STAFF REPORT

File No.: SS-RZ-2013.7

DATE OF MEETING:	May 26, 2020
TO:	Salt Spring Island Local Trust Committee
FROM:	Jason Youmans, Island Planner Salt Spring Island Team
SUBJECT:	Proposed Land Use Bylaw Amendment to Increase Density
APPLICANT:	Eric Booth
LOCATION:	Lot 10, Section 2, Range 3 East, North Salt Spring Island, Cowichan District, Plan 14710

RECOMMENDATION

1. **That the Salt Spring Island Local Trust Committee proceed no further with application SS-RZ-2013.7.**

REPORT SUMMARY

The purpose of this staff report is to recommend that the Salt Spring Island Local Trust Committee (LTC) proceed no further with application SS-RZ-2013.7 as the application fails to demonstrate a sufficient quantity of potable water to service the proposed density increase in a manner consistent with established occupancy assumptions.

BACKGROUND

Through this rezoning application, the applicant proposes:

- To increase the permitted density on the subject property from 33 to 49 units (16 additional units), of which 8 are proposed to be *affordable housing dwelling units* provided as an eligible community amenity under OCP Section H.3;

- To restrict permitted dwelling units on the property to 24 studio apartments with floor areas not exceeding 38 square metres (400 ft^2), 24 one-bedroom apartments with floor areas not exceeding 70 square metres (750 ft^2), and one detached single-family dwelling.

- To increase the permitted number of storeys to three, not exceeding 10 metres in height.

See Appendix 1 for the applicant's proposed zone variant.

This application was opened in August 2013 and was last considered by the LTC at its meeting of June 29, 2016.

At that meeting, the LTC passed the following resolutions:

> **SS-2016-136**
> **It was MOVED and SECONDED,**
> that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

1. Confirmation that potable water in the amount required to obtain occupancy permits can be provided under the plan for all proposed units and that water in the amount required for fire suppression and irrigation can also be provided;
2. Where potable water is to be supplied by groundwater, a pump test(s) conducted by a professional engineer and containing supporting documentation that the test was of sufficient duration to establish the long-term reliability of the water supply in accordance with generally acceptable hydrological engineering practices;
3. Where potable water is to be supplied by groundwater, a water quality analysis that demonstrates that the groundwater from each proposed water supply source or well is potable or can be made potable with a treatment system; and
4. Where potable water is to be supplied by groundwater, assessment of how groundwater use on site will impact:
    a. Nearby wells or other neighbourhood water supplies;
    b. Agricultural activities;
    c. Springs necessary to maintain fish habitat.
5. That the applicant makes every effort to include rainwater as part of the water supply plan.

CARRIED

SS-2016-137
It was MOVED and SECONDED,
that the Salt Spring Island Local Trust Committee direct staff, upon receipt of a water servicing plan from the applicant, to refer the plan to the Secretary to the Comptroller of Water Rights, Island Health, CRD Building Inspection and the North Salt Spring Water District for review and comment.

CARRIED

This file and corresponding staff report was on the LTC agenda for its August 27, 2019 meeting, but the applicant requested that it be withdrawn.

Prior to LTC's consideration of this file in 2016, the applicant proposed in 2013 to increase the permitted density on the property from 33 units to 83 units. At that time he was directed by the LTC to return with an application that was consistent with the Official Community Plan's specified multi-family density limit of 37 units/hectare.

See previous staff reports of October 2013 and June 2016 for further information.

Several development permit applications have been made for the subject lot over the years, in 1995, 1996, 2005 and 2011. The latest, application SS-DP-2011.6, was declared a dormant application by the LTC at its June 2, 2016 meeting and subsequently closed.

Image 1: Lot 10, Park Drive, 2017 ortho photo

ANALYSIS

Policy/Regulatory

Islands Trust Policy Statement:

Staff have not undertaken a complete review of the proposal relative to the Islands Trust Policy Statement (see Appendix 10). However, the most salient policy at this early stage is Section 4.4.2 which states, "Local trust committees and island municipalities shall, in their official community plans and regulatory bylaws, address measures that ensure: neither the density nor intensity of land use is increased in areas which are known to have a problem with the quality or quantity of the supply of freshwater."

Given the ongoing moratorium on new and expanded connections, staff consider the North Salt Spring Waterworks District (NSSWD) service area to have a "problem with the . . . quantity of the supply of freshwater." As such, the LTC should only entertain increasing density within the NSSWD area in full confidence that there is sufficient available fresh water to service the proposed density of development.

The applicant has proposed servicing future development through a groundwater well on the subject property. As discussed in greater detail below and in Appendix 7, the volume of water available from the well is not sufficient to service the proposed number of units if established occupancy guidelines are applied. The applicant is petitioning the LTC to apply unconventional occupancy assumptions in consideration of this application.

Official Community Plan:

See staff reports of October 2013 and June 2016 for discussion of applicable OCP policies and Development Permit Areas.

Land Use Bylaw:

See staff reports of October 2013 and June 2016 for discussion of applicable Land Use Bylaw regulations.

Issues and Opportunities

Water

As was the case when previously considered by the LTC in 2016, staff consider potable water to be the pivotal issue in considering whether to recommend advancing the application to bylaw drafting.

Water License

The applicant was granted a conditional water license by the Water Manager of Water Authorizations Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) in February 2018 authorizing the withdrawal of 19,000 litres of groundwater per day from a well on the property. See Appendix 2 for Conditional Water License 500810. The conditional license does not specify that the permitted maximum withdrawal volume is tied to a particular number of residential units. The water license application was supported by a report from a professional hydrogeological engineer consulting to the applicant. See Appendices 4 and 5 for that report and supplementary information.

2016 Resolution Status

As noted above, the applicant was directed by the LTC in June 2016 to engage the services of a professional engineer to develop a water servicing plan for the proposed density on site. In December 2019 the applicant provided a water servicing plan from a professional engineer similar to those provided for other recent multi-family dwelling rezoning applications (see Appendix 3). The applicant also provided a pump test (Appendices 4 and 5), water quality report (Appendices 4 and 5), and preliminary treatment system design (see Appendix 6) from professional engineers. The applicant considers the LTC's resolution to have been fulfilled. Staff will discuss each of the five specific provisions and the submitted information below.

> *SS-2016-136*
> *It was MOVED and SECONDED,* [and Carried]
> *that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:*
>
> 1. *Confirmation that potable water in the amount required to obtain occupancy permits can be provided under the plan for all proposed units and that water in the amount required for fire suppression and irrigation can also be provided;*

Staff Comment: The applicant has now provided a high level water servicing plan prepared by a professional engineer. This plan applies unit occupancy assumptions of the applicant's own invention that are inconsistent with water system design guidelines from public agencies. The report concludes that the well on site "appears to be able to accommodate the domestic demands of the development" but would be insufficient to meet the peak demands of the occupant load the applicant proposes, so construction of some sort of storage reservoir would be necessary. The report also concludes that the relationship between the well and pond on the property requires further consideration. North Salt Spring Waterworks District staff suggest the district may be able to connect the property for fire suppression purposes, pending necessary infrastructure upgrades at the applicant's expense. Doing so may require a decision of the NSSWD board.

SS-2016-136
It was MOVED and SECONDED, [and Carried]
that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

2. *Where potable water is to be supplied by groundwater, a pump test(s) conducted by a professional engineer and containing supporting documentation that the test was of sufficient duration to establish the long-term reliability of the water supply in accordance with generally acceptable hydrological engineering practices;*

Staff Comment: The applicant has provided a pump test from a professional engineer. See Appendices 4 and 5. This pump test was sufficient to satisfy FLNRORD that 19,000 litres per day can be withdrawn from the well on the subject property.

However, the LTC may wish to note the following observation from the report's author on page 29 of Appendix 4: "This analysis, however, does not consider possible groundwater seepage into the pond or years with below normal precipitation."

The pump test also determined that up to 59 percent of the water pumped from the well can be attributed to inflow from the pond.

SS-2016-136
It was MOVED and SECONDED, [and Carried]
that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

3. *Where potable water is to be supplied by groundwater, a water quality analysis that demonstrates that the groundwater from each proposed water supply source or well is potable or can be made potable with a treatment system; and*

Staff Comment: The applicant has provided a water quality analysis. See Appendix G of Appendix 4. The report notes:"Due to the close communication between the pond and the groundwater regime, the well is at risk of containing pathogens and will require disinfection according to the Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2 (BC Ministry of Health, 2016). In addition, a properly designed water treatment system will be required to reduce levels of colour, turbidity, iron and manganese and hydrogen sulphide. These latter parameters are of aesthetic concern and do not pose a health hazard."

The applicant has provided a preliminary water system design (Appendix 6). The engineer responsible for the preliminary design indicates that a system can be constructed that treats the groundwater to the necessary public health standards.

SS-2016-136
It was MOVED and SECONDED, [and Carried]
that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

4. *Where potable water is to be supplied by groundwater, assessment of how groundwater use on site will impact:*
    a. *Nearby wells or other neighbourhood water supplies;*
    b. *Agricultural activities;*
    c. *Springs necessary to maintain fish habitat.*

Staff Comment: The applicant's pump test and supplementary information indicate that use of groundwater in the volume authorized by the applicant's water license will not negatively impact nearby wells, neighbourhood water supplies, agricultural activities or springs necessary to maintain fish habitat.

SS-2016-136
It was MOVED and SECONDED, [and Carried]
that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

5. *That the applicant makes every effort to include rainwater as part of the water supply plan.*

Staff Comment: The applicant has indicated that rainwater will be directed into Swanson's Pond as the pond appears to serve, in part, as a reservoir for the groundwater well.

SS-2016-137
It was MOVED and SECONDED,
that the Salt Spring Island Local Trust Committee direct staff, upon receipt of a water servicing plan from the applicant, to refer the plan to the Secretary to the Comptroller of Water Rights, Island Health, CRD Building Inspection and the North Salt Spring Water District for review and comment.

CARRIED

Staff Comment: The applicant's water servicing plan and well yield report were referred to the above-noted agencies in December 2019. Comments about the report were received from North Salt Spring Water District. (see Appendix 8). The CRD did not address the applicant's water servicing plan, but rather his liquid waste disposal report. The CRD's comments have been provided to the applicant but are not included here, as they are largely technical in nature.

Proposed Density vs. Available Water

The applicant's current proposal asks the LTC to consider a zone for the subject property that would create 24 studio/bachelor units, 24 one-bedroom units, and one single-family dwelling.[1]

The applicant proposes that the LTC apply a variation on the people-per-unit occupancy metric that was used in a previous rezoning for the Croftonbrook affordable housing complex (see file SS-RZ-2017.4) to anticipate projected water demand. That metric is in the second column below (average cap/unit). The applicant would like the LTC to consider an average capacity per unit of 1 per studio unit, and 1.5 per one-bedroom unit.

Table 1: Croftonbrook Proposed Unit Capacity Model

Unit Type	Average cap/unit.	Phase 2		Phase 3		TOTAL	
		# units	capita	# units	capita	# units	capita
A- Studio	1	10	10	8	8	18	18
B- 1-bedroom (sm.)	1	0	0	4	4	4	4
C- 1-bedroom	1.2	10	12	8	10	18	22

However, as staff observed in its reports on the Croftonbrook application, the household sizes/occupancy rates proposed in the Croftonbrook application do not reflect guidance from public agencies with expertise in this field, but rather were proposed by the applicants for that file to reconcile their desired number of units to the volume of water available. Rather than reduce the number of units permitted, the Croftonbrook applicants proposed to cap the number of occupants per unit. As was discussed at length in the April 19, 2018 and September 27, 2018 staff reports for the Croftonbrook application, staff do not recommend occupancy caps as a means to control water use. Additionally, staff observed in a September 27, 2018 Croftonbrook staff report that:

> "It is important to note that LTC's decision to accept the information submitted by this applicant with respect to water supply not be interpreted as a precedent for future applications. As a government agency, BC Housing has appropriate tools to ensure that potable water is managed appropriately for this project that are not available to other present or future applicants (eg. limits to occupancy rates). The agency has made commitments to manage water supply for the duration of their involvement in the project (40 years) and they are publicly accountable for their actions."

The present application is being made by a private developer. No public agency will monitor occupancy of the units once constructed, except perhaps for the eight proposed affordable dwelling units if they are managed by a non-profit housing provider. While the LTC can control occupancy through restrictive covenant, legal advice received during consideration of the Croftonbrook rezoning application suggested that due to the problematic nature of enforcing occupancy (eg. evicting tenants that exceed occupancy limits) the LTC is advised not to engage in such a practice. For these reasons, staff do not recommend that the LTC proceed on the basis of unit occupancy/water use assumptions that depart significantly from those provided by public agencies. The guidelines developed by public agencies are inherently conservative so as to ensure that developments do not proceed if there is a risk that residents will run out of water.

[1] The applicant proposes that the single-family dwelling will be serviced by the existing North Salt Spring Waterworks District connection to the property.

The limited amount of information that staff could find concerning household size and number of bedrooms indicate that in the order of 12.5 to 20 percent of studio apartments are occupied by two or more occupants, which suggests that the LTC should not anticipate an average unit occupancy of 1 resident per studio unit as the applicant proposes. Census data for Salt Spring Island in 2016 indicates that the average household size for apartments "in a building that has fewer than five storeys" is 2.0.

See Appendix 7 for further discussion of this issue.

Approval Agencies

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

As noted above, the applicant has been granted a conditional water license from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development to withdraw a maximum of 19,000 litres per day from a well on the subject property. The conditional water license is not tied to a specific number of units. The applicant must make beneficial use of the water before December 31, 2022.

Island Health

Any water system developed for the property will require a construction permit and operating permit from Island Health pending source approval. Should the LTC advance this application, staff will recommend bylaw referral to Island Health for review. As a significant connection has been established between the groundwater well on the property and the pond, staff anticipate that the pond will need to be protected as a surface water drinking water source. Any recommendations from Island Health in this regard (setbacks, vegetative buffers) can be incorporated into the zoning bylaw or a restrictive covenant.

Secretary for the Comptroller for Water Rights

If the water system for the proposed development is determined to constitute a water utility, the applicant will require a Certificate of Public Convenience and Necessity from the Secretary for the Comptroller for Water Rights.

<u>Sewer</u>

The applicant intends that sewage disposal for the subject property will be provided by the Ganges Harbour Sewer system.

If the subject application is advanced by the LTC, it can anticipate that staff will recommend that the LTC require written confirmation from the Ganges Harbour Sewer Commission that there is sufficient capacity within their system to connect the subject property and the terms the applicant must meet to secure a connection.

The CRD has provided preliminary comments on the applicant's sewer servicing plan. These have been shared with the applicant.

<u>Site/Development Plans</u>

The applicant has only a general idea of the site layout and massing of future development on the property. Current policy in the Islands Trust Salt Spring office is that development permit applications for non-permitted densities or uses are not accepted where, at minimum, zoning applications have not advanced past public hearing. Nonetheless, as the applicant is requesting an increase to both density and height, which also triggers a need for increased parking, the LTC may wish to require the applicant to submit plans that demonstrate how possible massing configurations on the property may impact adjacent lots, particularly those abutting its western edge. The

location of development on the property will impact access and egress and by extension, surrounding roads. Additionally, submission of preliminary development plans at the time of rezoning can be seen to demonstrate that the rezoning application underpins a genuine intention to develop, rather than a speculative exercise.

Traffic Impacts

If the LTC determines there is sufficient merit to advance this application, staff will recommend that a traffic impact study by a professional engineer be undertaken to anticipate projected impacts and necessary mitigation measures.

Staff anticipate that increasing density on the subject property may necessitate upgrades to the pedestrian infrastructure in the neighbourhood, owing to its proximity to local public schools and the volume of foot traffic those schools generate. Bylaw referral to the Salt Spring Island CRD Transportation Commission, Island Pathways, neighbours, and other agencies and local groups may yield suggestions for traffic or pedestrian infrastructure improvements.

Affordable Housing

Amenity Zoning

The provision of eight units of affordable housing in return for eight units of market housing appears to be a reasonable community amenity.

However, consideration of an amenity zoning application requires adherence to OCP Policy H.3. If the LTC advances the subject application, staff will recommend that the LTC apply the guidance this policy provides. (See Appendix 10 for Policy H.3).

Unit Mix

The applicant states that the provision of studio and one-bedroom units fills a needed gap in Salt Spring's housing continuum, and that such units are appropriate for younger working people currently priced out of single-family home ownership and struggling to find lawful rental accommodations or entry-level ownership opportunities, as well as older single people.

However, as only eight of the proposed 48 units will be rent or sale-price controlled through an affordable housing agreement, there is no guarantee that what ultimately gets constructed will be geared toward the lower end of the income spectrum.

The 2015 Salt Spring Housing Needs Assessment determined that there is a documented need for housing across low to medium income households. The report notes:

"Evidence clearly points to ongoing shortages in almost all types of affordable housing for low to moderate income households. Entry level home ownership remains difficult for even median income households. Salt Spring's low income tenant households have few choices and struggle with both affordability and condition."

The 2020 Housing Needs Assessment for Salt Spring Island is currently underway by the Capital Regional District.

Rental Housing

If the LTC wishes to ensure that development on the property is kept totally, or partially, in the rental market, the LTC can exercise the new Residential Rental Tenure Zoning powers under Section 481.1 of the *Local Government Act*.

If the LTC advances this application, staff may recommend applying Section 481.1.

Swanson's Pond

The subject property was the site of a protracted disagreement over whether the pond on the lot constitutes a "water body" as such term is defined in the Salt Spring Island Land Use Bylaw. Staff consider that this issue was settled by a 2009 LTC-commissioned professional report that determined the pond does not constitute a water body under the Land Use Bylaw definition. The pond is also not subject to Development Permit Areas 4 and 7 for the protection of water bodies and riparian areas.

While the pond may not meet the Land Use Bylaw definition of "water body," staff anticipate that Island Health will require certain mitigation measures to protect its source quality, given the established connection between the groundwater well and pond. These mitigation measures may include setbacks from the pond boundary, thus impacting the buildable area of the subject property. The need to understand the source protection expectations from Island Health further underscores the need for agency referral of a water servicing plan from a professional engineers.

Additionally, the owner of the subject property was previously party to a Letter of Understanding with the Ministry of Environment and Climate Change Strategy that committed the owner to maintaining water flow from the property to nearby streams following the owner's land alterations which disconnected the pond from those streams. Ministry of Environment and Climate Change Strategy has confirmed that this LOU is no longer in effect, however the LTC can anticipate that if this application is advanced, staff will recommend habitat improvement measures consistent with those identified in the LOU.

Fire Protection

The applicant proposes to increase the permitted height of buildings on the subject property to 3 storeys. OCP policy B.5.2.2.9 is generally supportive of this approach in limited circumstances:

> "The LTC may consider changing zoning to permit some 3 storey buildings in areas away from the shoreline, the Ganges Village Core and established view corridors."

In recent years the Salt Spring Island Fire Protection District has expressed concerns about new three-storey buildings within its service area. If the subject application is advanced, staff will recommend referral to SSI Fire.

The applicant proposes that North Salt Spring Waterworks District (NSSWD) will service the subject property for fire suppression purposes. If the subject application is advanced, staff will recommend referral to NSSWD for written confirmation that this is the case and the terms the applicant must meet to secure a connection.

Heritage/Archaeology

Remote Access to Archaeological Data (RAAD) shows that the subject property is within an area of archaeological potential. Should the LTC advance this application, staff will recommend that an Archaeological Impact Assessment (AIA) of the site be undertaken to determine whether there are unrecorded items of cultural of historical

importance on the property that should be protected in the course of development. This would be consistent with recent rezoning applications in the Ganges area.

Consultation

Should the LTC advance this application, staff will recommend that a Community Information Meeting (CIM) be scheduled that both staff and the applicant should attend to field questions from the public.

Statutory Requirements

Statutory notification of the proposed rezoning will be made, if the LTC decides to proceed, in accordance with Section 466 of the *Local Government Act* and Salt Spring Island Development Procedures Bylaw No. 304. This will involve newspaper advertising and neighbourhood notification and will be undertaken once the LTC directs staff to schedule a public hearing.

Correspondence related to this application may be sent to ssiinfo@islandstrust.bc.ca.

Protocols

Staff are unaware of any protocols immediately relevant to this application.

Agencies

If the LTC directs staff to draft a bylaw amendment to advance this application, staff will return to the LTC at a future date with a recommended list of agency referral recipients.

First Nations

If the LTC directs staff to draft a bylaw amendment to advance this application, staff will return to the LTC at a future date with a list of First Nations referral recipients.

Correspondence

Public correspondence concerning this application is available here under SS-RZ-2013.7.

Rationale for Recommendation

1. **That the Salt Spring Island Local Trust Committee proceed no further with application SS-RZ-2013.7.**

   The subject rezoning application has been open since 2013 and it does not appear there is a viable path to a successful conclusion.

   Staff find that the application lacks merit for the following reasons:

   - The applicant's water servicing report is based on hypothetical unit occupancy assumptions provided by the applicant, not on established guidelines or evidence;
   - The applicant's water servicing report indicates that the well is insufficient – even with the applicant's minimal unit occupancy assumptions – to meet peak demand unless a storage system is developed; and;

- The applicant's pumping test report and water servicing report both conclude that the hydrostatic connection between the well and the pond creates "unknowns." These unknowns should be identified and assessed before rezoning proceeds. Of particular concern is how development of the site will impact the pond and what sort of protective measures would be required to ensure it is a safe water source for a future multi-family residential project.

Given Islands Trust Policy Statement policy 4.4.2, and given the inadvisability of the LTC's enforcing unit occupancy numbers, the LTC should only proceed when it can be established that there is abundant, or at least adequate, water to service a proposed density in all occupancy scenarios, not based on a best-case scenario that is beyond the LTC's control. Staff do not find this to be the case with the information provided to date.

ALTERNATIVES

The LTC may consider the following alternatives to the staff recommendation:

1. Draft Bylaw and Recommend Professional Reports and Bylaw Referrals

If the LTC is satisfied that there is sufficient potable water available to service the proposed density on the subject property, and sufficient merit to this application to warrant proceeding to the bylaw drafting stage, it may direct staff to do so.

If the LTC selects this option, staff also recommend that the LTC direct staff to provide a list of recommended professional reports and bylaw referral recipients in the subsequent staff report.

Potential resolutions in this regard are as follows:

That the Salt Spring Island Local Trust Committee direct staff to draft a bylaw to amend the Salt Spring Island Land Use Bylaw in accordance with the request by the applicant for rezoning application SS-RZ-2013.7.

And

That the Salt Spring Island Local Trust committee direct staff to return with a list of recommended professional reports and bylaw referral recipients.

The implications of these resolutions is that staff will return to the LTC at a future meeting with a draft bylaw for the LTC's consideration and a list of recommended professional reports and bylaw referral recipients.

2. Request Additional Information

The LTC may request further information prior to making a decision. If selecting this alternative, the LTC should describe the specific information needed and the rationale for this request. For example, the water system report provided by the applicant identifies several areas that require further investigation. Recommended wording for the resolution is as follows:

That the Salt Spring Island Local Trust Committee request that the applicant submit to the Islands Trust

- *[List information]*

The implication of this resolution is that the applicant will be expected to provide the information requested by the LTC before further LTC consideration of the file.

NEXT STEPS

If the LTC accepts staff's recommendation, the file will be closed and the applicant refunded in accordance with Salt Spring Island Local Trust Committee Bylaw No. 428.

If the LTC wishes to advance the application in some manner, staff will carry out the LTC's direction.

Submitted By:	Jason Youmans, Island Planner	May 12, 2020
Concurrence:	Stefan Cermak, Regional Planning Manager	May 14, 2020

ATTACHMENTS

1. Proposed Land Use Bylaw Amendment – Applicant Submission
2. Conditional Water License 500810
3. Preliminary Water Servicing Plan – Stantec Consulting Ltd. (2019)
4. Groundwater Supply Report – Hy-Geo Consulting (2017)
5. Groundwater Supply Report – Supplementary Information (2018)
6. Preliminary Treatment System Design (2019)
7. Proposed Density vs. Available Water – Staff Comment
8. North Salt Spring Waterworks District preliminary referral response
9. OCP Policy H.3
10. Island Trust Policy Statement Directives Only Checklist

Appendix 1

Jason Youmans

From: [redacted]
Sent: Tuesday, August 13, 2019 1:06 PM
To: Jason Youmans
Subject: Proposed Zoning

Hi Jason – Here's what I'm proposing:

Proposed Bylaw:

Section 9.9 –
RESIDENTIAL ZONES, Subsection 9.9.4 - "Exceptions in Particular Locations" is amended by adding a new R1(c) zone variation as follows:
"Zone Variation – R1(c)"

(1) Despite all other regulations of this bylaw, the principal uses within lands zoned R1(c) include ***dwelling units, affordable housing****.*

(2) Despite subsection 9.9.2 – Size, Siting and Density of Permitted Uses, Buildings and Structures –

(a) the maximum number of dwelling units is 49 with a minimum of 8 affordable housing dwelling units,

(b) the maximum number of dwelling units by type and size that can connect to a private water supply system are as follows –

(a) 24 studio suites not exceeding 37.2 square metres in size,
(b) 24 one bedroom dwellings not exceeding 75 square meters in size.

(3) Despite Subsection 3.8.1 - Height of Buildings and Structures"- the maximum building height for a structure is 10 metres provided that the structure does not exceed three storeys."

(4) Despite Section 3.13 – Home-Based Businesses, Subsection 3.13.6 – bed and breakfast operations, boarding houses, and repair of automobiles are not permitted.

(5) Despite Section 9.9.3 - Subdivision and Servicing Requirements - Minimum water servicing requirements will be met as follows:

(a) potable water will be provided by North Salt Spring Water District and/or through a water supply system approved by Island Health,
(b) water for fire protection purposes will be provided by North Salt Spring Water District, and
(c) water for landscape irrigation purposes shall be provided through a water supply system that is separate from the potable water supply system.

