2020/10/08 | 105 | 80 - 120 | 97 | 80 - 120 | <5.0 | ug/L | NC | 20 |
| A037100 | Dissolved Uranium (U) | 2020/10/08 | 109 | 80 - 120 | 104 | 80 - 120 | <0.10 | ug/L | 0.72 | 20 |
| A037100 | Dissolved Vanadium (V) | 2020/10/08 | 104 | 80 - 120 | 98 | 80 - 120 | <5.0 | ug/L | NC | 20 |
| A037100 | Dissolved Zinc (Zn) | 2020/10/08 | 100 | 80 - 120 | 100 | 80 - 120 | <5.0 | ug/L | NC | 20 |
| A037100 | Dissolved Zirconium (Zr) | 2020/10/08 | 108 | 80 - 120 | 96 | 80 - 120 | <0.10 | ug/L | NC | 20 |
| A037114 | Total Mercury (Hg) | 2020/10/08 | NC | 80 - 120 | 98 | 80 - 120 | <0.0019 | ug/L | NC | 20 |
| A037325 | pH | 2020/10/08 | | | 101 | 97 - 103 | | | 0.46 | N/A |
| A037334 | Alkalinity (PP as CaCO3) | 2020/10/08 | | | | | <1.0 | mg/L | NC | 20 |
| A037334 | Alkalinity (Total as CaCO3) | 2020/10/08 | 102 | 80 - 120 | 96 | 80 - 120 | <1.0 | mg/L | 2.7 | 20 |
| A037334 | Bicarbonate (HCO3) | 2020/10/08 | | | | | <1.0 | mg/L | 2.7 | 20 |



BUREAU
VERITAS

BV Labs Job #: C072986

Report Date: 2020/10/21

QUALITY ASSURANCE REPORT(CONT'D)

HY-GEO CONSULTING

Client Project #: MAYNE HOUSING

| QC Batch | Parameter | Date | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|----------|--------------------------|------------|--------------|-----------|--------------|-----------|--------------|-------|-----------|-----------|
| | | | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| A037334 | Carbonate (CO3) | 2020/10/08 | | | | | <1.0 | mg/L | NC | 20 |
| A037334 | Hydroxide (OH) | 2020/10/08 | | | | | <1.0 | mg/L | NC | 20 |
| A037336 | Conductivity | 2020/10/08 | | | 100 | 80 - 120 | <2.0 | uS/cm | | |
| A037484 | Nitrite (N) | 2020/10/07 | 104 | 80 - 120 | 100 | 80 - 120 | <0.0050 | mg/L | 6.5 | 20 |
| A038584 | Dissolved Chloride (Cl) | 2020/10/08 | | | 105 | 80 - 120 | <1.0 | mg/L | | |
| A038584 | Dissolved Sulphate (SO4) | 2020/10/08 | | | 102 | 80 - 120 | <1.0 | mg/L | | |
| A038894 | Dissolved Fluoride (F) | 2020/10/08 | 102 | 80 - 120 | 104 | 80 - 120 | <0.050 | mg/L | 0 | 20 |
| A039393 | Total Aluminum (Al) | 2020/10/09 | 99 | 80 - 120 | 101 | 80 - 120 | <3.0 | ug/L | | |
| A039393 | Total Antimony (Sb) | 2020/10/09 | 100 | 80 - 120 | 103 | 80 - 120 | <0.50 | ug/L | | |
| A039393 | Total Arsenic (As) | 2020/10/09 | 100 | 80 - 120 | 102 | 80 - 120 | <0.10 | ug/L | | |
| A039393 | Total Barium (Ba) | 2020/10/09 | 99 | 80 - 120 | 101 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Beryllium (Be) | 2020/10/09 | 98 | 80 - 120 | 99 | 80 - 120 | <0.10 | ug/L | | |
| A039393 | Total Bismuth (Bi) | 2020/10/09 | 97 | 80 - 120 | 99 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Boron (B) | 2020/10/09 | 109 | 80 - 120 | 109 | 80 - 120 | <50 | ug/L | | |
| A039393 | Total Cadmium (Cd) | 2020/10/09 | 100 | 80 - 120 | 102 | 80 - 120 | <0.010 | ug/L | | |
| A039393 | Total Chromium (Cr) | 2020/10/09 | 98 | 80 - 120 | 100 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Cobalt (Co) | 2020/10/09 | 98 | 80 - 120 | 100 | 80 - 120 | <0.20 | ug/L | | |
| A039393 | Total Copper (Cu) | 2020/10/09 | NC | 80 - 120 | 97 | 80 - 120 | <0.20 | ug/L | | |
| A039393 | Total Iron (Fe) | 2020/10/09 | 102 | 80 - 120 | 106 | 80 - 120 | <5.0 | ug/L | | |
| A039393 | Total Lead (Pb) | 2020/10/09 | 101 | 80 - 120 | 103 | 80 - 120 | <0.20 | ug/L | | |
| A039393 | Total Manganese (Mn) | 2020/10/09 | 100 | 80 - 120 | 103 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Molybdenum (Mo) | 2020/10/09 | 103 | 80 - 120 | 104 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Nickel (Ni) | 2020/10/09 | 98 | 80 - 120 | 102 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Selenium (Se) | 2020/10/09 | 102 | 80 - 120 | 104 | 80 - 120 | <0.10 | ug/L | | |
| A039393 | Total Silicon (Si) | 2020/10/09 | 104 | 80 - 120 | 105 | 80 - 120 | <100 | ug/L | | |
| A039393 | Total Silver (Ag) | 2020/10/09 | 97 | 80 - 120 | 99 | 80 - 120 | <0.020 | ug/L | | |
| A039393 | Total Strontium (Sr) | 2020/10/09 | 98 | 80 - 120 | 100 | 80 - 120 | <1.0 | ug/L | | |
| A039393 | Total Thallium (Tl) | 2020/10/09 | 100 | 80 - 120 | 101 | 80 - 120 | <0.010 | ug/L | | |
| A039393 | Total Tin (Sn) | 2020/10/09 | 99 | 80 - 120 | 100 | 80 - 120 | <5.0 | ug/L | | |
| A039393 | Total Titanium (Ti) | 2020/10/09 | 102 | 80 - 120 | 103 | 80 - 120 | <5.0 | ug/L | | |
| A039393 | Total Uranium (U) | 2020/10/09 | 105 | 80 - 120 | 107 | 80 - 120 | <0.10 | ug/L | | |
| A039393 | Total Vanadium (V) | 2020/10/09 | 101 | 80 - 120 | 102 | 80 - 120 | <5.0 | ug/L | | |
| A039393 | Total Zinc (Zn) | 2020/10/09 | NC | 80 - 120 | 105 | 80 - 120 | <5.0 | ug/L | | |