Province of British Columbia
Water Sustainability Act

Appendix 2

CONDITIONAL WATER LICENCE

The owner(s) of the land to which this licence is appurtenant is/are hereby authorized to divert and use water as follows:

a) The aquifer on which the rights are granted is 721.

b) The point of well diversion is located as shown on the attached plan.

c) The date from which this licence shall have precedence is February 6, 2018.

d) The purpose for which this licence is issued is waterworks (other).

e) The maximum quantity of water which may be diverted is 19 cubic metres per day.

f) The period of the year during which the water may be used is the whole year.

g) The land upon which the water is to be used and to which this licence is appurtenant is Lot 10, Section 2, Range 3 East, North Salt Spring Island, Cowichan District, Plan 14710.

h) The authorized works are pumphouse, pump, well, pipe, treatment facility, and pond (Swanson's Pond) which shall be located approximately as shown on the attached plan.

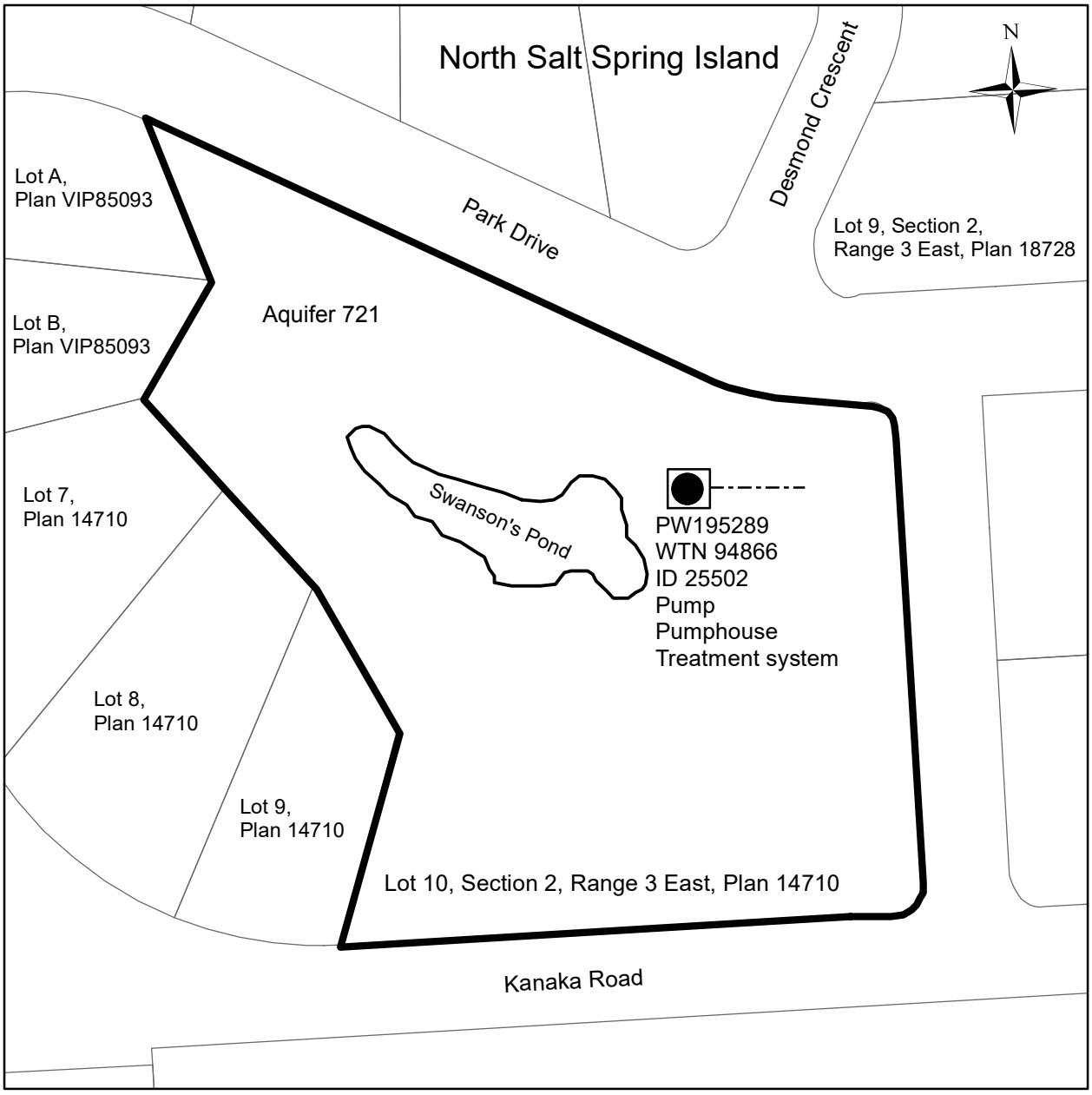
i) The construction of the said works shall be completed and the water shall be beneficially used prior to December 31, 2022. Thereafter, the licensee shall continue to make regular beneficial use of the water in the manner authorized herein.

j) The licensee shall install a flow measuring device to the satisfaction of a Water Manager under the *Water Sustainability Act*.

k) The licensee shall retain flow meter records for inspection upon request by a Water Manager under the *Water Sustainability Act*.

Darryl Slater
Water Manager

BRITISH COLUMBIA



WATER DISTRICT: Victoria
PRECINCT: Shawnigan
LAND DISTRICT: Cowichan

Signature:

Date: January 16, 2019

LEGEND

Scale: 1:1,212

Point of Diversion: ●

Map Number: 92.B.083.3.2

Pipe: - - - - - - - -

C.L.: 500810
FILE: 20006356

The boundaries of the land to which this licence is appurtenant are shown thus: ——————

Appendix 3

Stantec Consulting Ltd.
400-655 Tyee Road,
Victoria, BC V9A 6X5

December 4, 2019
File: 111720087

Attention: Eric Booth, Director
Salt Spring Ventures Inc,
238 Wildwood Crescent
Salt Spring Island, BC
V8K 2N7

Dear Mr Booth,

Reference: Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC

Stantec Consulting Ltd. (Stantec) were retained by Salt Spring Ventures to provide a high-level Domestic Water Study for the proposed development at Lot 10, Park Drive ("Lot 10") in the Village of Ganges on Salt Spring Island, BC.

This technical memorandum (memo) reviews the potential of the proposed water system to provide the required domestic flows, and the regulatory permits which would need to be obtained prior to construction. The water supply will be provided by Well No.25502, licensed under the Ministry of Environment Groundwater Use Act, situated within Lot 10.

This memo aims to address the following points :

- To determine the required water demand to service Lot 10's proposed developments
- To determine if the available capacity determined within the recently developed wells onsite can supply the proposed development solely for its domestic water purposes.

BACKGROUND DATA

Stantec reviewed the following reference documents:

- Emails exchanges between Salt Spring Ventures and Stantec from August 22, 2019 to August 30, 2019 and the attached document provided by Salt Spring Ventures named "info to Stantec Aug 30, 2019". The documents provide background information on the size of the development, the well and some preliminary calculations on the water demand.
- Report from Hy-Geo Consulting on ground water supply for Lot 10, Section 2, Range 3 East, North Salt Spring Island, dated of August 11, 2017. This report gives an assessment of the quality and quantity of available groundwater for the proposed Development.
- "Guidelines for the Approval of Water Supply Systems" (Island Health)
- Island Waterworks preliminary design figures for the water treatment design.

The North Salt Spring Water Works (NSSWW) District has a moratorium policy in place which restricts each parcel on the District's tax roll to one 19mm diameter water service. This is as a result of investigations carried out by consultants in 2014 which indicated that there is insufficient storage in St Mary's Lake and Maxwell Lake to allow for the withdrawal of the total licensed volume, and as such the Board of Trustee's opted to impose a limit on the number and size of services as a means of water conservation.

WATER DEMAND CALCULATIONS

Design Requirements and Assumptions

The Lot 10 development, as described in the background data sent to Stantec, details a total of 49 units including 1 single family dwelling, 24 studio units and 24 one bedroom units.

We understand that the single family dwelling unit water supply will be provided by NSSWD and therefore is not accounted in the following calculations.

Salt Spring Ventures has estimated a population of 1 occupant per dwelling for the 24 studio units and 1.5 occupants per dwelling for the 24 one bedroom units. This results in a population of 60 occupants in total which would be connected to the well.

Using this information Stantec calculated the domestic water demand anticipated to be placed on the well. The anticipated demand was then compared to the available flow from the well given in the hydrogeology report from Hy-Geo Consulting to determine if there will be any potential capacity issues.

Island Health (IH) mandates that water supplied must be of sufficient quantity for drinking and for sanitary purposes, and provides a design guideline of 225L/day/capita. This ties closely in with the Ministry of Forests, Lands, and Natural Resource Operations (FLNRO) guidelines of 230L/cap/day for indoor water demand.

No water saving measures such as grey water reuse or rainwater harvesting is accounted for in this report, all water required for domestic use is assumed to come from the well. Water for fire suppression is assumed to be provided by NSSWW.

Demand Calculations

Island Health Guidelines

The following subsections summarize the calculations used to determine the anticipated water usage for the 49 unit development. As noted above, we have used the IH mandated quantities per capita for this calculation and validated this quantity assumption by comparing with the FLNRO guidelines.

We have been provided the following population equivalent information to use as our design basis:

- 60 people to be serviced from the proposed wells, with 2 people per unit, and water quantity requirements of 225L/capita/day. Hence the Total Daily Water Demand = 60 * 225 = 13,500 L/day = 0.156 L/s.

Reference: **Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC**

Comparison with Ministry of Forests, Lands, and Natural Resource Operations Guidelines

As a due diligence exercise, we compared the water quantity estimates developed from the IH guidelines with the FLNRO design guidelines for rural water systems. FLNRO derives the Max Day Demand (MDD) flows using the following formula:

MDD = Indoor Demand (ID) + Water Loss Allowance (WLA) + Irrigation Demand (Irr)

$$MDD = ID + WLA + Irr$$

Indoor demand is based on a water usage rate of 230 L/capita/day, which closely resembles the IH recommendation. Utilizing this with the provided population equivalency of 60 to be serviced by the new well, we get the following results:

$$ID = 230\frac{L}{c * d} * 60\ \text{c} = 13{,}800\frac{\text{L}}{\text{d}}$$

The indoor demand calculated above considers all indoor appurtenances, including drinking water and sanitary uses.

Water Loss Allowance is based on the physical system and parameters such as length of mains, number of service connections and average operating pressures are utilized to determine this amount. It assumes that for a larger system there is a probability that joints or connection points may either be aging or installed incorrectly and thus create leaks. For a system of the size of this development it is not anticipated that there will be any significant leaks, but the calculation was still included to be conservative.

$$WLA = 5\ x\ (0.4704\ x\ Lm + 0.0303\ x\ Nc + 0.8Lc)x\ \left(\frac{P}{49.26}\right)^{1.5}$$

Where,

- WLA = Water Loss (m^3/d)
- L_m = watermain length (km)
- N_c = # of service connections
- L_c = total length of service connections (km)
- P = Average system pressure (metres water column)

The detailed design information for the water system is unknown at this time so the following conservative assumptions were made to provide a factor of safety in reviewing available capacity:

- The watermain length (L_m) was assumed to be approximately 100m.
- The number of service connections (N_c) was assumed to be one main service to the building.
- The length of service connections off of the watermain (L_c) was assumed to be 10m.
- The service pressure (P) was assumed to be 515kPa (52.5m) which is the maximum recommended pressure without requiring pressure reducing valves within buildings.

$$WLA = 5\ x\ \left(\frac{0.4704}{10} + 0.0303\ x\ 1 + 0.8 * 0.01\right)x\ \left(\frac{52.5}{49.26}\right)^{1.5} = 0.469\frac{m^3}{d} = 469\frac{L}{d}$$

Reference: **Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC**

Note:

1. *The values for length of watermain and service connections were given estimation based off the site size.*

2. *The WLA is a conservative estimate that considers the potential for water systems to develop leaks due to poor installation or aging systems. It is likely not an issue for a development and water system for this site as there is minimal piping onsite and it will likely remain undisturbed from future construction works. To reduce the likelihood of leaks additional design considerations may be stipulated which would make water loss negligible for this water system.*

At this time, no allowance has been made for irrigation on site.

Water Demand is calculated from combining the above items. Combining them we get:

$$DD = ID + WLA + Irr = 13{,}800 + 469 + 0 = 14{,}269\ L/d$$

Water Demand From Water Treatment Plant Filtration Backwash Water System:

As discussed below, the water extracted from the well will require filtration before being delivered. The filter backwash water requirements have been preliminarily assessed by Island Waterworks at :

$$Backwash\ water = 938\ l/d$$

Supporting calculations for the backwash water are shown below in the water treatment section.

Total Water Demand is calculated when adding the filters backwash requirements to the water demand :

$$MDD = ID + WLA + Irr + Backwash = 13{,}800 + 469 + 0 + 938 = 15{,}207\ L/d$$

WATER DEMAND COMPARED WITH WELL CAPACITY

Hy-Geo consulting completed hydrogeological pumping tests for the Well WID 25502 at different periods in 2017.

Their report mentions the following :

- A man-made pond, locally known as Swanson's Pond, occupies the central portion of the property covering an area of approximately 0.23 acres or 924 square meters based on late summer 2013 orthophoto mapping.

- During the pumping tests, Hy-Geo consulting assessed that under pumping conditions, up to 59 percent of the water pumped from the well can be attributed to inflow from the pond.

- The currently available long term capacity of the well has been rated in conjunction with the Swanson's Pond. The available long term pumping rate from the well has been assessed at 13.2 L/min, or 19,008 l/d.

The FLNRO *Design Guidelines for Rural Residential Community Water Systems* (2012) states in Section 2.2 – Groundwater: "The total developed groundwater capacity or dependable yield of well(s) must equal or exceed the Maximum Day Demand." Therefore, the calculated MDD placed on the well from must not exceed 19,008 L/d.

The calculated water demand based on the IH and FLNRO design guidelines are as follows:

- FLNRO: 14,269/L/day
- Island Health: 13,800L/day

The above calculations, relying on the information provided within the *Report on ground water supply for lot 10, section 2, range 3 east, north salt spring island*, from Hy-Geo Consulting, show that the water demand is potentially able to be serviced by the onsite well, but further investigation should be made as to what the effect of the inflow from the pond. It is unclear for the moment where the development will be located and whether it will have an impact on the pond. Further investigation will be required to assess the impact of the construction on the Swanson Pond.

WATER QUALITY

WELL WATER QUALITY

The *Report on ground water supply for lot 10, section 2, range 3 east, north salt spring island*, from Hy-Geo Consulting provides the analyses results of the well WID 2552 testing for water quality. The report indicates that the samples met or exceeded the *Guidelines for Canadian Drinking Water* (Federal-Provincial-Territorial Committee on Drinking Water, 2017) for all parameters tested except for:

- Total coliforms,
- E. Coli,
- Colour,
- Turbidity,
- Iron,
- Manganese
- Sulphide.

Presence of a slight sulphur odour was also detected during field sampling indicative of hydrogen sulphide (H2S). Most of these parameters, such as colour, iron, manganese and hydrogen sulphide are of aesthetic concern and do not pose a direct health hazard for the concentrations reported. The Langelier index ranging from -0.996 to -1.26 indicates mild to moderate corrosive tendencies.

Reference: **Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC**

CONCEPT DESIGN CONSIDERATIONS

POTABLE WATER TREATMENT

The analysis results show that the well water presents a risk of containing pathogens and will therefore require some disinfection. Additionally, the relatively high turbidity of the water tested implies that some type of filtration will be needed upstream the disinfection process. Finally, the relatively high level of iron, manganese, turbidity, colour and hydrogen sulphide imply the requirement of a properly designed water treatment system to reduce them to levels that meet or exceed the Guidelines for Canadian Drinking Water. While not posing a direct health hazard at the reported concentrations, iron and manganese oxides can affect the water color and flavor and create mineral deposit in the pipes. The type of water treatment will be selected in the detailed design but typically oxidation followed by filtration and finally disinfection is a common treatment for the parameters cited above.

Filtration treatment requires a regular backwash process which will require a supply of potable water to clean any residual material off the filters. If this is to be provided from the onsite well, a dedicated reservoir and pump system will need to be provided. The backwash water volumes required have been estimated by Island Waterworks according to the following calculations :

Water use for backwash of systems :

1. *2 x 2.0 Nexsand every 5 days using 95 gallons (431L) per backwash = total use 190 (862L) gallons per 5 days = 172.4L/day*
2. *2 x 2.0 Carbon every 5 days using 95 gallons (432L) per backwash = total use 190 (862L) gallons per 5 days = 172.4L/day*
3. *2 x Colorsoft set at 10 grains backwashing every 3000 gallons (13,620L) using 125 gallons (567.5L) per regen = 5.23 regenerations every 5 days (based on 14,269L/day = daily water supply). 5.23 x 567.5L = 2,968L/5 days = 593.6L/day*

Backwash water = 172.4L/day + 172.4L/day + 593.6L/day = 938L/day

Total backwash water requirement = 6.57% of 14,269L/day

Maximum daily water requirements = 938L/day + 14,269L/day = 15,207L/day total

The backwash water must be treated water, so a dedicated reservoir and pump post treatment will need to be used to store water for backwash use. Island Waterworks estimated the storage tank for the backwash to be in the range of 10,000 Gallons. Island Waterworks confirmed their system is designed to meet Island Health Standards.

Reference: **Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC**

ADDRESSING PEAK WATER DEMAND

The available long term pumping rate from the wells is 19,008 L/day, which equates to approximately 0.220 L/s. While this is enough to supply the daily demands from the development, it is not sufficient to supply the peak demands which are typical during the morning breakfast period, lunch time and evening dinner times. During the detailed design, the mechanical engineer will provide a peak flow that will need to be provided to the building and a minimum pressure that will need to be provided for suitable use in the buildings fixtures in accordance with BC Building Code (BCBC), and it is estimated these peak flows will be in the order of 5L/s based on previous similar projects.

To accommodate these peak flows, it is proposed to pump the water from the wells through the water treatment process and then into a storage reservoir which will be sized for one full day of water demand for the development. On the downstream side of this reservoir will be a pump skid (Grundfos BoosterPAQ or approved equal) which will be sized to accommodate the peak flows defined by the mechanical engineer and will also have variable speed capability to handle varying flow demands throughout the day.

The well pumps will fill the reservoir at the long term allowable pumping rate during off peak times to handle the high peak time flow demands from the building.

The above consideration is independent from the backwash flow issue.

FIRE SUPPRESSION

At this time, it is assumed all water for fire suppression will be provided by NSSWW. Hydrants should be located no more than 45m from Fire Department Connections on buildings for sprinklered units, and at no more than 90m hose laying length from any portion of the new buildings.

PERMITTING

According to the Drinking Water Protection (DWP) Act a “water supply system” is a well or surface water intake that serves more than a single-family home. As such this development’s well will be considered a water supply system and will need to meet the requirements of the DWP Act and Regulation. To assist developers the Island Health Authority provide an application guide for the Water System Approval Process which should be referred to for further information regarding the application and permitting process for: water source approval, construction permit, operating permit, water quality management, operation and maintenance procedures, source protection, emergency response plan, operator training, and annual reporting.

The permits and requirements typically involved in multi-residential developments are listed below for ease of reference:

- Ministry of Environment Well License
- Island Health Source Approval
- Island Health Water Works Construction Permit

Reference: **Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, BC**

- Island Health Operating Permit
- Island Health Holding Tank Permit (if required)
- BC Building Code Letters of Assurance (Schedule A, B, and C)
- Capital Regional District Building Permit
- Island Trust Development Permit

The Island Health Public Health Engineer will review the detailed design and specifications for compliance with the DWP Act and Regulation and requirements listed in the Water System Approval Process and will issue the permit to construct waterworks and the operating permit for the new water system, as well as a holding tank permit (if required for sanitary purposes).

The submittal for the Water Works Construction Permit will be handled by the water system design engineer and typically takes place around the time of the building permit application, once all design information has been finalized and only minor changes are expected. It is not recommended to begin the waterworks construction permit application process for this development until the rezoning for the site has been approved, the major design loads have been confirmed, and the project is in the detailed design stage.

If the design is submitted prior to the detailed design stage, it is likely that the submission will be rejected by Island Health and will require further advancement of the design as well as an additional subsequent submission to Island health prior to gaining their approval. This will have a negative effect on design costs and scheduling.

CLOSING

The IH and FLNRO design guidelines provide an effective and conservative tool towards developing the water demand capacity. Although the well appears to be able to accommodate the domestic demands from the development, there are unknowns associated with the effect of the pond on the well drawdown and these factors must be considered as the design proceeds forward.

Regards,

Stantec Consulting Ltd.

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Appendix 4

REPORT on GROUNDWATER SUPPLY for LOT 10, SECTION 2, RANGE 3 EAST, NORTH SPRING ISLAND

Prepared for:

Salt Spring Ventures Inc
109 Frazier Rd
Salt Spring Island BC
Canada V8K 2B5

Submitted by:

Hy-Geo Consulting
Victoria, British Columbia

August 11, 2017

File: 1609291

EXECUTIVE SUMMARY

Hy-Geo Consulting was retained by E. Booth of Salt Spring Ventures Inc to complete an assessment of the quantity and quality of available groundwater for a proposed multi-family development along Park Drive and identify any potential risks to adjacent groundwater or surface water sources. This report summarizes the results of the investigations carried out in order to meet the water supply conditions as outlined under OCP policy C.3.3.2.2.

A man-made pond, locally known as Swanson's Pond, occupies the central portion of the property covering an area of approximately 0.23 acres or 924 square metres based on late summer 2013 orthophoto mapping. A 15.2 cm (6-inch) diameter bedrock well WID 25502 (WTN 94866) situated close to the northeast shore of the pond is being proposed as the source of water supply for the multi-family development. The other nearest water supply source is a licensed spring (Hickey Spring) situated along the west side of Desmond Crescent about 85 m north of the well. Two other bedrock wells have been recorded in the region just over 300 m northwest of the property well.

Extended duration pumping tests of Well WID 25502 up to rates of 28.8L/min (7.6 USgpm) for 27.3 days has shown a direct communication between the well and the water in Swanson's Pond. Under pumping conditions, up to 59 percent of the water pumped from the well can be attributed to inflow from the pond. Based on the pumping test results and information currently available the long-term capacity of the well in conjunction with the pond has been rated at a maximum capacity of 13.2 L/min (3.5 USgpm). Long-term monitoring of Hickey Spring during 2017 showed that the well pumping tests had no measurable affects on the spring. Use of the well at a maximum rate of 13.2 L/min (3.5 USgpm) would have no measurable effect on existing wells, springs, or other water supplies.

Due to the close communication between the pond and the groundwater regime, the well is at risk of containing pathogens and will require disinfection according to the *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2* (BC Ministry of Health, 2016). In addition, a properly designed water treatment system will be required to reduce levels of colour, turbidity, iron and manganese and hydrogen sulphide. These latter parameters are of aesthetic concern and do not pose a health hazard.

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INTRODUCTION

Hy-Geo Consulting was retained by E. Booth of Salt Spring Ventures Inc to complete an assessment of the quantity and quality of available groundwater for a proposed multi-family development on the above property along Park Drive and identify any potential risks to adjacent groundwater or surface water sources. The property is situated close to Ganges harbour (Figure 1), encompasses Crown Parcel ID PIN 34987471 and occupies approximately 1.326 hectares (3.28 acres) in area. The land description is reported as Lot 10, Section 2, Range 3 East, North Salt Spring Island, Cowichan District, Plan 14710 (PID: 004-255-500).

This report summarizes the results of the investigations carried out in order to meet the water supply conditions as outlined under OCP policy C.3.3.2.2, (Islands Trust Staff Report, 2016). This policy states that, "When considering rezoning applications, the Local Trust Committee should consider the impacts of the proposed new use on existing wells, springs, or other water supplies. If the proposed use is expected to need more water than the uses already allowed on the property, then the Committee should ask for evidence that wells or other water supplies in the neighbourhood would not be depleted. The Committee should also consider whether water use would affect agricultural activities or deplete any springs necessary to maintain fish habitat."

Property Location and Water Sources

A man-made pond, locally known as Swanson's Pond, occupies the central portion of the property covering an area of approximately 0.23 acres or 924 square metres based on late summer 2013 orthophoto mapping available from the Capital Regional District (CRD, 2017). In addition to this surface water source there is a 15.2 cm (6-inch) diameter bedrock well WID 25502 (WTN 94866) situated close to the northeast shore of the pond. The well was initially drilled in 2008 by Drillwell Enterprises Ltd., to a depth of 30.48 m (100 feet) and estimated by the driller to yield 45.4 L/min (12 US gallons per minute). This well is being proposed as the source of water supply for the multi-family development. The other nearest water supply source is a spring (Hickey Spring) situated along the west side of Desmond Crescent about 85 m north of the well and having one domestic water licence. Two other bedrock wells have been recorded in the region just over 300 m northwest of the property well (Ministry of Environment, 2017a).

Based on the Islands Trust Staff Report (2016) on the subject property, the parcel appears to include Development Permit Areas 4 (Water Protection) and 7 (Riparian Protection). These permit areas are shown along the drainage ditch south of Hickey Spring and along the eastern boundary of the property (Figure 2). Flow in these drainage ditches occurs during the winter months while they are dry during the summer and early fall.

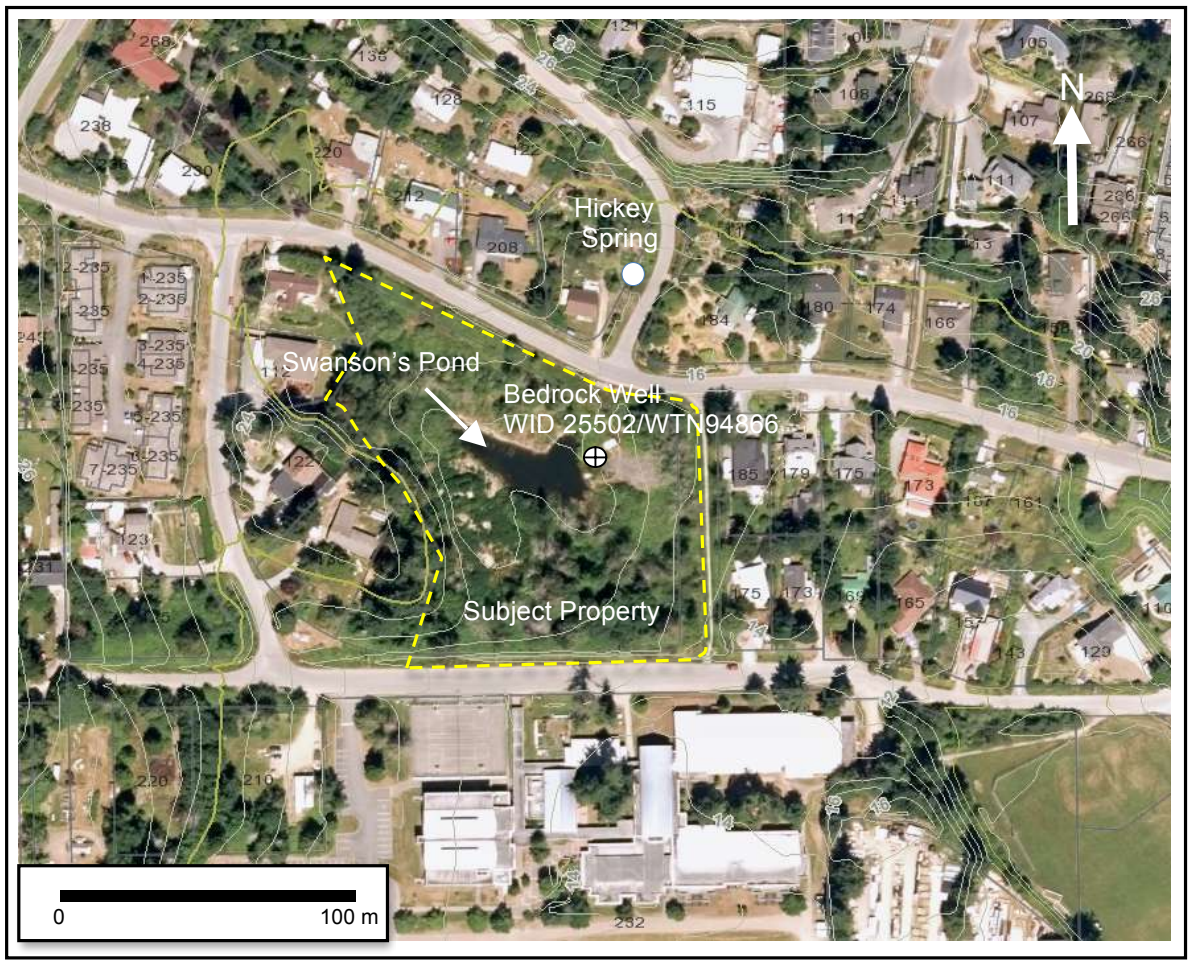

Figure 1. Location of subject property and water sources. Basemap from CRD (2017).

Soil Conditions

Soils in and about the property area (Figure 3) are reported to belong to the Mexicana-Trincomali series comprised of gravelly sandy loam to gravelly loam morainal deposits less than 100 cm deep over compact unweathered glacial till.

Bedrock Geology

The region is underlain by a series of Upper Cretaceous sedimentary rocks belonging to the Nanaimo Group (Muller and Jeletzky,1970) with the property area situated near the faulted contact zone between the Ganges (Pender) Formation and the Protection Formation as shown in Figure 4. At the well site, steeply dipping, dark grey to black mudstone is exposed beside Swanson's Pond (Figure 5). This unit is likely part of the Ganges Formation and reported as shale in the well record (WTN 94866).

Figure 2. Reported Riparian and Water Protection areas adjacent to subject property. Adapted from Islands Trust Staff Report (2016).

Climate

Lower elevations on Salt Spring Island are situated in the Coastal Douglas-fir biogeoclimatic zone with a moist maritime climate (Government of British Columbia, 2017). The climate is characterized by cool dry summers and humid mild winters. The majority of this precipitation falls during the period from November to February and the summers months are subject to drought conditions. Normal annual precipitation (Government of Canada, 2017) reported at the Saltspring St Mary's L climate station (ID: 1016995) was 987.0 mm (38.9 inches) during the period 1981 to 2010 (Figure 6). Global climate models (Allen *et al.,* 2008) suggest precipitation may increase slightly in the future, particularly during the winter months.

Topography, Drainage and Swanson's Pond

Swanson's Pond is an excavated pond that has been reported to have been originally dug in the 1950's in a swampy area (Salt Spring Island Archives, 2017). It is situated at an elevation of approximately 17 m above sea level (Figure 7). The pond was subsequently deepened by Eric Booth in late summer of 2008. Photographs taken of the excavation work at that time are shown in Appendix A. Maximum depth of the pond is reported to be about 3.05 m (10 feet), pers. comm., E. Booth, January 2017. Area and depth of the pond varies seasonally. Swanson's Pond is not directly connected to inflows from adjacent drainage ditches. A PVC, 15.2 cm (6-inch) diameter outlet pipe has been installed at the eastern end of the pond to enable

lowering of the pond if necessary, however, it is normally blocked to retain pond levels sustained by precipitation and groundwater seepage (pers. comm., E. Booth, May 2017).

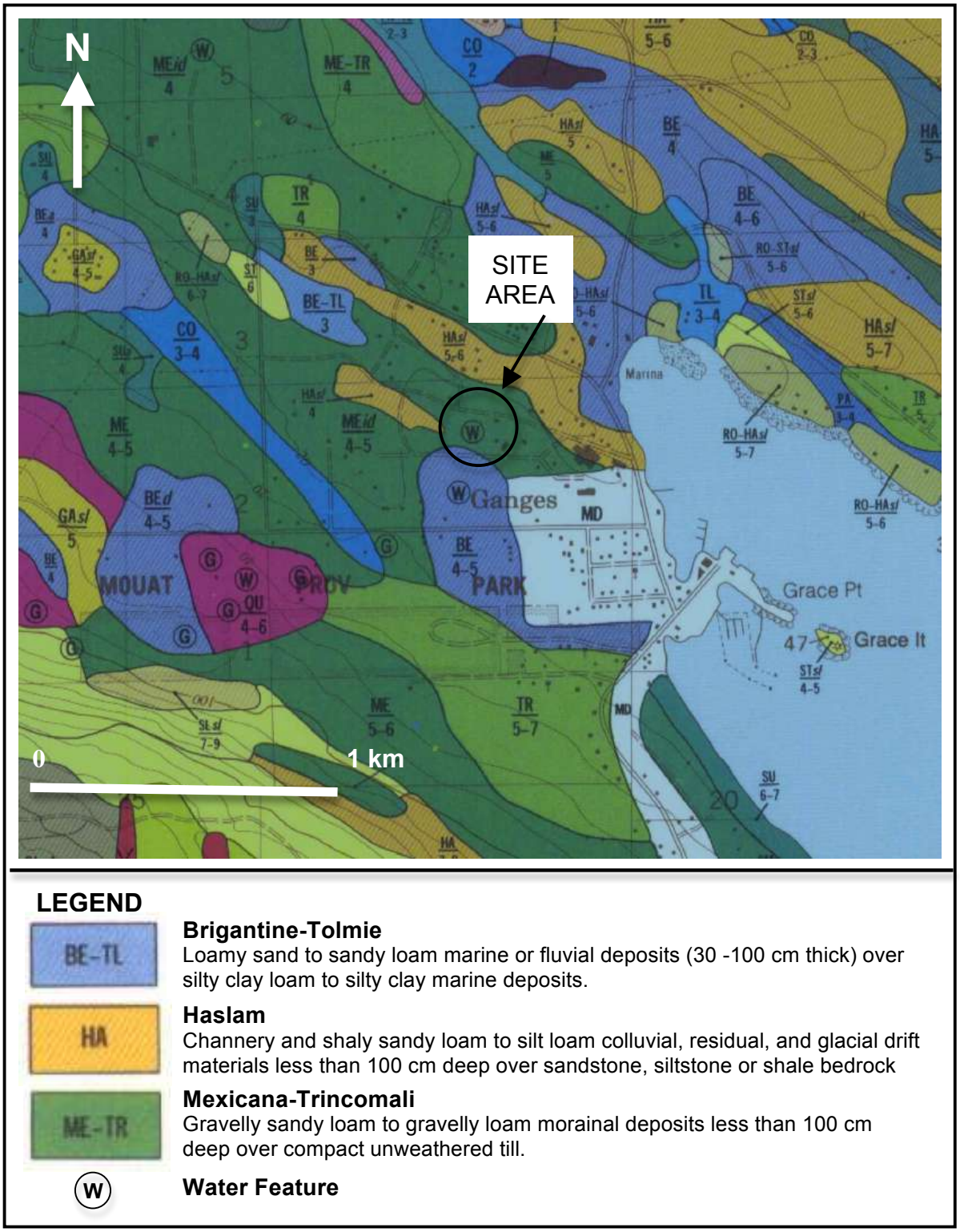

Figure 3. Soils in and about the site area. Adapted from Van Vliet *et al*., (1987).

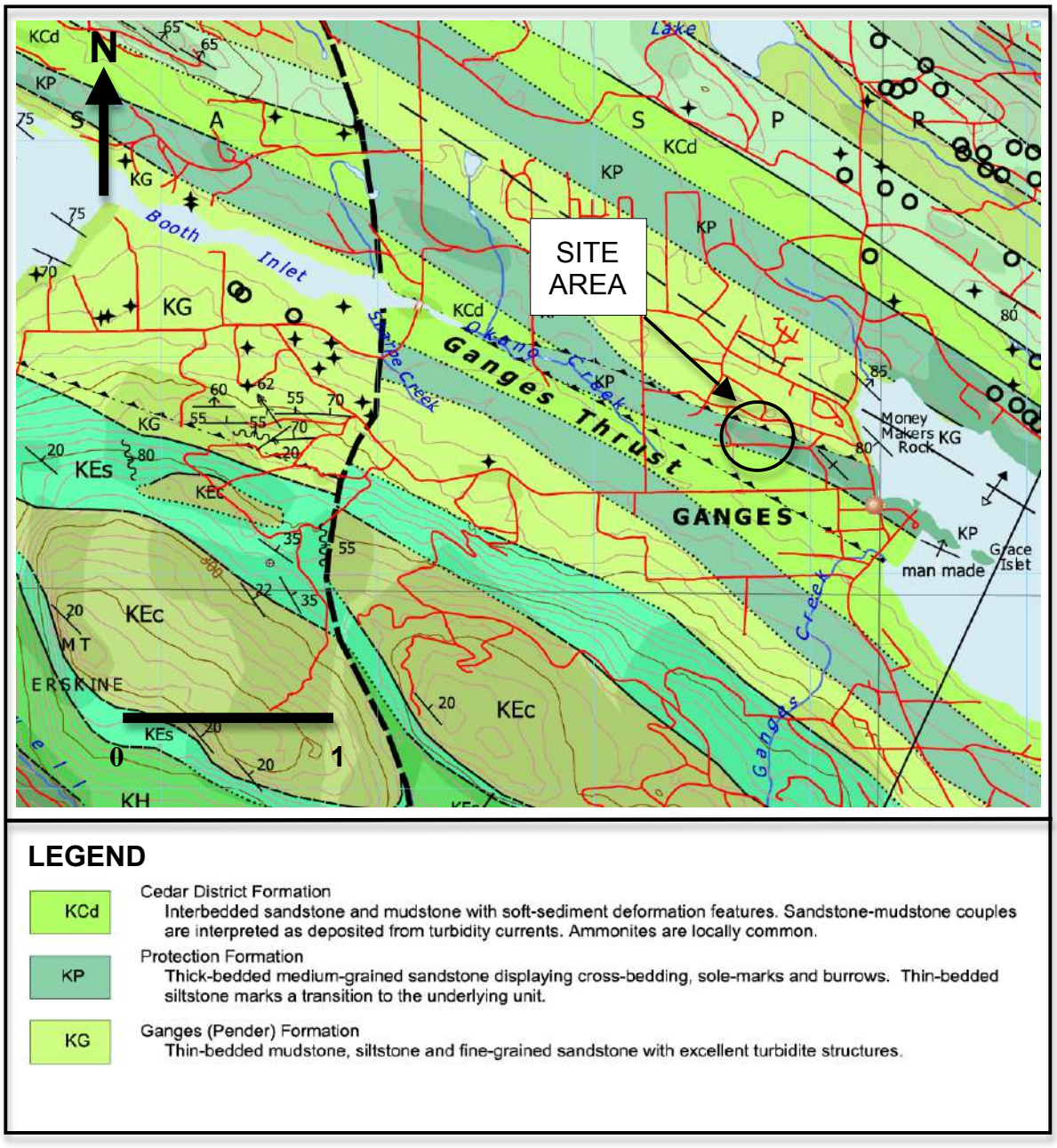

Figure 4. Bedrock geology in and about the site area. Adapted from Greenwood and Mihalynuk (2009).

Figure 5. Steeply dipping dark grey-black mudstone exposed at edge of pond, west of production well. Photograph taken May 14, 2017.

HYDROGEOLOGICAL SETTING

The hydrogeological conditions of Salt Spring Island have been described by Hodge (1977 and 1995), Larocque (2014) and Larocque *et al.,* (2015). Groundwater on the island is found primarily in open fractures in the bedrock formations as they are encountered during drilling of water wells. These fractures constitute the major zones for groundwater storage and movement. Larocque *et al.,* (2015) have mapped the regional groundwater level elevations and flow directions on the island based on water level data from existing water wells and other sources. This data indicates that the property is situated within a regional groundwater discharge area likely recharged from the surrounding topographically higher areas such as Mount Belcher.

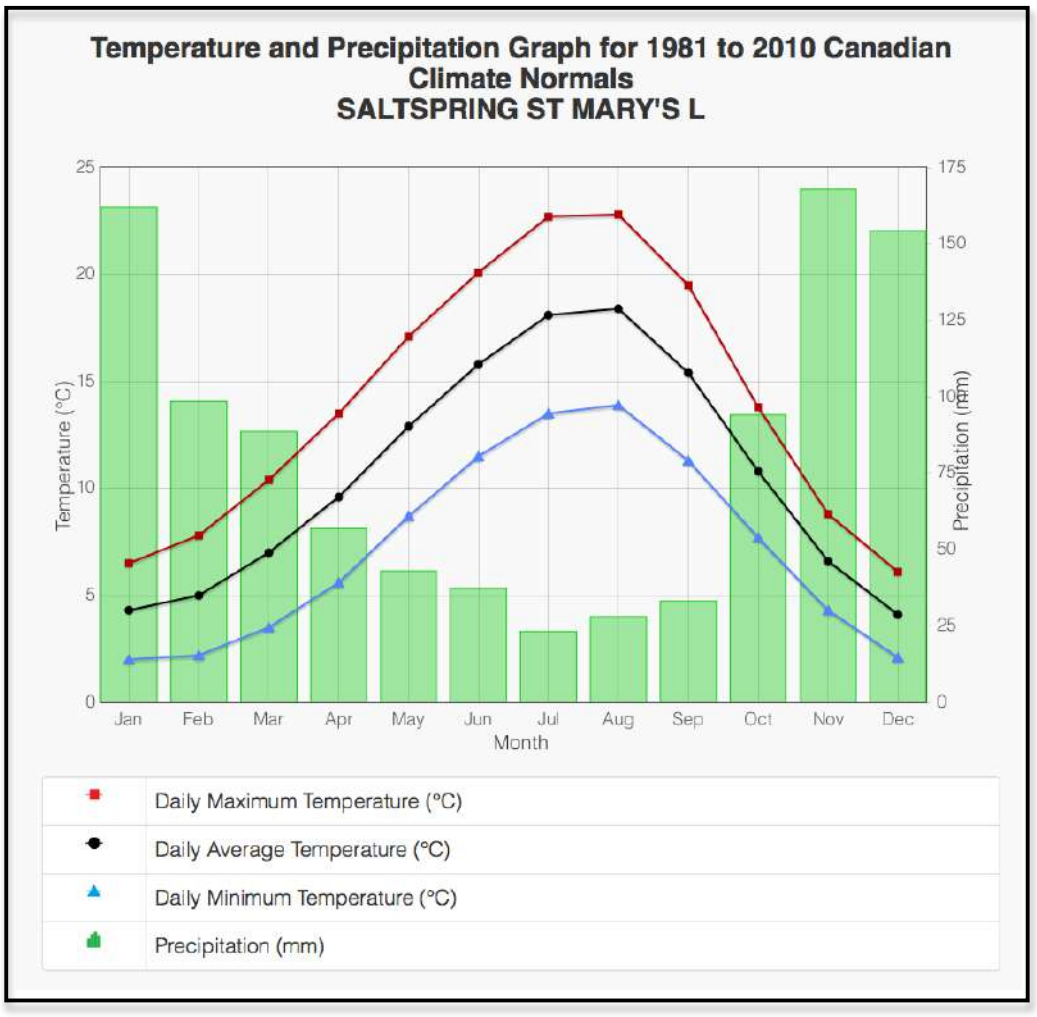

Figure 6. Monthly normal precipitation for Saltspring St Mary's L climate station. Data from Government of Canada, 2017.

Figure 7 shows the inferred directions of shallow groundwater flow around Swanson's Pond based on the local topography and field observations, i.e. discharge conditions such as Hickey Spring. Deeper groundwater flows are likely upwards in this region. Saline groundwater with elevated levels of chloride > 300 mg/L and total dissolved solids > 620 mg/L have been reported west of the property near Booth Bay (Hodge, 1977 and 1995). The Ministry of Environment (2017a) has identified and mapped two aquifers in the region, including bedrock Aquifer 721 and an unconsolidated sand and gravel Aquifer 156 along the west shore of Ganges Harbour. Aquifer 721 comprises the fractured sedimentary rock of the Nanaimo Group wherein the geometric mean of reported well yields is 0.13 L/s (2.0 USgpm). There is a lack of evidence for the sand and gravel Aquifer 156 occurring in the vicinity of the property.

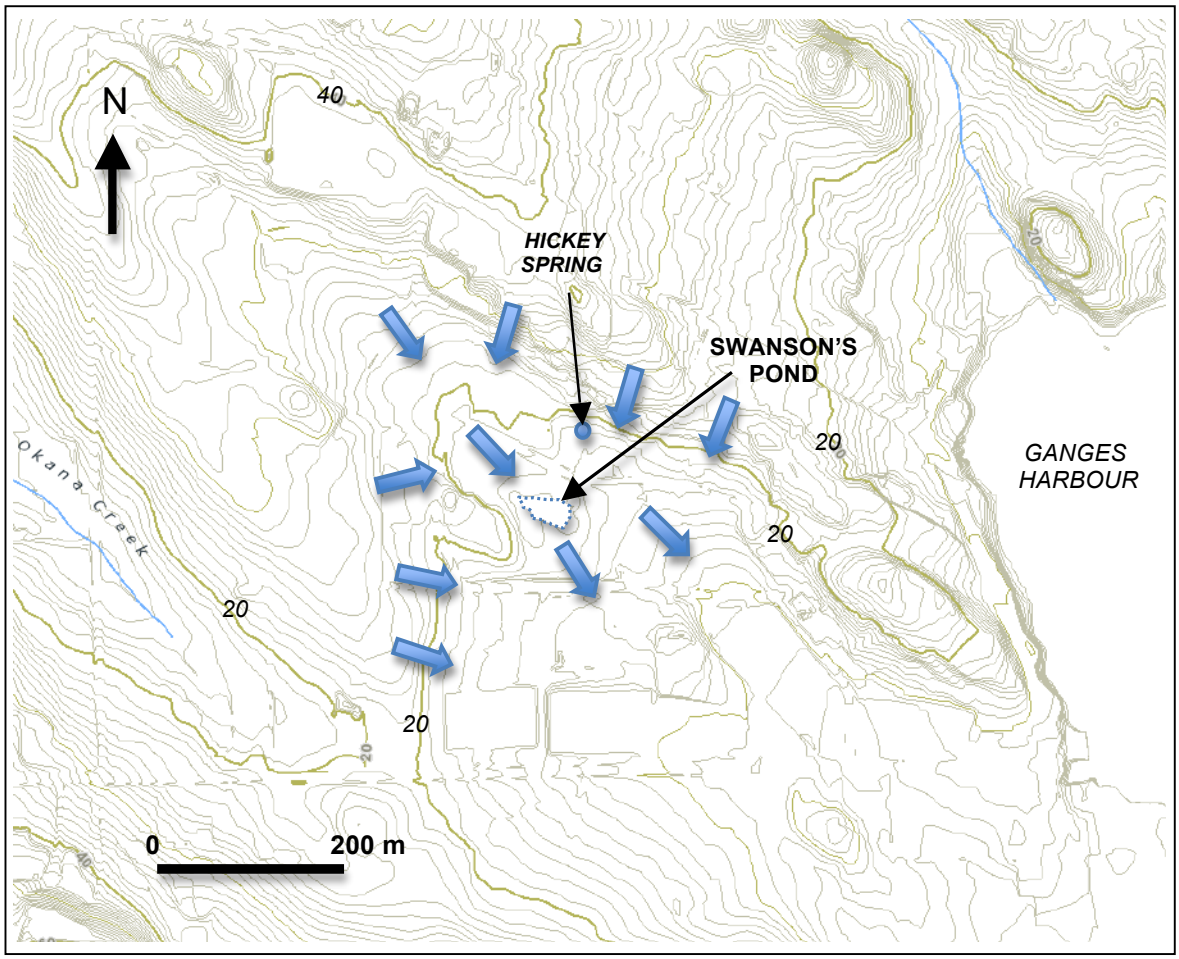

Figure 7. Inferred shallow groundwater flow directions around Swanson's Pond based on topography. Contour interval 1 m. Basemap from CRD Atlas (2017).

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 8 shows the groundwater level trend for Provincial Observation Well 373, situated south of Ganges for 2017 up to August of the year.

From January 2017 to July 2017 the water levels were slightly above the historic mean trend at this location, then falling below the mean in August. The well is situated in a groundwater recharge area on Mount Belcher Heights where seasonal fluctuations of several metres may occur. In the regional groundwater discharge regime of Swanson's Pond seasonal fluctuations of perhaps < 1 to 2 m may be anticipated.

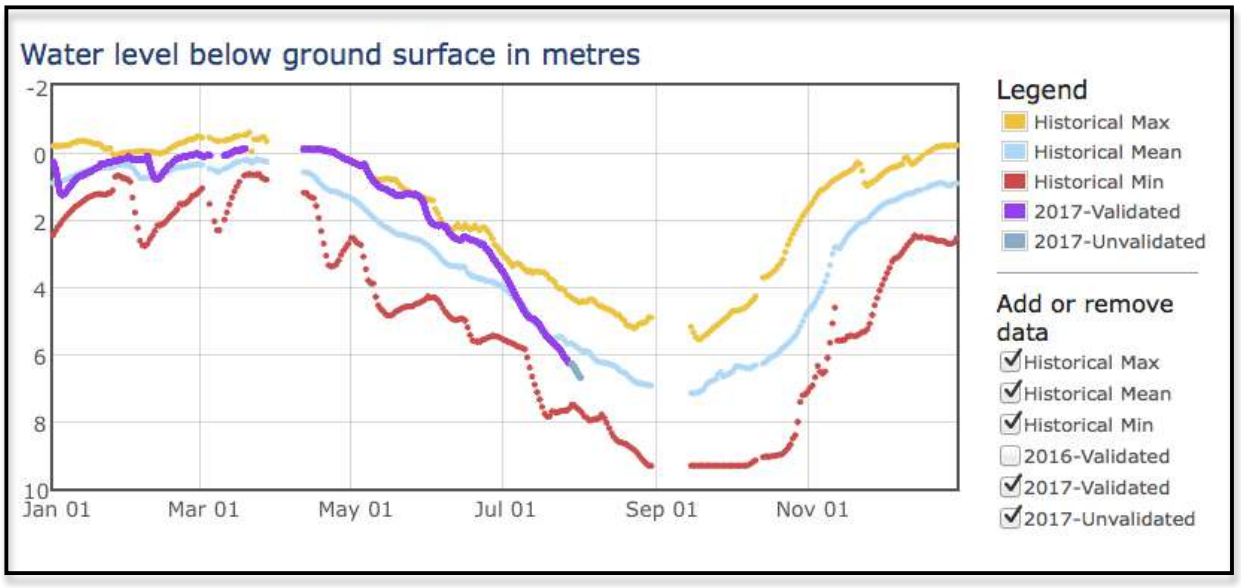

Figure 8. Groundwater level trend in 2017 compared to historic maximum and minimum data for Observation Well 373. From Ministry of Environment (2017b).

Well WID 25502 (WTN 94866)

Well WID 25502 (WTN 94866) was originally drilled September 9, 2008 before Swanson's Pond was deepened. The well was drilled to a depth of 30.48 m (100 feet) in shale bedrock and completed with 5.18 m (17 feet) of steel 15.2 cm (6-inch) diameter surface casing with a 0.304 m (1 foot) stickup above ground. Cumulative water flows of 22.7 L/min (6 gpm) and 45.4 L/min (12 gpm) were reported after drilling reached 6.1 m (20 feet) and 12.2 m (40 feet) respectively. A copy of the original well record is provided in Appendix B. The well is situated approximately 5.3 to 7.0 m (17.5 to 23.0 feet) away from the edge of Swanson's Pond, depending upon the water level in the pond.

Hickey Spring

Hickey Spring is a licensed water source (Licence No. C122815) that discharges into a concrete lined cribbing (Appendix C) approximately 1.8 m (6 feet) square and 3 m (9.8 feet) in depth. It is currently licensed for 345.374 cubic metres per year for residential lawn, fairway and garden use (Ministry of Environment, 2017a).

HYDROGEOLOGICAL TESTING

A series of pumping tests were conducted on the well and Swanson's Pond to assess the long-term yield of the well and hydraulic relationships among the well, Swanson's Pond and Hickey Spring. Investigations included the following:

1. A 73-hour, constant rate pumping test on the well in January 2017, in conjunction with monitoring of water levels on Swanson's pond and Hickey Spring.

2. An 8-hour, pumping test on Swanson's Pond, in February 2017, in conjunction with monitoring of water levels on the well and Hickey Spring.

3. An 11.3-day, constant rate pumping test on the well in May 2017, in conjunction with monitoring of water levels on Swanson's pond and Hickey Spring.

4. A 27.3-day pumping test on the well in June-July 2017, in conjunction with monitoring of water levels on Swanson's pond and Hickey Spring.