BUREAU
VERITAS

BV Labs Job #: C072986

Report Date: 2020/10/21

QUALITY ASSURANCE REPORT(CONT'D)

HY-GEO CONSULTING

Client Project #: MAYNE HOUSING

| QC Batch | Parameter | Date | Matrix Spike | | Spiked Blank | | Method Blank | | RPD | |
|----------|--------------------------|------------|--------------|-----------|--------------|-----------|--------------|-----------|-----------|-----------|
| | | | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| A039393 | Total Zirconium (Zr) | 2020/10/09 | 102 | 80 - 120 | 104 | 80 - 120 | <0.10 | ug/L | | |
| A039683 | Turbidity | 2020/10/08 | | | 104 | 80 - 120 | <0.10 | NTU | NC | 20 |
| A039946 | True Colour | 2020/10/08 | | | 95 | 80 - 120 | <5.0 | Col. Unit | NC | 20 |
| A042255 | Total Ammonia (N) | 2020/10/09 | 105 | 80 - 120 | 98 | 80 - 120 | <0.015 | mg/L | 0 | 20 |
| A044460 | Total Sulphide | 2020/10/13 | 48 (1) | 80 - 120 | 99 | 80 - 120 | <0.0018 | mg/L | 13 | 20 |
| A044840 | Total Dissolved Solids | 2020/10/14 | 100 | 80 - 120 | 95 | 80 - 120 | <10 | mg/L | 4.6 | 20 |
| A044956 | Transmittance at 254nm | 2020/10/13 | | | 100 | 97 - 103 | | | 0.030 | 25 |
| A053827 | Total Organic Carbon (C) | 2020/10/19 | 100 | 80 - 120 | 106 | 80 - 120 | <0.50 | mg/L | 3.5 | 20 |
| A054864 | Total Nitrogen (N) | 2020/10/21 | | | 97 | 80 - 120 | <0.020 | mg/L | | |
| A056389 | Nitrate plus Nitrite (N) | 2020/10/20 | 104 | 80 - 120 | 107 | 80 - 120 | <0.020 | mg/L | 0.66 | 25 |

N/A = Not Applicable

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.



VALIDATION SIGNATURE PAGE

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

Brad Newman, Scientific Specialist

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

Laura Martin, Sample Reception/PMA

Harry (Peng) Liang, Senior Analyst

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.