Prior to and during pumping tests 1 and 3 above, water samples were taken from the well, Swanson's Pond and Hickey Spring for laboratory analysis of microbiological, chemical and physical parameters. Copies of the laboratory analyses are provided in Appendix G.

A description of the pumping test procedures and results of testing are provided in the following sections.

73-hour Pumping Test of Well (WID 25502)

Well (WID 25502) was pump tested, using the existing pump in the well, at a constant rate of 22.7 L/min (6.0 USgpm) by Tony Kaye (Albert Kaye and Sons Drilling Ltd.) for a period of 73 hours between January 20 and January 23, 2017. Discharge was piped to the drainage ditch north of the well. A total of 26,280 USgals was pumped during this period. Manual water level measurements in the well were taken during pumping and after pump shutdown at intervals normally prescribed for long-duration pumping tests (Ministry of Environment, 2010). A staff gauge on Swanson's Pond was also monitored manually during the test period and pressure transducers were installed in the well, on the pond and at Hickey Spring to record water level measurements every 10 minutes. An additional pressure transducer was used to measure barometric pressure in order to correct the water level data collected for barometric effects. During the test, 4.32 mm of precipitation was reported at the Gulf Island Secondary School weather station (Gulf Island Secondary School, 2017).

Pumping test drawdown and recovery data for the well are shown in Appendix D. Drawdown during the test (Figure 9) appeared to have essentially stabilized at 1.341 m (4.4 feet) below the pre-pumping (static) level of 0.994 m (3.26 feet). Extrapolation of the drawdown to 100 days without recharge suggests drawdown would reach 1.402 m (4.6 feet) indicating a specific capacity of 16.19 L/min per metre of drawdown (1.30 USgpm per foot of drawdown). At a pumping rate of 22.7 L/min (6.0 USgpm), only 12 percent of the available drawdown of approximately 11.28 m (37 feet) in the well would be utilized after 100 days thereby providing a significant safety factor.

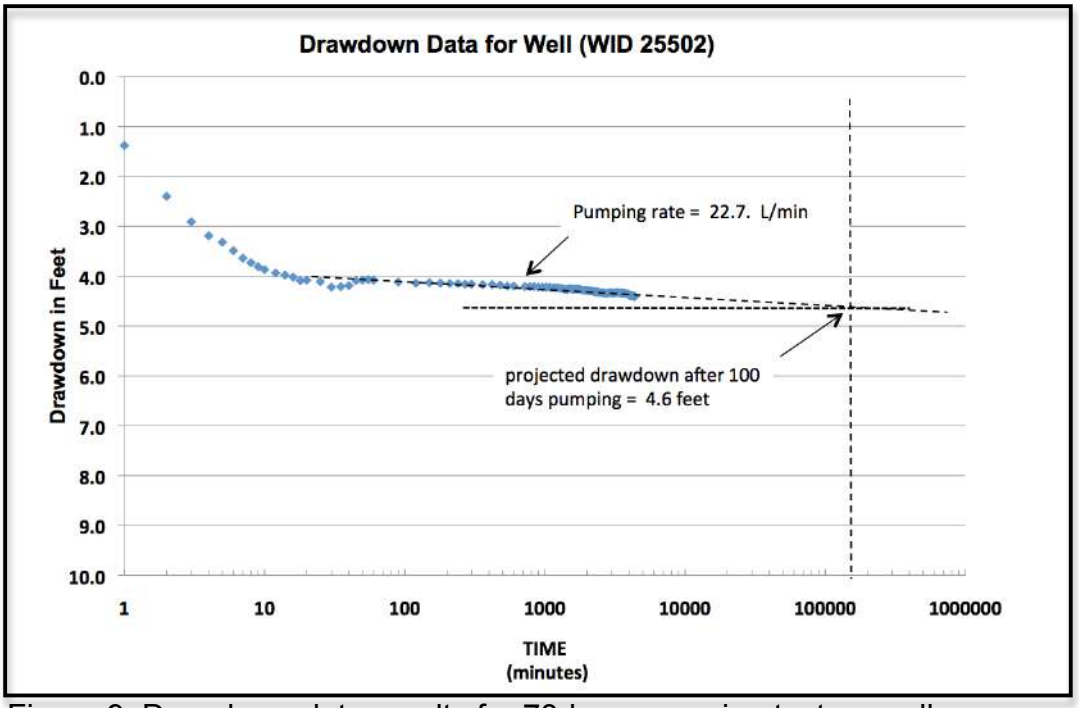

Figure 9. Drawdown data results for 73-hour pumping test on well.

Recovery after pumping was essentially 97 percent complete 9 hours after pump shutdown and then started to decline slowly (Appendix D).

Initially the water level on Swanson's Pond was rising prior to the well test, then began to level out and then started to decline after the first day of well pumping, falling approximately 3.5 cm to the end of the test (Figure 10). Pond levels continued to decline steadily a further 11 cm after the well test until January 30, 2017 (Figure 11).

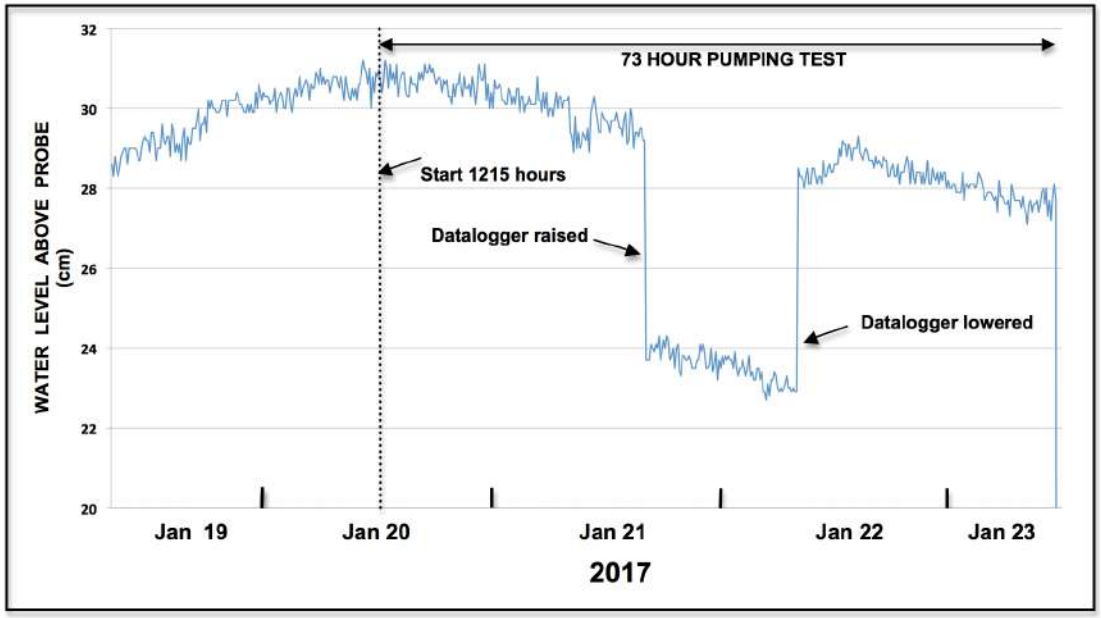

Figure 10. Water level on Swanson's Pond during pumping test of Well WID 25502.

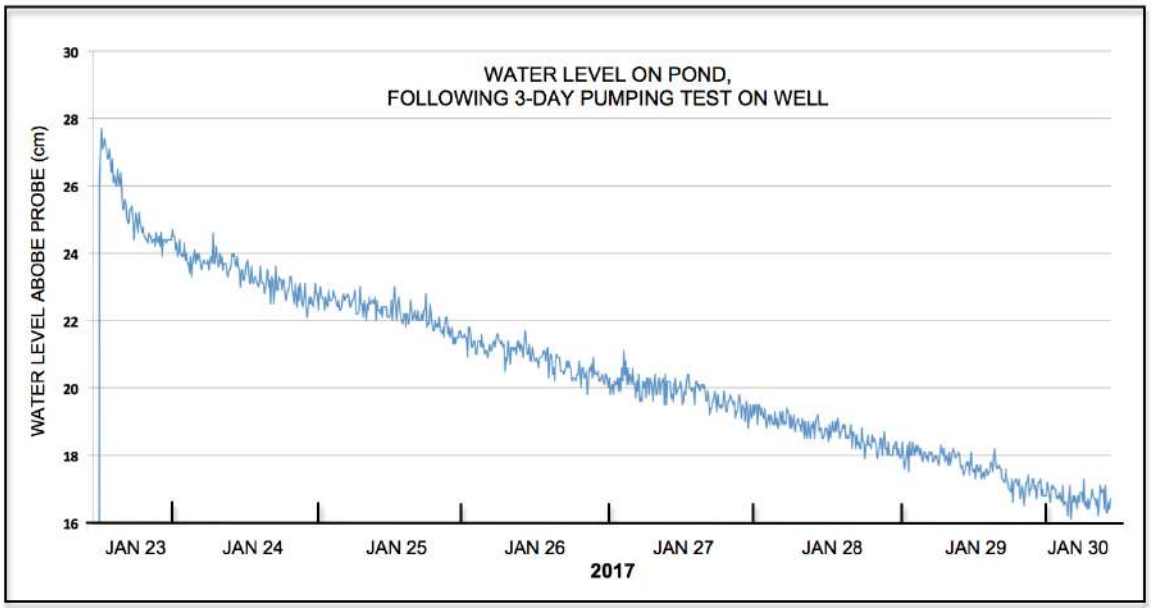

Figure 11. Water level on Swanson's Pond following pumping test of Well WID 25502.

The water level of Hickey Spring (Figure 12) remained relatively static during the 73-hour pumping test fluctuating approximately 0.5 cm, within the accuracy of the pressure transducer. A slight decreasing trend appears to have occurred during the last day of the test.

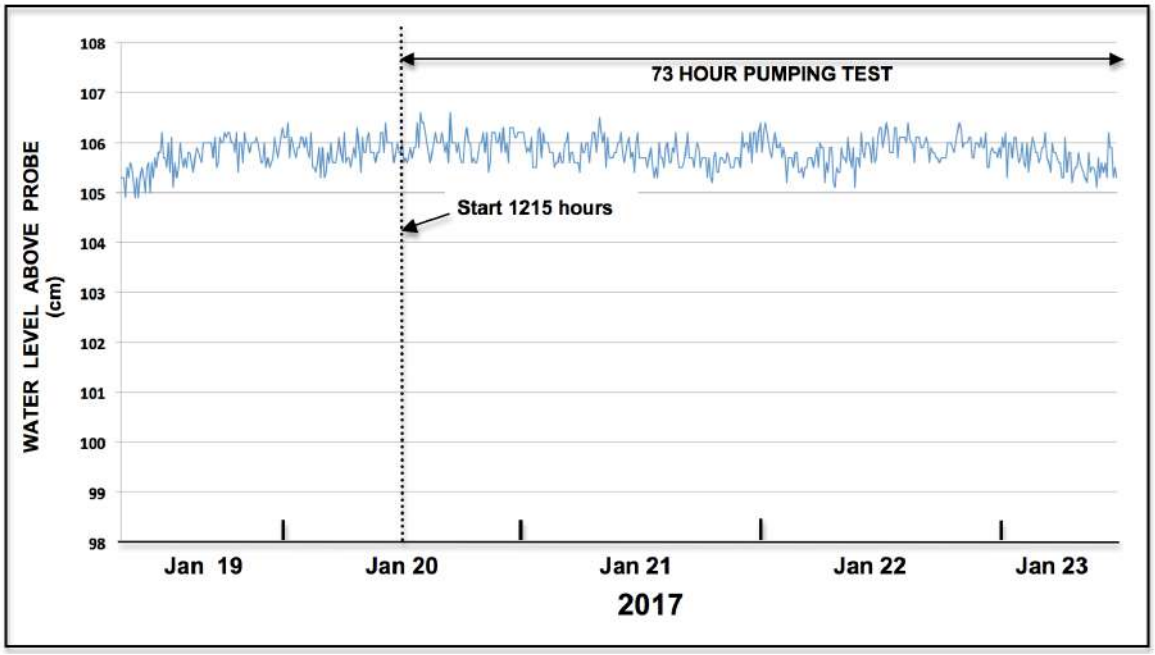

Figure 12. Water level in Hickey Spring during 73-hour pumping test.

Based on the water level monitoring results it appeared that the well pumping may have affected the water level on Swanson's Pond while at the same time the water

level in the pond was naturally declining. Further longer term testing of the well was recommended.

8-hour Pumping Test of Swanson's Pond

Swanson's Pond was pump tested at an average rate of 284 L/min (75 USgpm) by Tony Kaye (Albert Kaye and Sons Drilling Ltd.) for a period of 8 hours on February 2, 2017. Manual water level measurements were taken in the well during pumping and a staff gauge on Swanson's Pond was also monitored manually during the test period. Pressure transducers on the pond and the well also recorded water level measurements every 10 minutes. Hickey Spring was not monitored during this test. An additional pressure transducer was used to measure barometric pressure and correct the water level data collected.

During the pond test, the pond dropped 6.6 cm (Figure 13) while water level in the well dropped 5.1 cm (Figure 14). After the pond test, water levels on the pond and well were relatively stable to about 11:00 am on the day following the test. Water levels in the pond then started rising. Water levels in the well were not available as the datalogger was removed from the well for downloading. The volume of water pumped from the pond was approximately 36,000 USgals or 5455 gals/cm drop in pond level. This would suggest that the area occupied by the pond on February 2, 2017 was 2065 m^2 assuming no groundwater inflow to the pond during pumping. No precipitation was reported at the Gulf Island Secondary School weather station on February 1 and 2, 2017 (Gulf Island Secondary School, 2017).

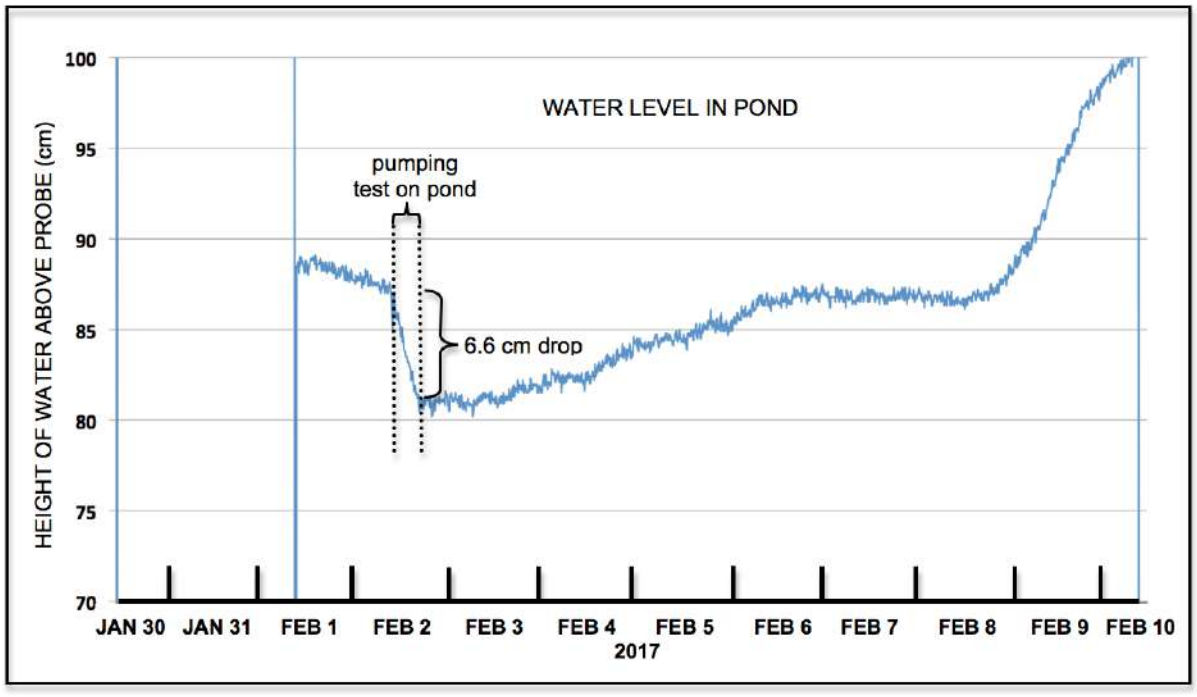

Figure 13. Water level in pond during pumping of pond on February 2, 2017.

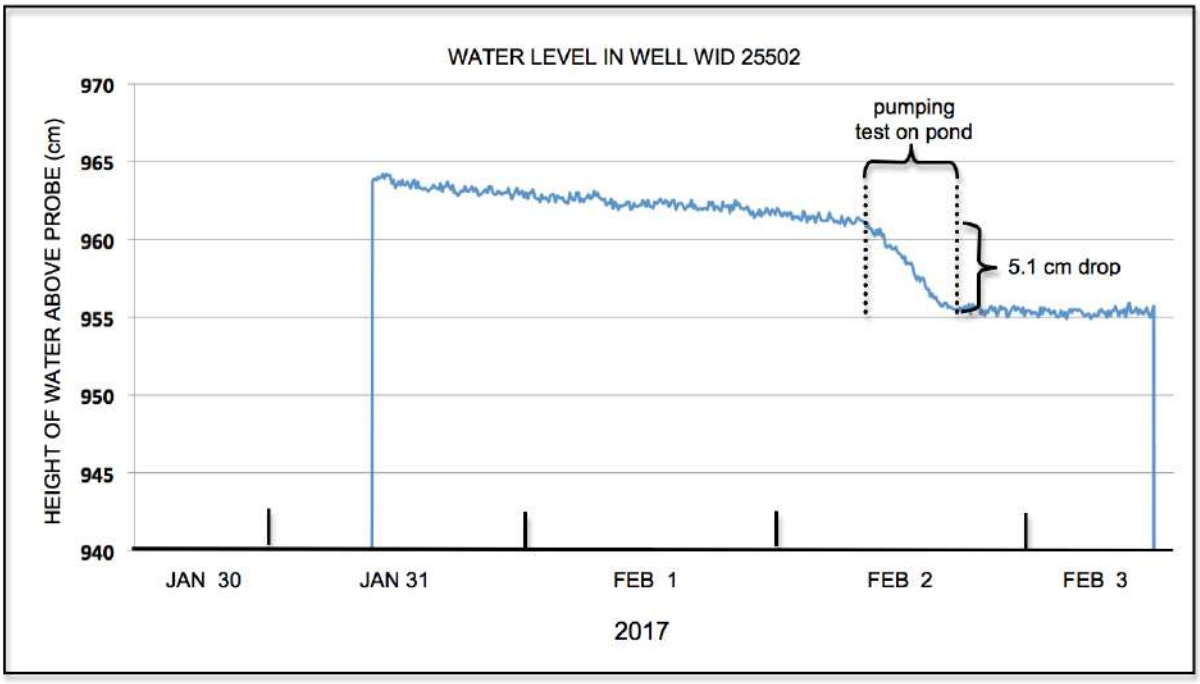

Figure 14. Water level in Well WID 25502 during 8-hour pumping test of Swanson's Pond on February 2, 2017.

Results of the pond testing confirmed a close hydraulic connection between water levels in the well and water levels of the pond. A significant portion of the water pumped therefore during the 73-hour well test may have been contributed by the pond. Further monitoring of water levels in the pond and the well during the period March 22 to April 3, 2017 also confirmed the close hydraulic connection between the pond and the groundwater regime as shown in Figures 15 and 16.

Based on the initial results of pump testing the well, pump testing the pond and water level monitoring, E. Booth proceeded with having the well sealed by Drillwell Enterprises Ltd., to a depth of 15.24 m (50 feet) to minimize possible seepage of any saline groundwaters into the well. He also proceeded with pumping the pond to further reduce the level of the pond and its potential influence on the well before conducting any further long-term well testing. By May 6, 2017 the pond level was lowered by approximately 0.76 m (2.5 feet), and monitoring of water levels in the well, the pond and Hickey Spring were recommenced. Photographs of the pond taken in 2017 are provided in Appendix H.

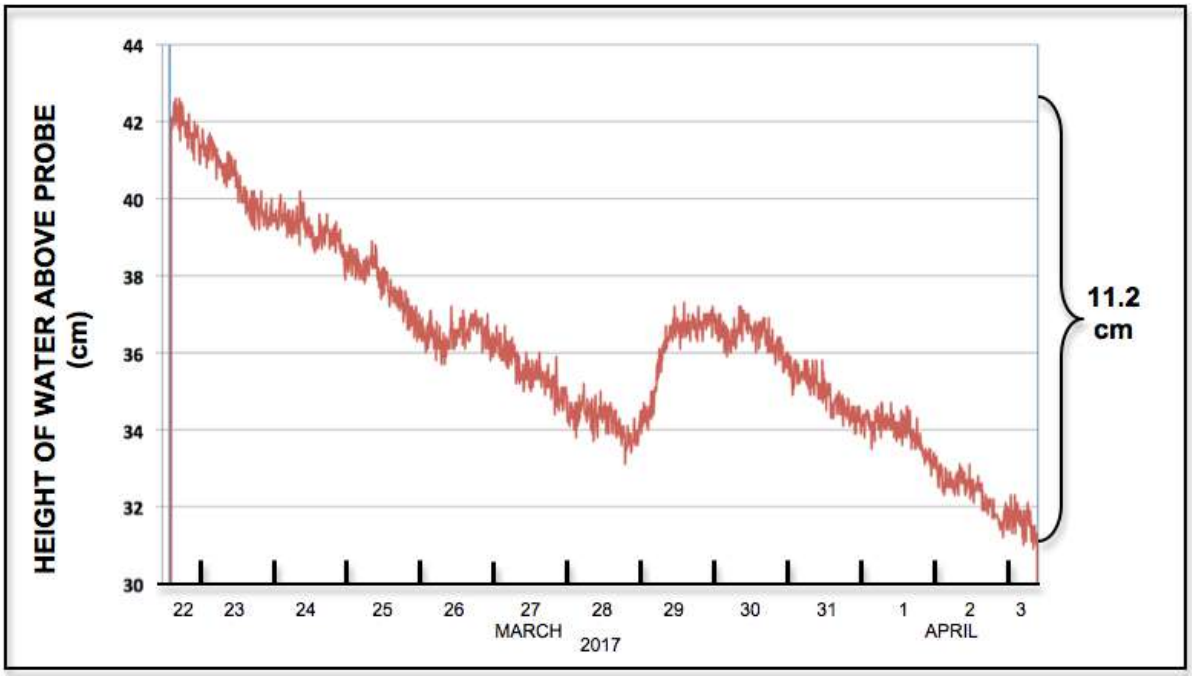

Figure 15. Water level on pond March 22 to April 3, 2017.

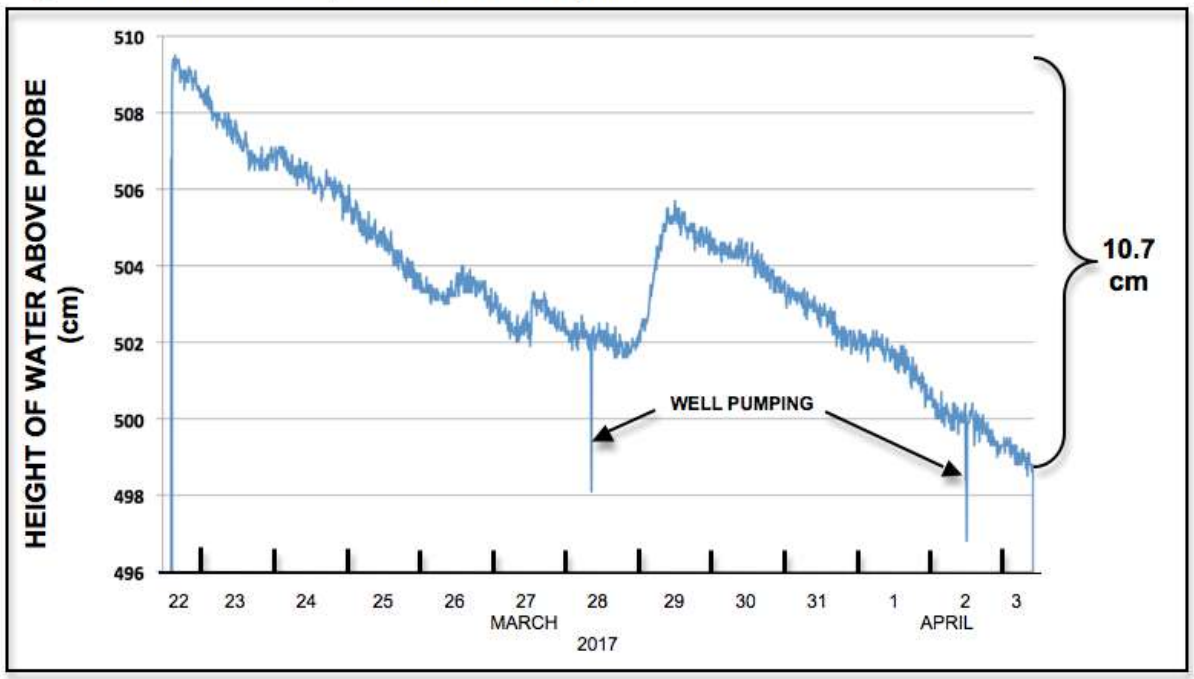

Figure 16. Water level in well March 22 to April 3, 2017.

11.3-day Pumping Test of Well (WID 25502)

Well (WID 25502) was pump tested, using the existing pump in the well, at a constant rate of 28.8 L/min (7.6 USgpm) by Eric Booth under supervision of A. Kohut, P.Eng., for a period of 11.3 days (271.6 hours) between May 17 and May 28, 2017. A total of 123,850 USgals was pumped during this period. Discharge was piped 41 m (135 feet) towards the drainage ditch east of the well. Manual water level measurements in the

well were taken for 100 minutes during pumping and after pump shutdown.

Pressure transducers were installed in the well, on the pond and at Hickey Spring to record water level measurements every 10 minutes. An additional pressure transducer was used to measure barometric pressure and correct the water level data collected. During the test, 12.7 mm of precipitation was reported at the Gulf Island Secondary School weather station (Gulf Island Secondary School, 2017).

Pumping test drawdown and recovery data for the well are shown in Appendix E. Drawdown during the test (Figure 17) reached 2.90 m (9.51 feet) below the pre-pumping (static) level of 2.127 m (6.98 feet). Extrapolation of the drawdown to 100 days without recharge suggests drawdown would reach 4.4 m (14.43 feet) indicating a specific capacity of 6.55 L/min per metre of drawdown (0.52 USgpm per foot of drawdown). These values are approximately 40 percent of the values estimated from the results of the 73-hour pumping test. At a pumping rate of 28.8 L/min (7.6 USgpm), close to 40 percent of the available drawdown of approximately 11.28 m (37 feet) in the well would be utilized after 100 days but still maintaining a significant safety factor.

Recovery after pumping was essentially 86 percent complete 24 hours after pump shutdown (Appendix E).

Prior to the start of the 11.3 day pumping test on the well, the water levels in the well and Swanson's Pond were relatively stable as shown in Figure 18(a) and 18(c), respectively. After pump startup on May 17, the pond level began to decline rapidly, dropping 20 cm by May 25 and falling below the level of the pressure transducer. A drop of 20 cm in the pond represents approximately 184.8 m^3 or 48,818 USgals assuming a pond area of 924 m^2. This suggests that the pond may have contributed up to 56 percent of the well flow during the period May 17 to May 25 (11,440 minutes). Water levels at Hickey Spring shown in Figure 18(b), remained relatively stable, rising slightly during the first few days of the pumping test. The pumping effect of the well on the pond is clearly discernable in Figure 18(c). **Well pumping, however showed no measurable effect on Hickey Spring.**

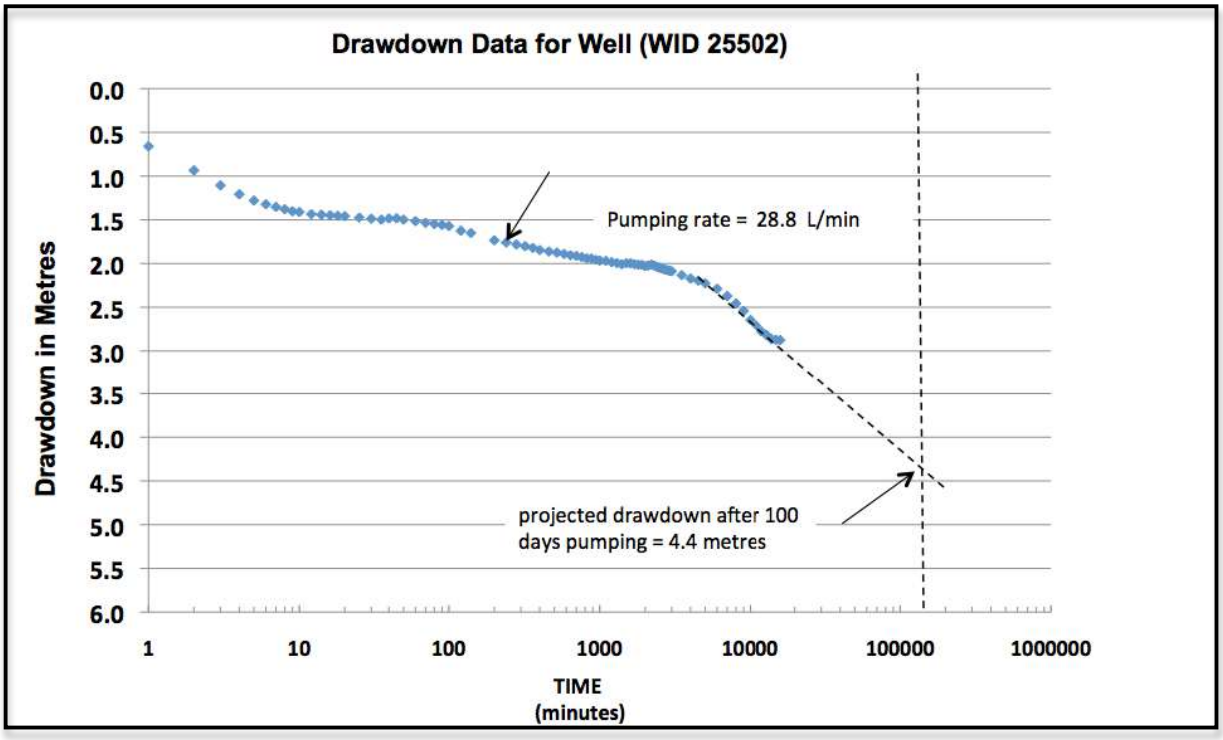

Figure 17. Drawdown data results for 11.3-day pumping test on well.

Electrical conductivity of the well water was monitored daily and dropped relatively steadily during the test from 504 µS/cm on May 17 to 426 µS/cm on May 28 (Figure 19). This decline was likely due to recharge from the pond which is lower in conductivity compared to the groundwater.

27.3-day Pumping Test of Well (WID 25502)

Well (WID 25502) was pump tested, using the existing pump in the well, at a constant rate of 28.8 L/min (7.6 USgpm) by Eric Booth under supervision of A. Kohut, P.Eng., for a period of 27.3 days (655.7 hours) between June 4 and July 1, 2017. On June 12 and 13 the flow was reduced over a period of 23 hours due to a probable restriction in the discharge line. The flow resumed at 28.8 L/min (7.6 USgpm) at 16:20 hours on June 13. Discounting the reduced flow period, approximately of 288,511 USgals was pumped during the pumping test. Pressure transducers were in place in the well, on the pond and at Hickey Spring to record water level measurements every 10 minutes. An additional pressure transducer was used to measure barometric pressure and correct the water level data collected. Discharge was piped 41 m (135 feet) towards the drainage ditch east of the well. Manual water level measurements in the well were taken for 100 minutes after pump shutdown. During the test, 25.4 mm of precipitation was reported at the Gulf Island Secondary School weather station (Gulf Island Secondary School, 2017).

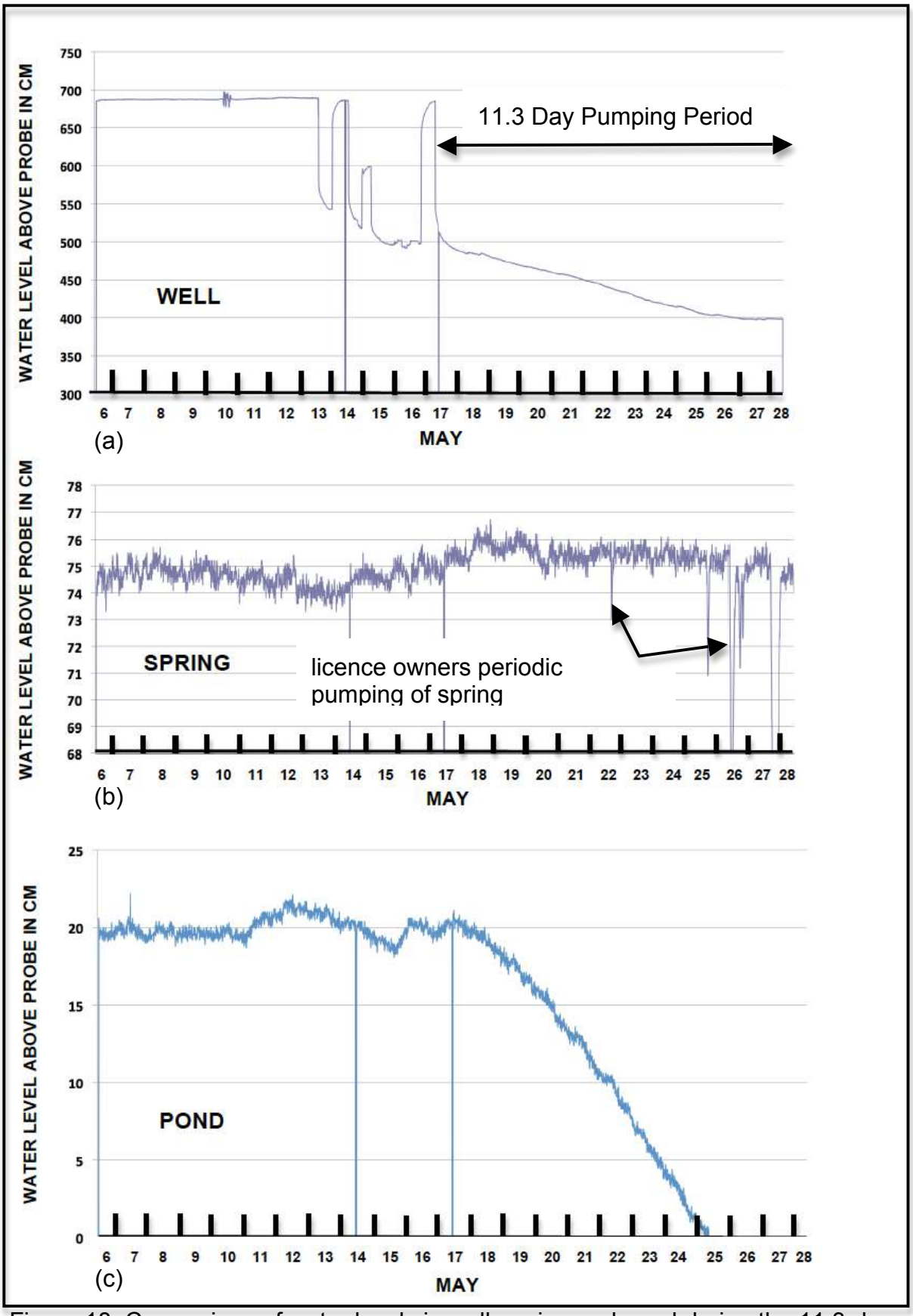

Figure 18. Comparison of water levels in well, spring and pond during the 11.3-day pumping test on the well.

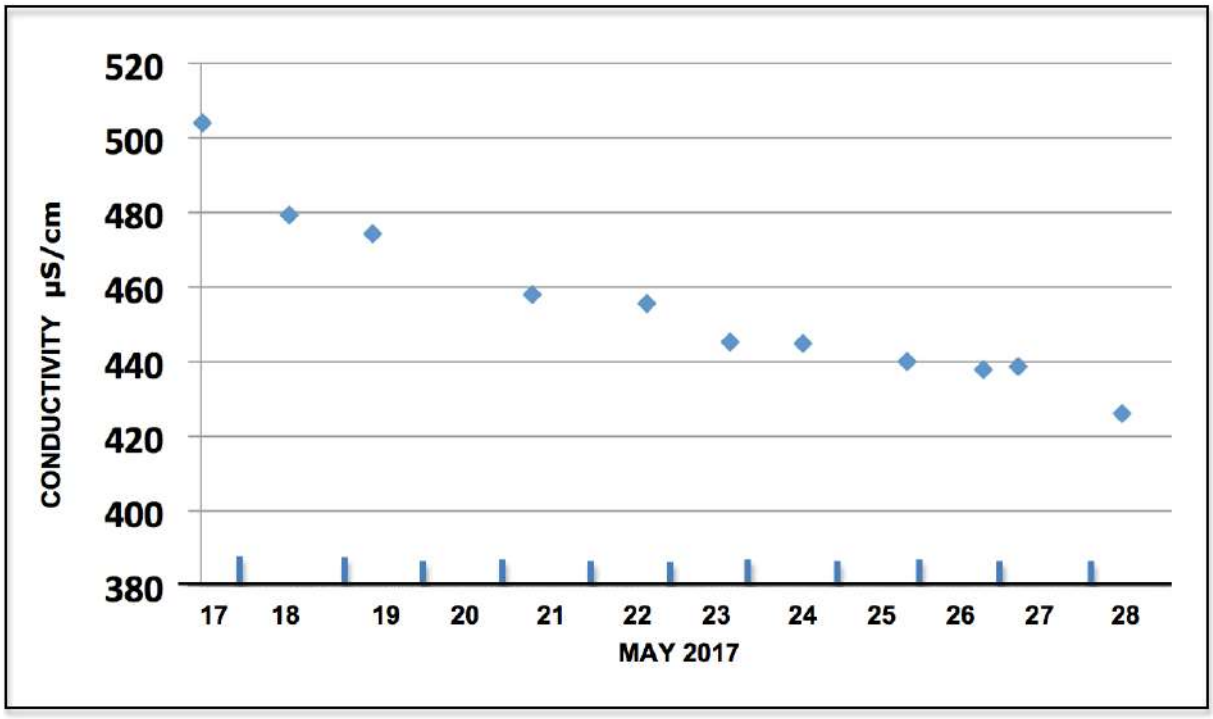

Figure 19. Variations in conductivity at 25 ºC of well water during 11.3-day pumping test.

Pumping test drawdown and recovery data for the well are shown in Appendix F. Drawdown during the test (Figure 20) reached 6.80 m (22.3 feet) below the pre-pumping (static) level of 2.410 m (7.91 feet). Extrapolation of the drawdown to 100 days without recharge suggests drawdown would reach 9.5 m (31.17 feet) indicating a specific capacity of 3.03 L/min per metre of drawdown (0.24 USgpm per foot of drawdown). At a pumping rate of 28.8 L/min (7.6 USgpm), close to 85 percent of the available drawdown of approximately 11.28 m (37 feet) in the well would be utilized after 100 days. **Operating at 28.2 L/min (7.6 USgpm) would not allow for a sufficient safety factor to be maintained in the well.**

Recovery after pumping was essentially 80 percent complete 36 hours after pump shutdown (Appendix F). Complete recovery was not achieved as the non-pumping water level in the well reflected the drop in pond level.

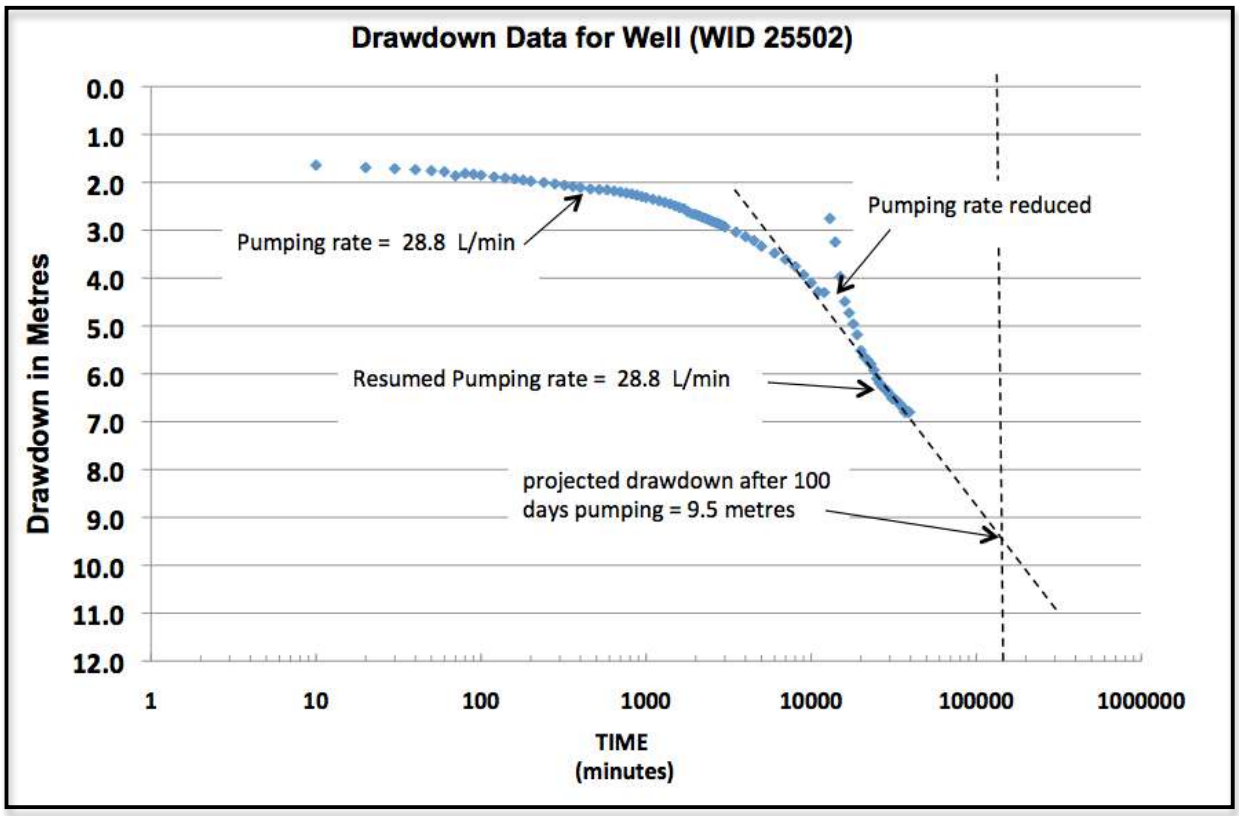

Figure 20. Drawdown data results for 27.3-day pumping test on well, June 4 to July 1, 2017.

Prior to the start of the 27.3-day pumping test on the well, the water levels in the well and Swanson's Pond were relatively stable as shown in Figure 21 and 22 respectively. After pump startup on June 4, the pond level began to decline rapidly, dropping approximately 90 cm by July 1. During pumping, the water level in the pond dropped several times below the transducer requiring lowering of the transducer. Unfortunately this introduced some errors, possibly as much as 10 cm in the data collected and it was not possible to verify the accuracy of the data collected during the last three days of the test. Water level surveys conducted between the well pumphouse floor and the pond level on May 28 and June 27 indicated a difference in pond levels of 72 cm over this period. Pond area at this time was estimated by E. Booth to be approximately 750 m^2. A drop of 72 cm in the pond represents approximately 540 m^3 or 142,652 US gals assuming a pond area of 750 m^2. This suggests that the pond may have contributed up to 59 percent of the well flow during the period June 4 to June 27 (31,740 minutes). Water levels at Hickey Spring as shown in Figure 23 remained relatively stable during June apart from declines during periodic pumping of the spring.

Electrical conductivity of the well water was monitored for a number of days during the test and showed an overall increase from 445 µS/cm on June 5 to 549 µS/cm on June 27 (Figure 24). This rise may be due to drawing upon zones of more mineralized groundwater with pumping.

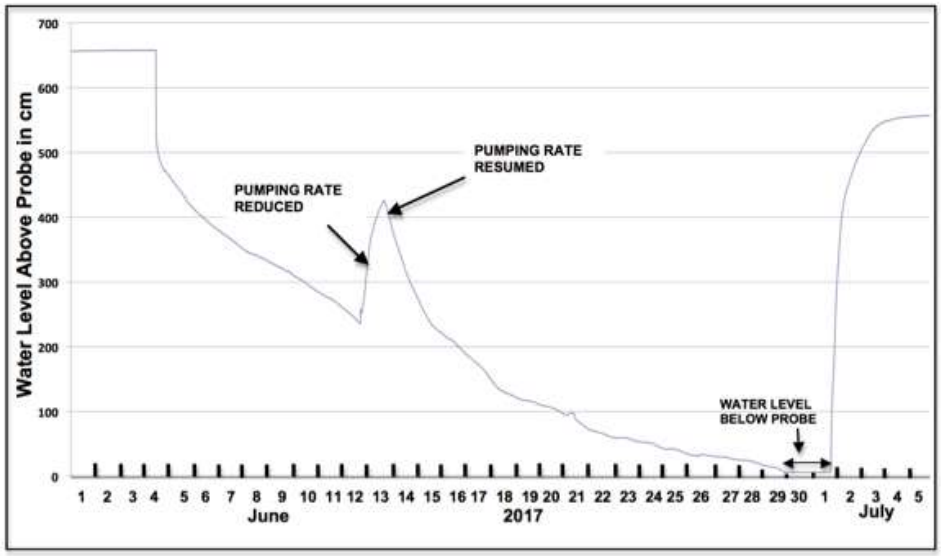

Figure 21. Water level in well during 27.3-day pumping test.

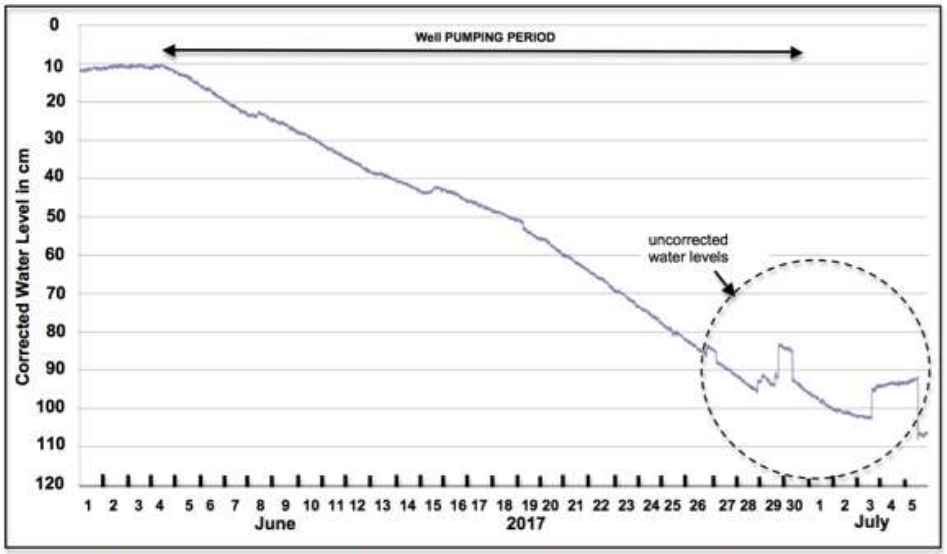

Figure 22. Water level in pond during 27.3-day pumping test.

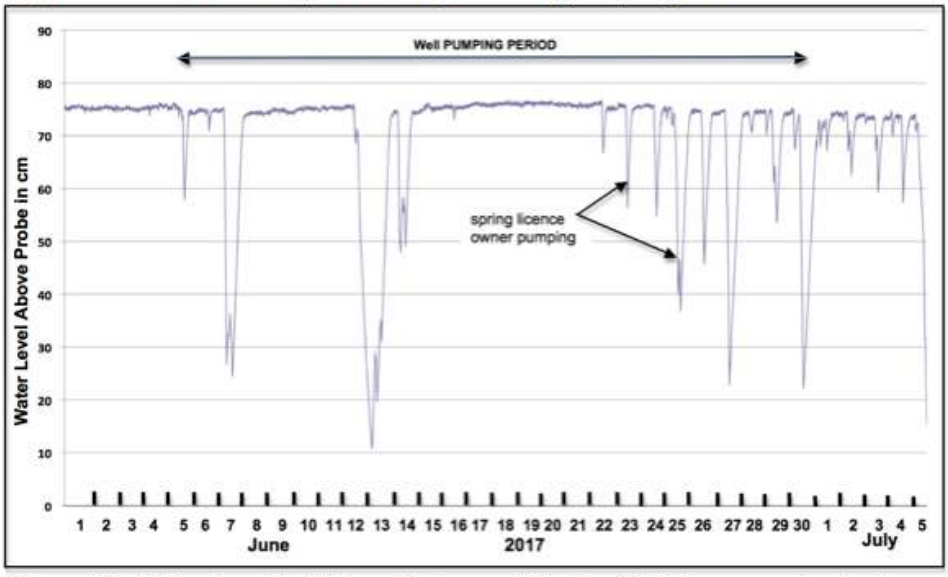

Figure 23. Water level in Hickey Spring well during 27.3-day pumping test.

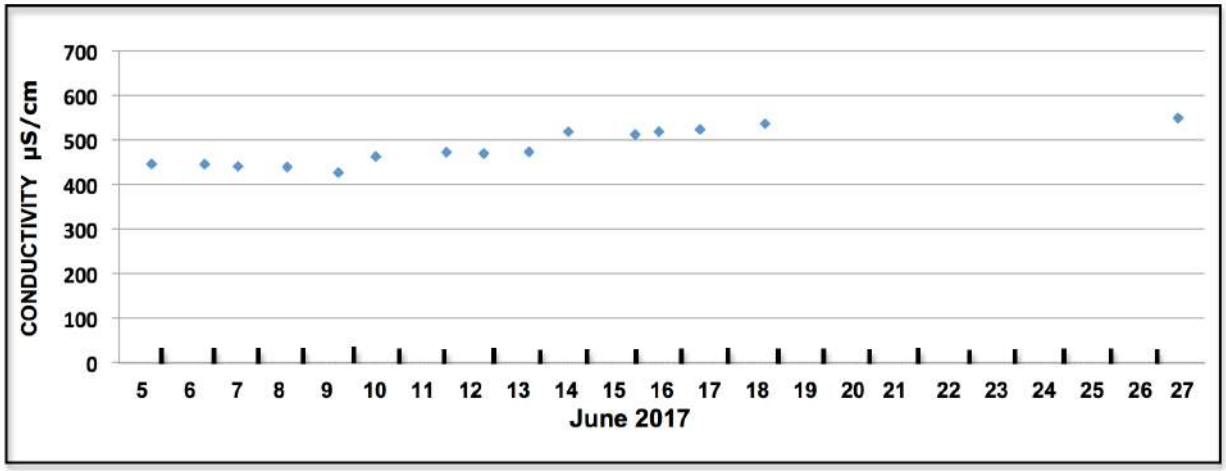

Figure 24. Variations in conductivity at 25 ºC of well water during 27.3-day pumping test.

WATER QUALITY RESULTS

A summary of all laboratory analyses completed for this project is provided in Table 1. Laboratory reports are contained in Appendix G.

Well WID 25502

Well WID 25502 was sampled on four occasions, Nov. 9, 2016 before any pump testing, January 23, 2017 after pump testing for 70 hours 40 minutes, May 17, 140 minutes after starting the 11 day test and May 28 near the end of the 11.3 day test after 11.1 days.

All groundwater samples exhibited a similar overall chemistry that can be classified as a sodium-calcium-bicarbonate-chloride type with total mineralization ranging from 171 to 310 mg/L total dissolved solids. All samples met or exceeded the *Guidelines for Canadian Drinking Water* (Federal-Provincial-Territorial Committee on Drinking Water, 2017) for all parameters tested except for: total coliforms, E. Coli, colour, turbidity, iron, manganese and sulphide. Presence of a slight sulphur odour was also detected during field sampling indicative of hydrogen sulphide (H_2S). Most of these parameters, such as colour, turbidity, iron, manganese and hydrogen sulphide are of aesthetic concern and do not pose a health hazard. The Langelier index ranging from -0.996 to -1.26 indicates mild to moderate corrosive tendencies.

Total coliforms ranged from 210 to >2100 CFU/100ml and E.Coli ranged from 0 to 8.0 CFU/100ml. Proximity of the well to Swanson's Pond and results of pump testing indicate a close communication between the pond and the groundwater regime. It is evident that the well is at risk of containing pathogens and will require disinfection according to the *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2* (BC Ministry of Health, 2016).

Table 1. Summary of water quality analyses.

Parameters/Site and Sampling Date	WELL WID 25502 Nov 9/16	WELL WID 25502 Jan 23/17	WELL WID 25502 May 17/17	WELL WID 25502 May 28/17	Swanson's Pond Nov 9/16	Hickey Spring Jan 10/17	Canadian DWGuideline 2017	Units
PHYSICAL TESTS								
True Colour		32	38	28	75		< or =15	TCU
Conductivity	258	545	493	419	132	219		µS/cm
Total Hardness ($CaCO_3$)	55.6	43.7	42.4	45.1	44.6	71.9		mg/L
pH	7.8	7.8	7.4	7.5	7.5	7.0	7.0-10.5	pH units
Total Dissolved solids (TDS)	171	310	282	263	90	155	< or = 500	mg/L
Turbidity	8.0	3.1	3.9	2.5	3.5	50.0	<1.0	NTU
DISSOLVED ANIONS								
Alkalinity (Total as $CaCO_3$)	100	111	115	109	41.6	58.9		mg/L
Alkalinity (PP as $CaCO_3$)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		mg/L
Bicarbonate	122.0	136	141	133	50.7	71.9		mg/L
Carbonate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		mg/L
Hydroxide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		mg/L
Chloride	13	67	54	47	9.3	20	< or = 250	mg/L
Fluoride	0.170	0.190	0.190	0.170	0.055	0.064	1.5	mg/L
Nitrate (N)	<0.020	<0.0050	<0.020	<0.020	0.107	0.771	10	mg/L
Nitrite (N)	0.0082	<0.020	<0.0050	<0.0050	0.0073	0.0136	1	mg/L
Total Organic Nitrogen (N)		0.324		0.386				mg/L
Total Ammonia (N)		0.13		0.11				mg/L
Nitrate plus Nitrite (N)	<0.020	<0.020		<0.020	0.115	0.784		mg/L
Total Nitrogen (N)		0.458		0.495				mg/L
Total Organic Carbon (C)		4.56		5.830				mg/L
Total Phosphorus (P)	0.0889				0.0550			mg/L
Sulphate		39.6	32.1	25.1		13.1	< or =500	mg/L
TOTAL METALS								
Aluminum		161	125	104		3080		µg/L
Antimony		<0.50	<0.50	<0.50		<0.50	6	µg/L
Arsenic	2.83	6.62	5.31	5.17	0.67	0.65	10	µg/L
Barium		19.1	15.7	17.1		53.5	1000	µg/L
Beryllium		<0.10	<0.50	<0.10		<0.10		
Bismuth		<1.0	<1.0	<1.0		<1.0		
Boron		58	53	51		<50	5000	µg/L
Cadmium		0.010	0.010	<0.010		0.041	5	µg/L
Chromium		<1.0	<1.0	<1.0		2.9	50	µg/L
Cobalt		<0.50	<0.20	<0.20		0.78		µg/L
Copper	15.9	1.58	1.27	0.90	3.49	7.94	< or =1000	µg/L
Iron	2680	697	813	650	265	2470	< or = 300	µg/L
Lead	5.88	0.21	0.27	<0.20	0.46	0.93	10	µg/L
Manganese	713	372	319	377	44.4	77.6	< or = 50	µg/L
Mercury		<0.010	<0.010	<0.010		<0.010	1	µg/L
Molybdenum		<1.0	<1.0	<1.0		<1.0		µg/L
Nickel		<1.0	<1.0	<1.0		3.5		µg/L
Selenium		<0.10	<0.10	<0.10		<0.10	50	µg/L
Silicon		6970	5890	5290		10500		µg/L
Silver		<0.020	<0.020	<0.020		0.030		µg/L
Strontium		332	293	304		129		µg/L
Thallium		<0.010	<0.010	<0.010		<0.050		µg/L
Tin		<5.0	<5.0	<5.0		<5.0		µg/L
Titanium		7.2	5.3	<5.0		104		
Uranium		<0.10	<0.10	<0.10		<0.10	20	µg/L
Vanadium		<5.0	<5.0	<5.0		5.0		µg/L
Zinc	27.0	<5.0	<5.0	<5.0	7.4	12.4	< or = 5000	µg/L
Zirconium		<0.50	0.14	0.15		0.50		
Calcium	16.5	13.3	12.9	13.6	11.8	20.0		mg/L
Magnesium	3.48	2.51	2.44	2.73	3.69	5.33		mg/L
Potassium	0.850	0.730	0.779	0.850	1.74	1.76		mg/L
Sodium	28.0	100	86.2	73	9.6	17.2	< or = 200	mg/L
Sulphur	<3.0	14.6	13.5	8.9	3.2	4.7		mg/L
MICROBIOLOGICAL								
Total Coliforms	>2100	480	230	210	280	>2800	ND	CFU/100mL
Escherichia Coli (E.Coli)	2	2	8.0	0	150	87	ND	CFU/100mL
Heterotrophic Plate Count		32		26				CFU/100mL
Iron Bacteria		35000		2200				CFU/100mL
Sulphate reducing bacteria		120000		27000				CFU/100mL
OTHER								
Total Sulphide		0.107		0.165			< or = 0.05	mg/L
Langelier Index (@4.4C)		-0.996		-1.26				
Langelier Index (@60C)		0.0450		-0.218				
Saturation pH (@4.4C)		8.78		8.77				
Saturation pH (@60C)		7.74		7.73				

* 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.

Swanson's Pond

Swanson's Pond was sampled on one occasion on November 9, 2016 and conductivity was checked periodically at different times during pump testing of the well. Based on the November sample, the water quality of Swanson's Pond can be classified as a calcium-magnesium-bicarbonate type with low overall mineralization (TDS of 90 mg/L and conductivity of 132 µ/cm) observed during the winter of 2016. Conductivity readings recorded in 2017 were: 126.3 µ/cm (January 23), 200.2 µ/cm (June 5) and 203.8 µ/cm (June 27). It is evident that infiltration of water from Swanson's Pond is resulting in a dilution effect on the groundwater pumped from the well. In November 2016, the pond showed elevated total coliforms (280 CFU/100ml) and E. Coli (150 CFU/100ml). Swanson's pond is a potential source of coliforms found in the pumped groundwater.

DISCUSSION and CONCLUSIONS

Extended duration pump testing of Well WID 25502 up to rates of 28.8L/min (7.6 USgpm) has shown a direct communication between the well and the water in Swanson's Pond. Under pumping conditions, up to 59 percent of the water pumped from the well can be attributed to inflow from the pond. This suggests that the groundwater component of flow was providing just over 11.4L/min (3 USgpm).

Extrapolation of well drawdown data to 100 days without precipitation recharge indicates that a long term pumping rate of 28.8 L/min (7.6 USgpm) would not provide for an adequate drawdown safety factor in the well. Utilizing a specific capacity of 3.03 L/min per metre of drawdown (0.24 USgpm per foot of drawdown) and a safety factor of 50 percent indicates that theoretically the well should be able to sustain a rate of 16.7 L/min (4.4 USgm) over the long term in conjunction with the pond.

A sustainable pumping rate of 16.7 L/min (4.4 USgpm) however, would also depend on sufficient water being present in Swanson's Pond on an annual basis. For a normal year with precipitation of 987 mm, potential annual evapotranspiration of approximately 671 mm would be anticipated, leaving 316 mm of water available in Swanson's Pond. Potential evapotranspiration was estimated based on the Thornthwaite-type analysis adapted from Dingman (2001) that uses the Hamon (1963) method. Based on a pond area of 924m^2 , this would leave 292 m^3 or 77,139 USgals, or enough water to sustain a pumping rate from the pond of approximately 1.9 L/min (0.5 USgpm) over 100 days. This analysis however, does not consider possible groundwater seepage into the pond or years with below normal precipitation.

Without a detailed topographic survey of the pond, an accurate determination of the pond area and available water at various water levels is not currently possible. **Based on the information currently available and given the uncertainties involved and interrelationship between the groundwater regime and pond levels, it would be prudent to rate the long-term capacity of the well in conjunction with the pond at a maximum rate of 13.2 L/min (3.5 USgpm).**

Long-term monitoring of Hickey Spring during 2017 showed that the well pumping tests had no measurable affects on the spring. Use of the well at a maximum rate of 13.2 L/min (3.5 USgpm) would have no measurable effect on existing wells, springs, or other water supplies.

Due to the close communication between the pond and the groundwater regime, the well is at risk of containing pathogens and will require disinfection according to the *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2* (BC Ministry of Health, 2016). In addition, a properly designed water treatment system will be required to reduce levels of colour, turbidity, iron and manganese and hydrogen sulphide. These latter parameters are of aesthetic concern and do not pose a health hazard.

RECOMMENDATIONS

The following recommendations are provided for consideration:

1. In designing an adequate water treatment system for the well, it may be necessary to conduct further laboratory testing of the well water, that may include determining both total and dissolved levels of constituents such as iron and manganese. This would require field filtering and acidification of samples prior to laboratory submission

2. When put into production, the well discharge should be equipped with a flow meter to monitor production with time and also a water level sensor to monitor water levels.

3. A permanent staff gauge should be installed on Swanson's Pond to monitor water level changes with time.

4. Results of items 2 and 3 should be reviewed annually as part of an ongoing well operation and monitoring program.

5. A water licence would likely be required for use of the well for water supply purposes. Application can be made to the Ministry of Forests, Lands and Natural Resource Operations in Nanaimo. Information on the application process can be found at:
   FrontCoiunterBC http://www.frontcounterbc.gov.bc.ca/info/

CLOSURE

This report was prepared in accordance with generally accepted engineering, hydrogeological and consulting practices. It is intended for the prime use of E. Booth and Salt Spring Ventures Inc, 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 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,

Alan P. Kohut PEng
Principal and Senior Hydrogeologist

HY-GEO CONSULTING

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APPENDIX A

Photographs taken during excavation
of Swanson's Pond, late summer 2008.

Photo 1. Shale (mudstone) bedrock, blasted and excavated late summer 2008, photograph looking northeasterly.

Photo 2. Excavated pond looking westerly, late summer 2008. Note groundwater seepage into pond.

Photo 3. Excavated pond looking northerly showing exposed stoney marine clay overlying glacial till, late summer 2008.

Photo 4. Shale (mudstone) bedrock exposed in excavation, late summer 2008. Photograph looking northeasterly.

APPENDIX B

BRITISH COLUMBIA — The Best Place on Earth | Ministry of Environment

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

DRILLWELL ENTERPRISES LTD. 4994 Polkey Road Duncan, B.C. [illegible] phone/fax [illegible] required.

Ministry Well ID Plate Number: 25502
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: SALTSPRING VENTURES INC. (BOOTH, ERIC)
Mailing address: 140 Fruitvale Rd. Town: Salt Spring Isl. Prov.: B.C. Postal Code: V8K 2M1
Well Location: Address: Street no.: across from 212 Street name: PARK PL. Town: Salt Spring Isle.
(or) Legal description: Lot 10 Plan 14710 D.L. _____ Block ____ Sec 3 Twp. ____ Rg. 3-E Land District: Cowichan
(or) PID: _____ (and) Description of well location (attach sketch, if nec.): North Saltspring

NAD 83: Zone: 10 (see note 2) (and) UTM Easting: 462762 m UTM Northing: 5411691 m (or) Latitude (see note 3): _____ Longitude: _____
Method of drilling: ☑ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): DUAL ROT.
Orientation of well: ☑ vertical ☐ horizontal Ground elevation: 84 ft (asl) Method (see note 4): GPS
Class of well (see note 5): WATER SUPPLY Sub-class of well: DOMESTIC
Water supply wells: indicate intended water use: ☐ private domestic ☐ water supply system ☑ irrigation ☐ commercial or industrial ☐ other (specify): _____

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

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	2		BR	DENSE CLAY		
2	100	H	BL	SHALE (BEDROCK)		
					✓	FLOWAT 20' Gpm
						40' 12
						60 12
						80 12
						100' 12 gpm

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	17	10"	PULLED OUT		
~~17~~	~~100~~				
0	17	6"	STEEL	.217	—
17	100	6"	OPEN HOLE		

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

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

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

Well yield estimated by:

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

Obvious water quality characteristics:

☑ Fresh ☐ Salty ☐ Clear ☑ Cloudy ☐ Sediment ☐ Gas
Colour/odour: GY-BR Water sample collected: ☐

Final well completion data:

Total depth drilled: 100 ft Finished well depth: 100 ft (bgl)
Final stick up: 12 in Depth to bedrock: 2 ft (bgl)
SWL: 10 ft (btoc) Estimated well yield: 12 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: WELDED LID Well disinfected: ☑ Yes ☐ No
Where well ID plate is attached: TO CASING

Well closure information:

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

Well driller (print clearly):
Name (first, last) (see note 19): DOUG WATT
Registration no. (see note 20): 0412402
Consultant (if applicable, name and company): _____

Date of work (YYYY/MM/DD):
Started: 08/09/09 Completed: 08/09/09
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 [signature]

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

white: Customer copy canary: Driller copy pink: Ministry copy | Sheet ____ of ____

APPENDIX C

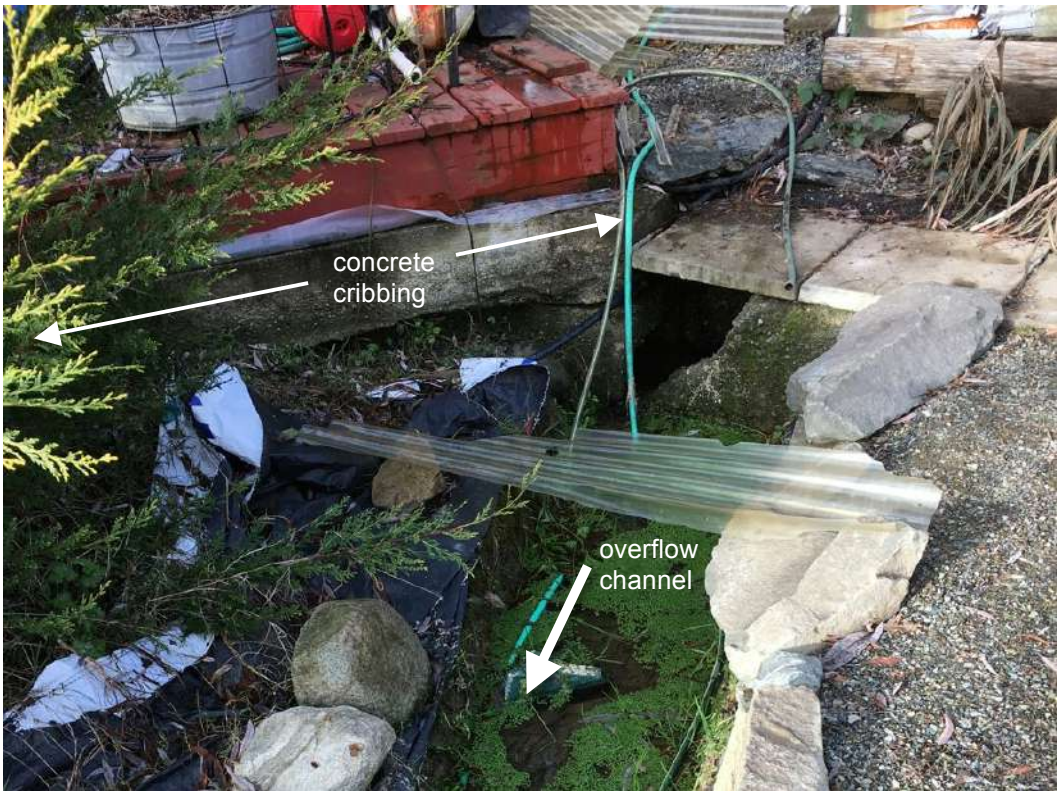

Photo 1. Hickey spring. Photograph taken January 10, 2017 looking northerly.

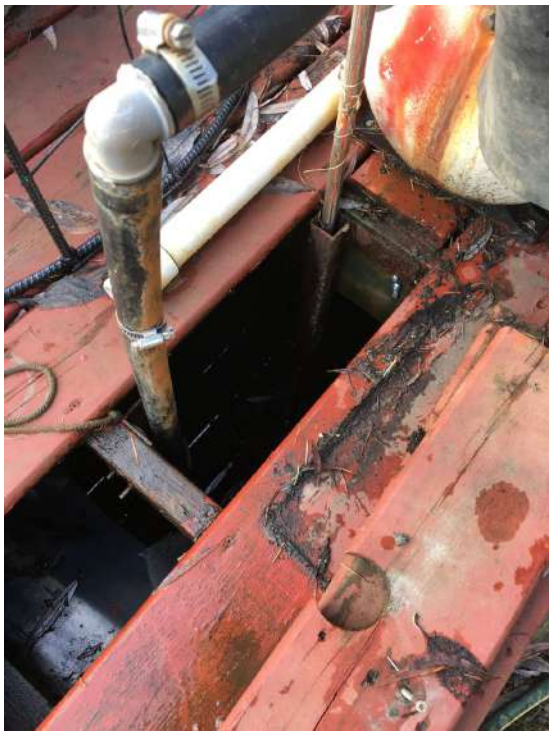

Photo 2. Hickey spring, wooden cribbing cover and pump intake pipe. Photograph taken January 10, 2017.

APPENDIX D

Pumping Test Data for Well (WID 25502)

Project: Booth Property
Client: E. Booth
Location: Saltspring Island
Date of Test: 20-Jan-17
Test Conducted by: Tony Kaye (Albert Kay & Sons Drilling Ltd.)
Pumped Well: WID 25502
Pumping Rate: 22.7 L/min (0.38L/s)
Static Water Level: 3.260 feet

Reference: all readings from top of well casing
Stick up: 12 inches above ground
Observation Wells: none
Pump Start Time: 12:15 PM Jan.20/17
Pump End Time: 1:15 PM Jan.23/17
Analysis by: A. Kohut, P.Eng.

Drawdown Data: **Recovery Data:**

Time (minutes)	Water Level (feet)	Drawdown (feet)	Time t (minutes)	Time t' (minutes)	Water Level (feet)	t/t'	Residual Drawdown (feet)
1	4.64	1.38	4385	5	3.9129	877.0	0.65
2	5.66	2.4	4395	15	3.4339	293.0	0.17
3	6.17	2.91	4405	25	3.3814	176.2	0.12
4	6.45	3.19	4415	35	3.3781	126.1	0.12
5	6.58	3.32	4425	45	3.3781	98.3	0.12
6	6.75	3.49	4435	55	3.3683	80.6	0.11
7	6.9	3.64	4440	60	3.41	74.0	0.15
8	6.99	3.73	4455	75	3.3584	59.4	0.10
9	7.07	3.81	4465	85	3.3715	52.5	0.11
10	7.13	3.87	4475	95	3.3519	47.1	0.09
12	7.2	3.94	4485	105	3.3813	42.7	0.12
14	7.24	3.98	4500	120	3.39	37.5	0.13
16	7.28	4.02	4560	180	3.39	25.3	0.13
18	7.35	4.09	4620	240	3.38	19.3	0.12
20	7.34	4.08	4680	300	3.38	15.6	0.12
25	7.37	4.11	4740	360	3.37	13.2	0.11
30	7.48	4.22	4800	420	3.36	11.4	0.10
35	7.47	4.21	4860	480	3.36	10.1	0.10
40	7.45	4.19	4920	540	3.36	9.1	0.10
45	7.35	4.09	4985	605	3.4043	8.2	0.14
50	7.34	4.08	5085	705	3.3880	7.2	0.13
55	7.33	4.07	5185	805	3.4142	6.4	0.15
60	7.34	4.08	5285	905	3.4175	5.8	0.16
90	7.38	4.12	5385	1005	3.4175	5.4	0.16
120	7.4	4.14	5485	1105	3.4240	5.0	0.16
150	7.39	4.13	5585	1205	3.4273	4.6	0.17
180	7.4	4.14	5685	1305	3.4339	4.4	0.17
210	7.41	4.15	5785	1405	3.4273	4.1	0.17
240	7.41	4.15					
270	7.42	4.16					
300	7.42	4.16		Data from transducer			
360	7.43	4.17					
420	7.43	4.17					
480	7.44	4.18					
540	7.46	4.2					
600	7.46	4.2					
720	7.47	4.21					
780	7.47	4.21					
840	7.47	4.21					
900	7.48	4.22					
960	7.48	4.22					

APPENDIX D

Time (minutes)	Water Level (feet)	Drawdown (feet)	Time t (minutes)	Time t' (minutes)	Water Level (feet)	t/t'	Residual Drawdown (feet)
1020	7.48	4.22					
1080	7.48	4.22					
1140	7.49	4.23					
1200	7.49	4.23					
1260	7.5	4.24					
1320	7.51	4.25					
1380	7.52	4.26					
1440	7.53	4.27					
1500	7.51	4.25					
1560	7.52	4.26					
1620	7.52	4.26					
1680	7.52	4.26					
1740	7.52	4.26					
1800	7.53	4.27					
1860	7.54	4.28					
1920	7.54	4.28					
1980	7.55	4.29					
2040	7.55	4.29					
2100	7.55	4.29					
2160	7.56	4.3					
2220	7.57	4.31					
2280	7.57	4.31					
2340	7.58	4.32					
2400	7.58	4.32					
2460	7.59	4.33					
2520	7.59	4.33					
2580	7.59	4.33					
2640	7.60	4.34					
2700	7.60	4.34					
2760	7.61	4.35					
2820	7.60	4.34					
2880	7.59	4.33					
2940	7.59	4.33					
3000	7.59	4.33					
3060	7.60	4.34					
3120	7.60	4.34					
3180	7.59	4.33					
3240	7.59	4.33					
3300	7.59	4.33					
3360	7.59	4.33					
3420	7.59	4.33					
3480	7.60	4.34					
3540	7.60	4.34					
3600	7.60	4.34					
3660	7.60	4.34					
3720	7.60	4.34					
3780	7.61	4.35					
3840	7.61	4.35					
3900	7.62	4.36					
3960	7.63	4.37					
4020	7.65	4.39					
4080	7.64	4.38					
4140	7.66	4.4					
4200	7.65	4.39					
4260	7.65	4.39					
4320	7.66	4.4					
4380	7.67	4.41					

APPENDIX D

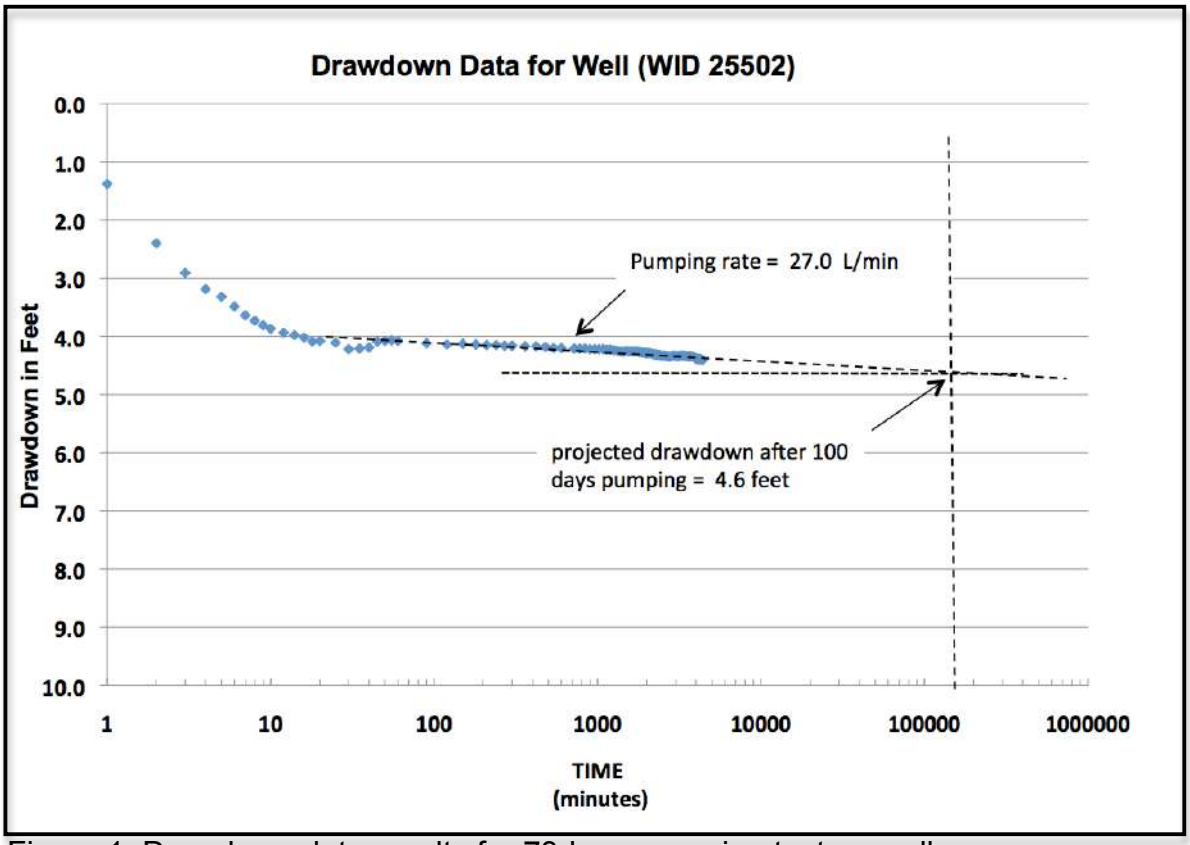

Figure 1. Drawdown data results for 73-hour pumping test on well.

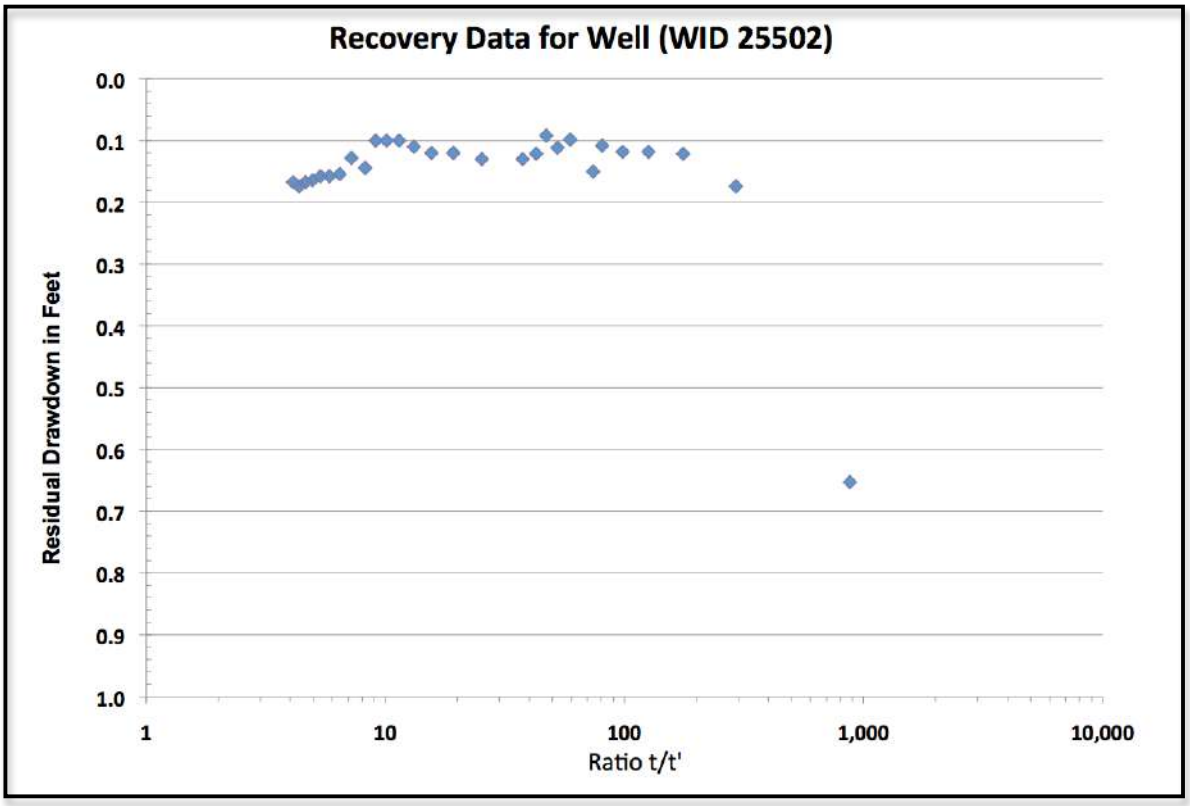

Figure 2. Recovery data results for 73-hour pumping test on well.

APPENDIX E

Pumping Test Data for Well (WID 25502)

Project: Booth Property
Client: E. Booth
Location: Saltspring Island
Date of Test: 17-May-17
Test Conducted by: Eric Booth under supervision of A. Kohut
Pumped Well: WID 25502
Pumping Rate: 28.8 L/min (0.48L/s)
Static Water Level: 2.127 m

Reference: all readings from top of well casing
Stick up: 12 inches above ground
Observation Wells: none
Pump Start Time: 8:00 AM May 17/17
Pump End Time: 5:35 PM May 28/17
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)
1	2.787	0.66	16296	1	4.212	16296.0	2.09
2	3.062	0.94	16297	2	3.93	8148.5	1.80
3	3.233	1.11	16298	3	3.72	5432.7	1.59
4	3.335	1.21	16299	4	3.68	4074.8	1.55
5	3.407	1.28	16300	5	3.62	3260.0	1.49
6	3.449	1.32	16301	6	3.58	2716.8	1.45
7	3.480	1.35	16302	7	3.54	2328.9	1.41
8	3.506	1.38	16303	8	3.51	2037.9	1.39
9	3.529	1.40	16304	9	3.50	1811.6	1.37
10	3.538	1.41	16305	10	3.479	1630.5	1.35
12	3.562	1.44	16307	12	3.457	1358.9	1.33
14	3.569	1.44	16309	14	3.440	1164.9	1.31
16	3.575	1.45	16311	16	3.428	1019.4	1.30
18	3.582	1.46	16313	18	3.415	906.3	1.29
20	3.585	1.46	16315	20	3.404	815.8	1.28
25	3.602	1.48	16320	25	3.382	652.8	1.26
30	3.614	1.49	16325	30	3.367	544.2	1.24
35	3.625	1.50	16330	35	3.349	466.6	1.22
40	3.612	1.49	16335	40	3.332	408.4	1.21
45	3.610	1.48	16340	45	3.316	363.1	1.19
50	3.625	1.50	16345	50	3.298	326.9	1.17
60	3.642	1.52	16355	60	3.265	272.6	1.14
70	3.661	1.53	16365	70	3.238	233.8	1.11
80	3.674	1.55	16375	80	3.213	204.7	1.09
90	3.685	1.56	16385	90	3.192	182.1	1.07
100	3.698	1.57	16395	100	3.179	164.0	1.05
120	3.752	1.63	16420	125	3.157	131.4	1.03
140	3.778	1.65	16470	175	3.087	94.1	0.96
200	3.861	1.73	16520	225	3.014	73.4	0.89
240	3.886	1.76	16570	275	2.944	60.3	0.82
280	3.909	1.78	16620	325	2.877	51.1	0.75
320	3.929	1.80	16670	375	2.828	44.5	0.70
360	3.947	1.82	16720	425	2.776	39.3	0.65
400	3.973	1.85	16770	475	2.73	35.3	0.60
460	3.989	1.86	16820	525	2.693	32.0	0.57
520	4.002	1.88	16920	625	2.627	27.1	0.50

APPENDIX E

Time (minutes)	Water Level (m)	Drawdown (m)	Time t (minutes)	Time t' (minutes)	Water Level (m)	t/t'	Residual Drawdown (m)
580	4.017	1.89	17020	725	2.578	23.5	0.45
640	4.032	1.91	17120	825	2.544	20.8	0.42
700	4.041	1.91	17220	925	2.525	18.6	0.40
760	4.053	1.93	17320	1025	2.504	16.9	0.38
820	4.068	1.94	17420	1125	2.487	15.5	0.36
880	4.070	1.94	17520	1225	2.482	14.3	0.36
940	4.082	1.96	17620	1325	2.472	13.3	0.35
1000	4.093	1.97	17740	1445	2.465	12.3	0.34
1100	4.098	1.97					
1200	4.112	1.99					
1300	4.121	1.99					
1400	4.134	2.01					
1500	4.124	2.00					
1600	4.125	2.00					
1700	4.134	2.01					
1800	4.142	2.02					
1900	4.143	2.02					
2000	4.158	2.03					
2100	4.148	2.02					
2200	4.140	2.01					
2300	4.150	2.02					
2400	4.166	2.04					
2500	4.175	2.05					
2600	4.186	2.06					
2700	4.198	2.07					
2800	4.201	2.07					
2900	4.213	2.09					
3000	4.215	2.09					
3500	4.260	2.13					
4000	4.299	2.17					
4500	4.322	2.20					
5000	4.353	2.23					
6000	4.416	2.29					
7000	4.499	2.37					
8000	4.584	2.46					
9000	4.668	2.54					
10000	4.773	2.65					
11000	4.834	2.71					
12000	4.904	2.78					
13000	4.944	2.82					
14000	4.992	2.87					
15000	4.998	2.87					
16000	5.003	2.88					
16295	5.030	2.90					

Data from transducer

APPENDIX E

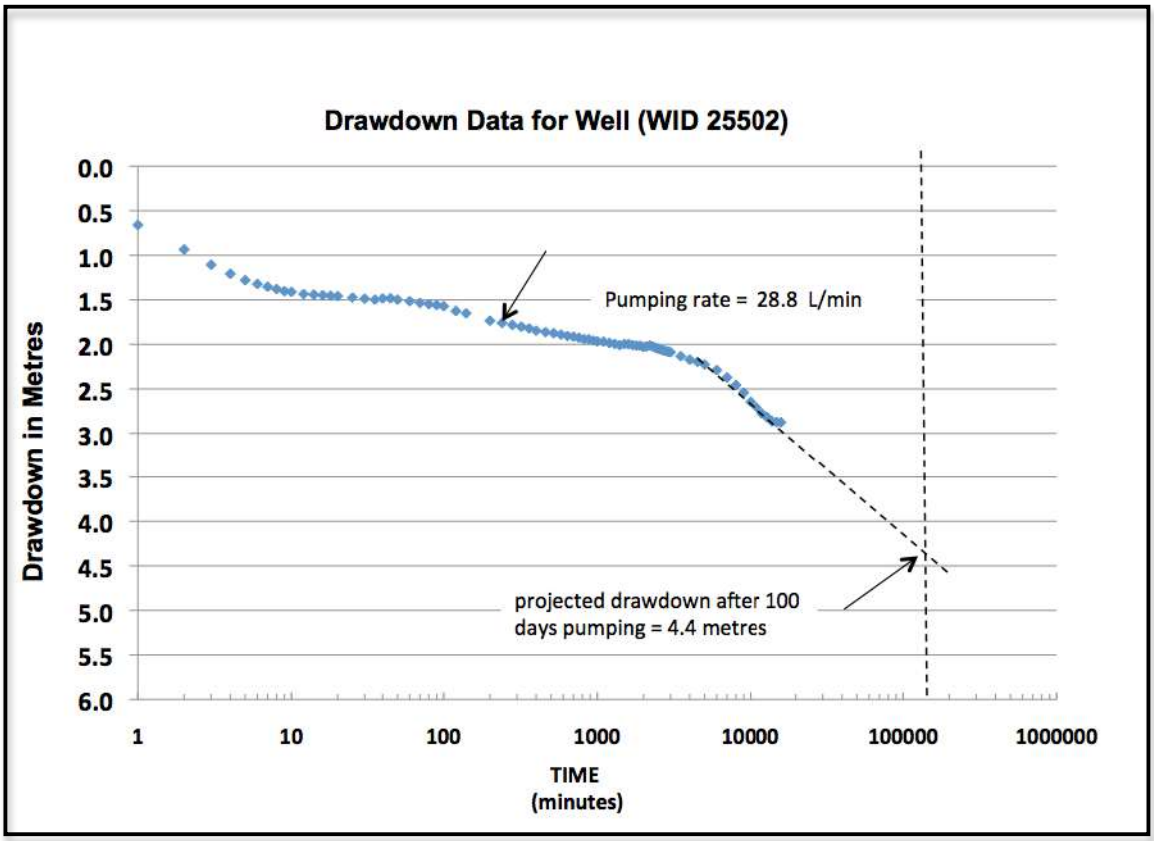

Figure 1. Drawdown data results for 11.3-day pumping test on well.

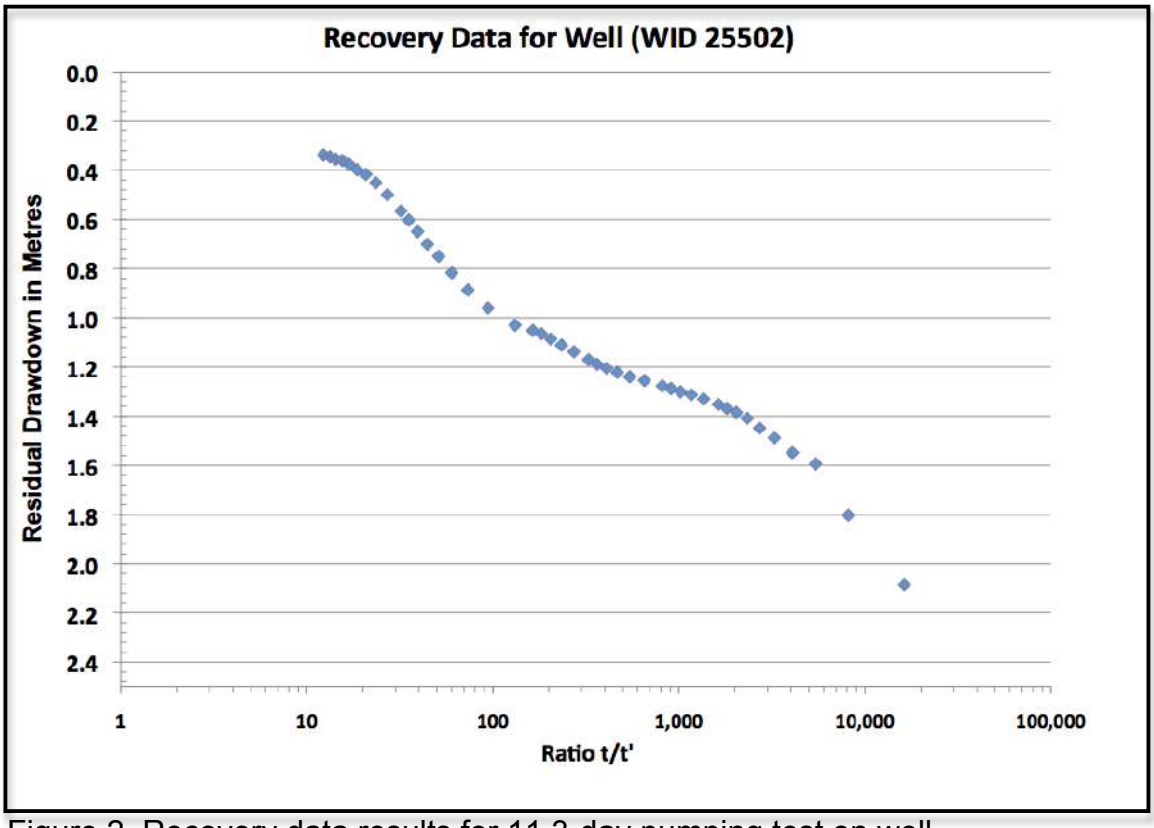

Figure 2. Recovery data results for 11.3-day pumping test on well.

APPENDIX F

Pumping Test Data for Well (WID 25502)

Project: Booth Property
Client: E. Booth
Location: Saltspring Island
Date of Test: 04-Jun-17
Test Conducted by: Eric Booth under supervision of A. Kohut
Pumped Well: WID 25502
Pumping Rate: 28.8 L/min (0.48L/s)
Static Water Level: 2.410 m

Reference: all readings from top of well casing
Stick up: 12 inches above ground
Observation Wells: none
Pump Start Time: 10:40 AM June 4/17
Pump End Time: 6:30 PM July 1/17
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)
10	3.770	1.64	39341	1	8.618	39341.0	6.21
20	3.818	1.69	39342	2	8.580	19671.0	6.17
30	3.841	1.71	39343	3	8.558	13114.3	6.15
40	3.861	1.73	39344	4	8.543	9836.0	6.13
50	3.885	1.76	39345	5	8.526	7869.0	6.12
60	3.905	1.78	39346	6	8.502	6557.7	6.09
70	3.992	1.87	39347	7	8.475	5621.0	6.07
80	3.942	1.82	39348	8	8.454	4918.5	6.04
90	3.957	1.83	39349	9	8.436	4372.1	6.03
100	3.978	1.85	39350	10	8.415	3935.0	6.01
120	4.014	1.89	39352	12	8.378	3279.3	5.97
140	4.036	1.91	39354	14	8.348	2811.0	5.94
160	4.054	1.93	39356	16	8.325	2459.8	5.92
180	4.080	1.95	39358	18	8.302	2186.6	5.89
200	4.104	1.98	39360	20	8.279	1968.0	5.87
240	4.130	2.00	39365	25	8.198	1574.6	5.79
280	4.159	2.03	39370	30	8.170	1312.3	5.76
320	4.188	2.06	39375	35	8.115	1125.0	5.71
360	4.212	2.09	39380	40	8.071	984.5	5.66
400	4.235	2.11	39385	45	8.029	875.2	5.62
460	4.267	2.14	39390	50	7.993	787.8	5.58
520	4.278	2.15	39395	55	7.956	716.3	5.55
580	4.285	2.16	39400	60	7.921	656.7	5.51
640	4.309	2.18	39410	70	7.832	563.0	5.42
700	4.330	2.20	39420	80	7.763	492.8	5.35
760	4.351	2.22	39430	90	7.696	438.1	5.29
820	4.371	2.24	39440	100	7.632	394.4	5.22
880	4.399	2.27	39460	120	7.563	328.8	5.15
940	4.423	2.30	39480	140	7.449	282.0	5.04
1000	4.443	2.32	39500	160	7.337	246.9	4.93
1100	4.482	2.36	39540	200	7.091	197.7	4.68
1200	4.514	2.39	39580	240	6.721	164.9	4.31
1300	4.547	2.42	39640	300	6.286	132.1	3.88
1400	4.580	2.45	39740	400	5.8	99.4	3.39
1500	4.617	2.49	39840	500	5.388	79.7	2.98
1600	4.654	2.53	39940	600	5.059	66.6	2.65
1700	4.677	2.55	40040	700	4.844	57.2	2.43
1800	4.750	2.62	40140	800	4.675	50.2	2.27

APPENDIX F

Time (minutes)	Water Level (m)	Drawdown (m)	Time t (minutes)	Time t' (minutes)	Water Level (m)	t/t'	Residual Drawdown (m)
1900	4.786	2.66	40240	900	4.58	44.7	2.17
2000	4.802	2.68	40340	1000	4.498	40.3	2.09
2100	4.832	2.71	40440	1100	4.413	36.8	2.00
2200	4.863	2.74	40540	1200	4.33	33.8	1.92
2300	4.885	2.76	40640	1300	4.254	31.3	1.84
2400	4.909	2.78	40740	1400	4.178	29.1	1.77
2500	4.941	2.81	40840	1500	4.109	27.2	1.70
2600	4.960	2.83	40940	1600	4.053	25.6	1.64
2700	4.982	2.86	41040	1700	3.988	24.1	1.58
2800	5.007	2.88	41140	1800	3.932	22.9	1.52
2900	5.034	2.91	41240	1900	3.881	21.7	1.47
3000	5.057	2.93	41430	2000	3.835	20.7	1.43
3500	5.165	3.04	41530	2100	3.783	19.8	1.37
4000	5.261	3.13	41630	2200	3.738	18.9	1.33
4500	5.344	3.22					
5000	5.463	3.34					
6000	5.607	3.48					
7000	5.737	3.61					
8000	5.881	3.75					
9000	6.060	3.93					
10000	6.227	4.10					
11000	6.413	4.29					
12000	6.428	4.30					
13000	4.882	2.76					
14000	5.376	3.25					
15000	6.099	3.97					
16000	6.620	4.49					
17000	6.855	4.73					
18000	7.086	4.96					
19000	7.311	5.18					
20000	7.642	5.52					
21000	7.773	5.65					
22000	7.845	5.72					
23000	7.923	5.80					
24000	8.051	5.92					
25000	8.225	6.10					
26000	8.326	6.20					
27000	8.395	6.27					
28000	8.445	6.32					
29000	8.489	6.36					
30000	8.562	6.44					
31000	8.647	6.52					
32000	8.659	6.532					
33000	8.689	6.562					
34000	8.739	6.612					
35000	8.781	6.654					
36000	8.843	6.716					
37000	8.928	6.801					
38000	8.927	6.800					
39000	8.927	6.800					
39340	8.927	6.800					

Data from transducer

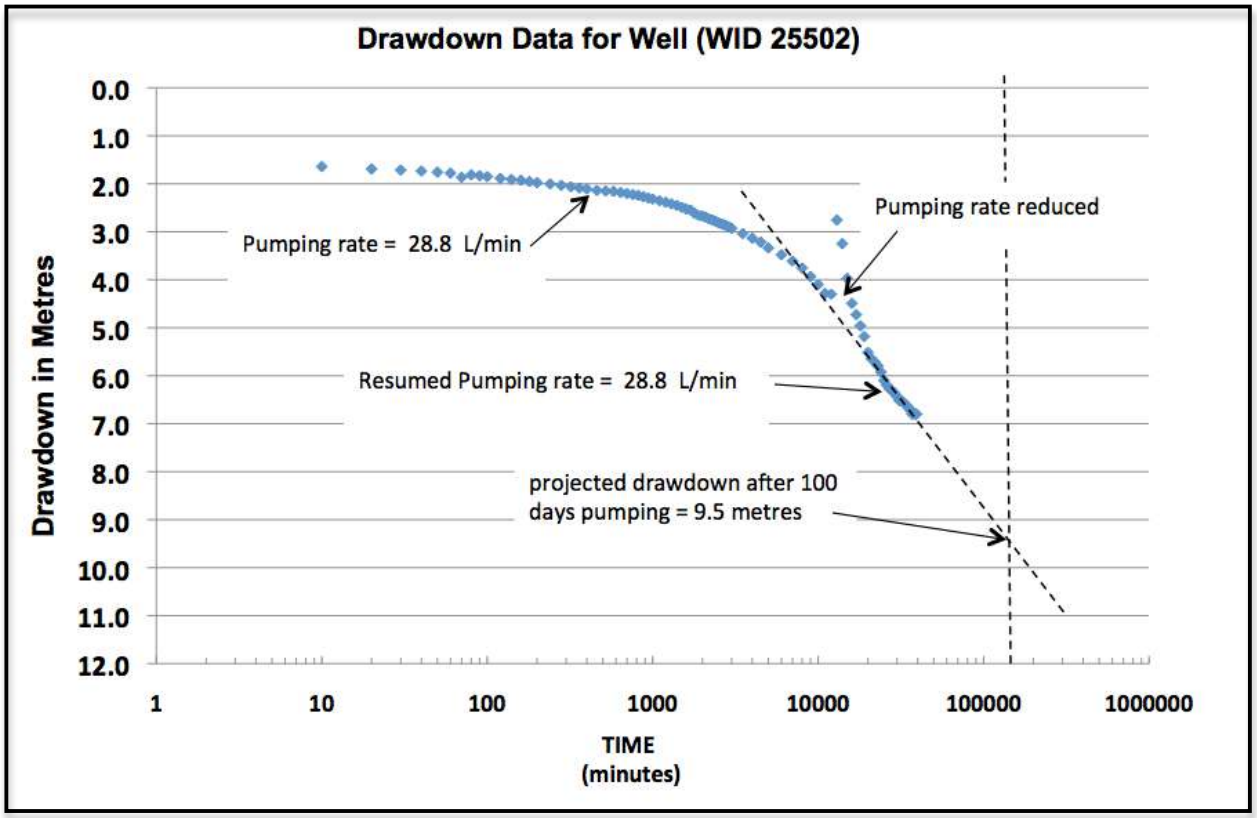

Figure 1. Drawdown plot for 27.3 day pumping test June 4 to July 1, 2017.

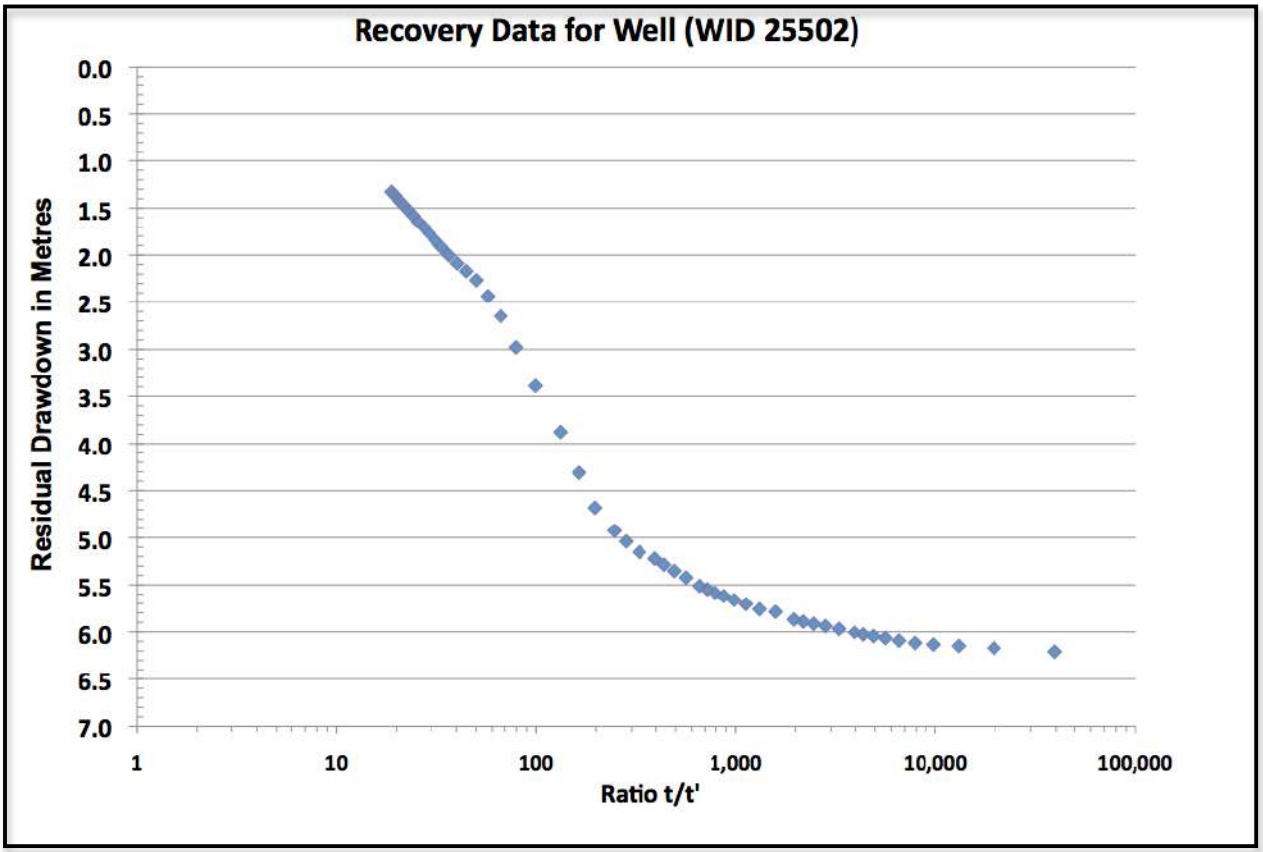

Figure 2. Recovery plot for 27.3 day pumping test June 4 to July 1, 2017.

APPENDIX G

WATER QUALITY LABORATORY ANALYSES

Your C.O.C. #: WI005071

Attention:ERIC BOOTH

SALT SPRING VENTURES INC.
109 FRAZIER RD.
SALT SRING ISLAND, BC
Canada V8K2B5

Report Date: 2016/12/07
Report #: R2312848
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6A0498
Received: 2016/11/09, 13:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	2	2016/11/15	2016/11/15	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	2	N/A	2016/11/14	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - water (1)	2	N/A	2016/11/15	BBY6SOP-00026	SM-2510B
Fluoride	2	N/A	2016/11/10	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO3)	1	N/A	2016/11/16	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3)	1	N/A	2016/11/17	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2016/11/14	2016/11/16	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2016/11/14	2016/11/17	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	N/A	2016/11/14	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by CRC ICPMS (total)	2	2016/11/14	2016/11/16	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Nitrate + Nitrite (N)	2	N/A	2016/11/10	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2016/11/10	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2016/11/12	BBY6SOP-00010	SM 22 4500-NO3 I m
pH Water (1, 2)	2	N/A	2016/11/15	BBY6SOP-00026	SM-4500H+B
Total Dissolved Solids (Filt. Residue) (1)	2	N/A	2016/11/16	VIC SOP-00008	Based on SM 2540C
Total Coliform & E.Coli by MF-Chromocult (1)	2	N/A	2016/11/09	VIC SOP 00112	Based on SM-9222
Total Phosphorus	2	N/A	2016/11/15	BBY6SOP-00013	SM 22 4500-P E m
Turbidity (1)	2	N/A	2016/11/10	VIC SOP-00011	Based on SM - 2130

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your C.O.C. #: WI005071

Attention:ERIC BOOTH

SALT SPRING VENTURES INC.
109 FRAZIER RD.
SALT SRING ISLAND, BC
Canada V8K2B5

Report Date: 2016/12/07
Report #: R2312848
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6A0498
Received: 2016/11/09, 13:45

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.

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 Maxxam Victoria
(2) The BC-MOE and APHA Standard Method require 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 BC-MOE/APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B6A0498
Report Date: 2016/12/07

SALT SPRING VENTURES INC.

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					PZ6667	PZ6668		
Sampling Date					2016/11/09 09:30	2016/11/09 09:30		
COC Number					WI005071	WI005071		
	UNITS	MAC	AO	OG	POND - SSI VENTURES	SWANSON POND WELL - SSI VENTURES	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	1	-	-	0.0073	0.0082	0.0050	8468561
Calculated Parameters								
Nitrate (N)	mg/L	10	-	-	0.107	<0.020	0.020	8464817
Misc. Inorganics								
Fluoride (F)	mg/L	1.5	-	-	0.055	0.170	0.010	8467849
Alkalinity (Total as CaCO3)	mg/L	-	-	-	41.6	100	0.5	8470821
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	<0.5	0.5	8470821
Bicarbonate (HCO3)	mg/L	-	-	-	50.7	122	0.5	8470821
Carbonate (CO3)	mg/L	-	-	-	<0.5	<0.5	0.5	8470821
Hydroxide (OH)	mg/L	-	-	-	<0.5	<0.5	0.5	8470821
Anions								
Dissolved Chloride (Cl)	mg/L	-	250	-	9.3	13	0.50	8470232
Nutrients								
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.115	<0.020	0.020	8468560
Total Phosphorus (P)	mg/L	-	-	-	0.0550	0.0889	0.0050	8471097
Physical Properties								
Conductivity	uS/cm	-	-	-	132	258	1	8470825
pH	pH	-	6.5:8.5	-	7.5	7.8		8470826
Physical Properties								
Total Dissolved Solids	mg/L	-	500	-	90	171	10	8469990
Turbidity	NTU	see remark	see remark	see remark	3.5	8.0	0.1	8469715

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B6A0498
Report Date: 2016/12/07

SALT SPRING VENTURES INC.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID				PZ6667	PZ6668		
Sampling Date				2016/11/09 09:30	2016/11/09 09:30		
COC Number				WI005071	WI005071		
	UNITS	MAC	AO	POND - SSI VENTURES	SWANSON POND WELL - SSI VENTURES	RDL	QC Batch
Total Metals by ICPMS							
Total Arsenic (As)	ug/L	10	-	0.67	2.83	0.10	8469737
Total Copper (Cu)	ug/L	-	1000	3.49	15.9	0.50	8469737
Total Iron (Fe)	ug/L	-	300	265	**2680**	10	8469737
Total Lead (Pb)	ug/L	10	-	0.46	5.88	0.20	8469737
Total Manganese (Mn)	ug/L	-	50	44.4	**713**	1.0	8469737
Total Zinc (Zn)	ug/L	-	5000	7.4	27.0	5.0	8469737
Total Calcium (Ca)	mg/L	-	-	11.8	16.5	0.050	8469651
Total Magnesium (Mg)	mg/L	-	-	3.69	3.48	0.050	8469651
Total Potassium (K)	mg/L	-	-	1.74	0.850	0.050	8469651
Total Sodium (Na)	mg/L	-	200	9.59	28.0	0.050	8469651
Total Sulphur (S)	mg/L	-	-	3.2	<3.0	3.0	8469651

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B6A0498
Report Date: 2016/12/07

SALT SPRING VENTURES INC.

MICROBIOLOGY (WATER)

Maxxam ID			PZ6667	PZ6668		
Sampling Date			2016/11/09 09:30	2016/11/09 09:30		
COC Number			WI005071	WI005071		
	UNITS	MAC	POND - SSI VENTURES	SWANSON POND WELL - SSI VENTURES	RDL	QC Batch
Microbiological Param.						
Total Coliforms	CFU/100mL	<1	280	SEE NOTE (1)	1	8469681
E. coli	CFU/100mL	<1	150	2	1	8469681

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

(1) Due to confluent growth on 3/4 of the plate a calculated estimate of >2100 is given.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B6A0498
Report Date: 2016/12/07

SALT SPRING VENTURES INC.

TOT. METALS W/ CV HG FOR DRINKING WATER (WATER)

Maxxam ID			PZ6667	PZ6668		
Sampling Date			2016/11/09 09:30	2016/11/09 09:30		
COC Number			WI005071	WI005071		
	UNITS	AO	POND - SSI VENTURES	SWANSON POND WELL - SSI VENTURES	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO3)	mg/L	-	44.6	55.6	0.50	8465116
Total Metals by ICPMS						
Total Calcium (Ca)	mg/L	-	11.8	16.5	0.050	8464816
Total Magnesium (Mg)	mg/L	-	3.69	3.48	0.050	8464816
Total Potassium (K)	mg/L	-	1.74	0.850	0.050	8464816
Total Sodium (Na)	mg/L	200	9.59	28.0	0.050	8464816

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GENERAL COMMENTS

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, October 2014.

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.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B6A0498
Report Date: 2016/12/07

QUALITY ASSURANCE REPORT

SALT SPRING VENTURES INC.

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8467849	Fluoride (F)	2016/11/10	109	80 - 120	106	80 - 120	0.014, RDL=0.010	mg/L	0	20
8468560	Nitrate plus Nitrite (N)	2016/11/10	103	80 - 120	109	80 - 120	<0.020	mg/L	NC	25
8468561	Nitrite (N)	2016/11/10	100	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20
8469715	Turbidity	2016/11/10			98	80 - 120	<0.1	NTU	NC	20
8469737	Total Arsenic (As)	2016/11/16	97	80 - 120	99	80 - 120	<0.10	ug/L	4.8	20
8469737	Total Copper (Cu)	2016/11/16	NC	80 - 120	104	80 - 120	<0.50	ug/L	0.58	20
8469737	Total Iron (Fe)	2016/11/16	NC	80 - 120	102	80 - 120	<10	ug/L	3.8	20
8469737	Total Lead (Pb)	2016/11/16	NC	80 - 120	97	80 - 120	<0.20	ug/L	2.4	20
8469737	Total Manganese (Mn)	2016/11/16	NC	80 - 120	97	80 - 120	<1.0	ug/L	0.52	20
8469737	Total Zinc (Zn)	2016/11/16	NC	80 - 120	114	80 - 120	<5.0	ug/L	0.61	20
8469990	Total Dissolved Solids	2016/11/16			98	80 - 120	<10	mg/L	2.6	20
8470232	Dissolved Chloride (Cl)	2016/11/14	97	80 - 120	107	80 - 120	0.58, RDL=0.50	mg/L	1.7	20
8470821	Alkalinity (PP as CaCO3)	2016/11/15	12	N/A			<0.5	mg/L		
8470821	Alkalinity (Total as CaCO3)	2016/11/15	NC	80 - 120	91	80 - 120	<0.5	mg/L		
8470821	Bicarbonate (HCO3)	2016/11/15					<0.5	mg/L		
8470821	Carbonate (CO3)	2016/11/15					<0.5	mg/L		
8470821	Hydroxide (OH)	2016/11/15					<0.5	mg/L		
8470825	Conductivity	2016/11/15			102	90 - 110	<1	uS/cm		
8470826	pH	2016/11/15			101	96 - 104				
8471097	Total Phosphorus (P)	2016/11/15	102	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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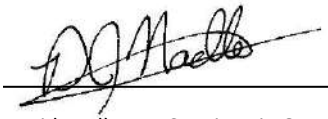
Maxxam Job #: B6A0498
Report Date: 2016/12/07

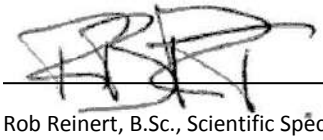
SALT SPRING VENTURES INC.

VALIDATION SIGNATURE PAGE

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



David Nadler, AASc, Victoria Operations Manager



Rob Reinert, B.Sc., Scientific Specialist

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Your C.O.C. #: WI005311

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/02/03
Report #: R2341448
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B704971
Received: 2017/01/23, 15:22

Sample Matrix: DRINKING WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	1	2017/01/25	2017/01/24	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	1	N/A	2017/01/26	BBY6SOP-00011	SM 22 4500-Cl- E m
True Colour (Single Wavelength) (1)	1	N/A	2017/01/26	VIC SOP-00010	Based on SM-2120 C
Conductance - water (1)	1	N/A	2017/01/24	BBY6SOP-00026	SM-2510B
Fluoride	1	N/A	2017/01/26	BBY6SOP-00048	SM 22 4500-F C m
Iron Bacteria (1)	1	N/A	2017/01/24	VIC SOP-00114	SM 22 9240 m
Hardness Total (calculated as CaCO3)	1	N/A	2017/01/30	BBY WI-00033	Auto Calc
Mercury (Total) by CVAF	1	2017/01/27	2017/01/27	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Heterotropic Plate Count Water Mem. Filt (1)	1	N/A	2017/01/24	BBY4 SOP-00003	Based on SM-9215
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/01/30	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by CRC ICPMS (total)	1	N/A	2017/01/27	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Nitrogen (Total)	1	2017/01/26	2017/01/26	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2017/01/26	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate + Nitrite (N)	1	N/A	2017/01/26	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2017/01/26	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2017/01/27	BBY6SOP-00010	SM 22 4500-NO3 I m
Nitrogen (Organic) (Cal. TKN, NH4,N/N)	1	N/A	2017/01/27	BBY WI-00033	Auto Calc
pH Water (1, 2)	1	N/A	2017/01/24	BBY6SOP-00026	SM-4500H+B
Sat. pH and Langelier Index (@ 4.4C)	1	N/A	2017/01/30	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C)	1	N/A	2017/01/30	BBY WI-00033	Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2017/01/26	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate Reducing Bacteria (1)	1	N/A	2017/01/24	VIC SOP-00114	SM 22 9240 m
Sulphide - total	1	N/A	2017/01/27	BBY6SOP-00006	SM 22 4500-S2- D m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2017/01/26	VIC SOP-00008	Based on SM 2540C
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2017/01/24	VIC SOP 00112	Based on SM-9222
Carbon (Total Organic) (3)	1	N/A	2017/01/25	BBY6SOP-00003	SM 22 5310 C m
Turbidity (1)	1	N/A	2017/01/26	VIC SOP-00011	Based on SM - 2130

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your C.O.C. #: WI005311

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/02/03
Report #: R2341448
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B704971
Received: 2017/01/23, 15:22

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

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.

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 Maxxam Victoria
(2) The BC-MOE and APHA Standard Method require 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 BC-MOE/APHA Standard Method holding time.
(3) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276

==========

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Maxxam Job #: B704971
Report Date: 2017/02/03

Hy-Geo Consulting

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID					QL0842		
Sampling Date					2017/01/23 10:55		
COC Number					WI005311		
	UNITS	MAC	AO	OG	BOOTH WELL	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	<0.0050	0.0050	8538253
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	43.7	0.50	8535384
Nitrate (N)	mg/L	10	-	-	<0.020	0.020	8535389
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.190	0.010	8539279
Alkalinity (Total as CaCO3)	mg/L	-	-	-	111	0.5	8536171
Total Organic Carbon (C)	mg/L	-	-	-	4.66	0.50	8536972
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	8536171
Bicarbonate (HCO3)	mg/L	-	-	-	136	0.5	8536171
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	8536171
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	8536171
Anions							
Dissolved Sulphate (SO4)	mg/L	-	500	-	39.6	0.50	8538793
Dissolved Chloride (Cl)	mg/L	-	250	-	67	0.50	8538788
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	**32**	5	8541901
Nutrients							
Total Organic Nitrogen (N)	mg/L	-	-	-	0.324	0.020	8535703
Total Ammonia (N)	mg/L	-	-	-	0.13	0.0050	8537541
Nitrate plus Nitrite (N)	mg/L	-	-	-	<0.020	0.020	8538251
Total Nitrogen (N)	mg/L	-	-	-	0.458	0.020	8538085
Physical Properties							
Conductivity	uS/cm	-	-	-	545	1	8535426
pH	pH	-	6.5:8.5	-	7.8		8535425
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	310	10	8536532
Turbidity	NTU	see remark	see remark	see remark	3.1	0.1	8538589

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B704971
Report Date: 2017/02/03

Hy-Geo Consulting

MERCURY BY COLD VAPOR (DRINKING WATER)

Maxxam ID			QL0842		
Sampling Date			2017/01/23 10:55		
COC Number			WI005311		
	UNITS	**MAC**	**BOOTH WELL**	**RDL**	**QC Batch**
Elements					
Total Mercury (Hg)	ug/L	1	<0.010	0.010	8538410

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B704971
Report Date: 2017/02/03

Hy-Geo Consulting

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID					QL0842		
Sampling Date					2017/01/23 10:55		
COC Number					WI005311		
	UNITS	MAC	AO	OG	BOOTH WELL	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	**161**	3.0	8538139
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	8538139
Total Arsenic (As)	ug/L	10	-	-	6.62	0.10	8538139
Total Barium (Ba)	ug/L	1000	-	-	19.1	1.0	8538139
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	8538139
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	8538139
Total Boron (B)	ug/L	5000	-	-	58	50	8538139
Total Cadmium (Cd)	ug/L	5	-	-	0.010	0.010	8538139
Total Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	8538139
Total Cobalt (Co)	ug/L	-	-	-	<0.50	0.50	8538139
Total Copper (Cu)	ug/L	-	1000	-	1.58	0.20	8538139
Total Iron (Fe)	ug/L	-	300	-	**697**	5.0	8538139
Total Lead (Pb)	ug/L	10	-	-	0.21	0.20	8538139
Total Manganese (Mn)	ug/L	-	50	-	**372**	1.0	8538139
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	8538139
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	8538139
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	8538139
Total Silicon (Si)	ug/L	-	-	-	6970	100	8538139
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	8538139
Total Strontium (Sr)	ug/L	-	-	-	332	1.0	8538139
Total Thallium (Tl)	ug/L	-	-	-	<0.010	0.010	8538139
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	8538139
Total Titanium (Ti)	ug/L	-	-	-	7.2	5.0	8538139
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	8538139
Total Vanadium (V)	ug/L	-	-	-	<5.0	5.0	8538139
Total Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	8538139
Total Zirconium (Zr)	ug/L	-	-	-	<0.50	0.50	8538139
Total Calcium (Ca)	mg/L	-	-	-	13.3	0.050	8535701
Total Magnesium (Mg)	mg/L	-	-	-	2.51	0.050	8535701
Total Potassium (K)	mg/L	-	-	-	0.730	0.050	8535701
Total Sodium (Na)	mg/L	-	200	-	100	0.050	8535701
Total Sulphur (S)	mg/L	-	-	-	14.6	3.0	8535701

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B704971
Report Date: 2017/02/03

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MICROBIOLOGY (DRINKING WATER)

Maxxam ID			QL0842		
Sampling Date			2017/01/23 10:55		
COC Number			WI005311		
	UNITS	**MAC**	**BOOTH WELL**	**RDL**	**QC Batch**
Microbiological Param.					
Heterotrophic Plate Count	CFU/mL	-	32	1	8541898
Iron Bacteria	CFU/mL	-	35000	25	8544731
Sulphate reducing bacteria	CFU/mL	-	120000	75	8544725
Total Coliforms	CFU/100mL	<1	*SEE NOTE (1)	1	8537378
E. coli	CFU/100mL	<1	2	1	8537378

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

(1) Due to confluent growth a calculated estimate of 480 CFU/100mL was determined

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Report Date: 2017/02/03

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CALCULATED PARAMETERS (DRINKING WATER)

Maxxam ID		QL0842	
Sampling Date		2017/01/23 10:55	
COC Number		WI005311	
	UNITS	BOOTH WELL	QC Batch
Parameter			
Langelier Index (@ 4.4C)	N/A	-0.996	8535705
Langelier Index (@ 60C)	N/A	0.0450	8535707
Saturation pH (@ 4.4C)	N/A	8.78	8535705
Saturation pH (@ 60C)	N/A	7.74	8535707

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Maxxam Job #: B704971
Report Date: 2017/02/03

Hy-Geo Consulting

MISCELLANEOUS (DRINKING WATER)

Maxxam ID			QL0842		
Sampling Date			2017/01/23 10:55		
COC Number			WI005311		
	UNITS	AO	BOOTH WELL	RDL	QC Batch
MISCELLANEOUS					
Total Sulphide	mg/L	0.05	**0.107 (1)**	0.0050	8538765

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

(1) Sample received at less than recommended preservation pH 9.

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	10.0°C

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, October 2014.

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.

Results relate only to the items tested.

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Maxxam Job #: B704971
Report Date: 2017/02/03

QUALITY ASSURANCE REPORT

Hy-Geo Consulting

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8535425	pH	2017/01/24			101	96 - 104			0	N/A
8535426	Conductivity	2017/01/24			103	90 - 110	2,RDL=1	uS/cm	1.3	20
8536171	Alkalinity (PP as CaCO3)	2017/01/24					<0.5	mg/L	NC	20
8536171	Alkalinity (Total as CaCO3)	2017/01/24	NC	80 - 120	91	80 - 120	0.6, RDL=0.5	mg/L	2.4	20
8536171	Bicarbonate (HCO3)	2017/01/24					0.7, RDL=0.5	mg/L	2.4	20
8536171	Carbonate (CO3)	2017/01/24					<0.5	mg/L	NC	20
8536171	Hydroxide (OH)	2017/01/24					<0.5	mg/L	NC	20
8536532	Total Dissolved Solids	2017/01/26			90	80 - 120	<10	mg/L	0.58	20
8536972	Total Organic Carbon (C)	2017/01/25	118	80 - 120	103	80 - 120	<0.50	mg/L	NC	20
8537378	E. coli	2017/01/24							NC	N/A
8537378	Total Coliforms	2017/01/24							NC	N/A
8537541	Total Ammonia (N)	2017/01/26	100	80 - 120	103	80 - 120	<0.0050	mg/L	0.86	20
8538085	Total Nitrogen (N)	2017/01/26	NC	80 - 120	101	80 - 120	<0.020	mg/L	1.4	20
8538139	Total Aluminum (Al)	2017/01/27	109	80 - 120	111	80 - 120	<3.0	ug/L		
8538139	Total Antimony (Sb)	2017/01/27	99	80 - 120	98	80 - 120	<0.50	ug/L		
8538139	Total Arsenic (As)	2017/01/27	106	80 - 120	103	80 - 120	<0.10	ug/L	NC	20
8538139	Total Barium (Ba)	2017/01/27	NC	80 - 120	96	80 - 120	<1.0	ug/L	7.2	20
8538139	Total Beryllium (Be)	2017/01/27	101	80 - 120	98	80 - 120	<0.10	ug/L		
8538139	Total Bismuth (Bi)	2017/01/27	99	80 - 120	100	80 - 120	<1.0	ug/L		
8538139	Total Boron (B)	2017/01/27	104	80 - 120	112	80 - 120	<50	ug/L	NC	20
8538139	Total Cadmium (Cd)	2017/01/27	101	80 - 120	98	80 - 120	<0.010	ug/L	NC	20
8538139	Total Chromium (Cr)	2017/01/27	98	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
8538139	Total Cobalt (Co)	2017/01/27	97	80 - 120	100	80 - 120	<0.50	ug/L		
8538139	Total Copper (Cu)	2017/01/27	NC	80 - 120	99	80 - 120	<0.20	ug/L	4.1	20
8538139	Total Iron (Fe)	2017/01/27	94	80 - 120	103	80 - 120	<5.0	ug/L		
8538139	Total Lead (Pb)	2017/01/27	98	80 - 120	98	80 - 120	<0.20	ug/L	NC	20
8538139	Total Manganese (Mn)	2017/01/27	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
8538139	Total Molybdenum (Mo)	2017/01/27	NC	80 - 120	102	80 - 120	<1.0	ug/L		
8538139	Total Nickel (Ni)	2017/01/27	96	80 - 120	100	80 - 120	<1.0	ug/L		
8538139	Total Selenium (Se)	2017/01/27	102	80 - 120	102	80 - 120	<0.10	ug/L	NC	20
8538139	Total Silicon (Si)	2017/01/27					<100	ug/L		
8538139	Total Silver (Ag)	2017/01/27	102	80 - 120	107	80 - 120	<0.020	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8538139	Total Strontium (Sr)	2017/01/27	NC	80 - 120	98	80 - 120	<1.0	ug/L		
8538139	Total Thallium (Tl)	2017/01/27	100	80 - 120	99	80 - 120	<0.010	ug/L		
8538139	Total Tin (Sn)	2017/01/27	100	80 - 120	102	80 - 120	<5.0	ug/L		
8538139	Total Titanium (Ti)	2017/01/27	97	80 - 120	98	80 - 120	<5.0	ug/L		
8538139	Total Uranium (U)	2017/01/27	98	80 - 120	97	80 - 120	<0.10	ug/L	NC	20
8538139	Total Vanadium (V)	2017/01/27	98	80 - 120	97	80 - 120	<5.0	ug/L		
8538139	Total Zinc (Zn)	2017/01/27	NC	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
8538139	Total Zirconium (Zr)	2017/01/27					<0.50	ug/L		
8538251	Nitrate plus Nitrite (N)	2017/01/26	106	80 - 120	104	80 - 120	<0.020	mg/L	0.088	25
8538253	Nitrite (N)	2017/01/26	96	80 - 120	95	80 - 120	<0.0050	mg/L	NC	20
8538410	Total Mercury (Hg)	2017/01/27	86	80 - 120	96	80 - 120	<0.010	ug/L	NC	20
8538589	Turbidity	2017/01/26			99	80 - 120	<0.1	NTU	6.3	20
8538765	Total Sulphide	2017/01/27	101	80 - 120	103	80 - 120	<0.0050	mg/L	NC	20
8538788	Dissolved Chloride (Cl)	2017/01/26			97	80 - 120	<0.50	mg/L	NC	20
8538793	Dissolved Sulphate (SO4)	2017/01/26	NC	80 - 120	97	80 - 120	<0.50	mg/L	1.3	20
8539279	Fluoride (F)	2017/01/26	96	80 - 120	96	80 - 120	<0.010	mg/L	NC	20
8541898	Heterotrophic Plate Count	2017/01/24							3.2	N/A
8541901	True Colour	2017/01/26			86	80 - 120	<5	Col. Unit	3.1	10
8544725	Sulphate reducing bacteria	2017/01/24							0	N/A
8544731	Iron Bacteria	2017/01/24							0	N/A

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Due to confluent growth a calculated estimate of 440 CFU/100mL was determined

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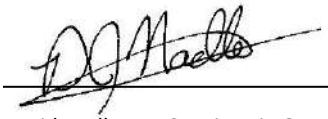
Maxxam Job #: B704971
Report Date: 2017/02/03

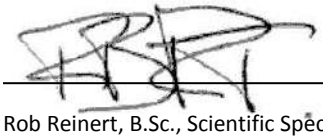
Hy-Geo Consulting

VALIDATION SIGNATURE PAGE

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



David Nadler, AASc, Victoria Operations Manager



Rob Reinert, B.Sc., Scientific Specialist

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Maxxam
A Bureau Veritas Group Company

Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Ph: (250) 385-6112 Toll Free: (866) 385-6112
Courtenay: 2755 B Moray Ave, Courtenay, BC V9N 8M9 Ph: (250) 338-7788 Toll Free: (800) 665-8566

WI 005311

Maxxam Job #: B704971

Company: HY-GEO CONSULTING
Contact Name: AL KOHUT
Mailing Address: 1041 LABURNUM RD
VICTORIA, BC V8Z2M9
Phone #: 250 744 7859
E-mail apkohut@telus.net
After Hours Contact #: 250 477 3418

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

SPECIAL INSTRUCTIONS:
Return Cooler ☐ **Ship Sample Bottles (please specify)** ☐

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.

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

Please note your invoice may be subject to a $60 minimum bill.

Payment Received: Yes ☐ **No** ☐

	Sample Identification (Sample Location &/or Description)	Lab Identification (Lab Use Only)	Sample Location (eg. Tap, Wellhead)	Date/Time Sampled (24hr)	PLEASE CIRCLE: 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	ANALYSIS REQUESTED PLEASE SELECT BELOW: Drinking Water Scan VIHA	Home Safety Scan	Total Metals Scan including Hardness & Hg	Total Coliform and E. Coli			Report Drinking Water Criteria DWG14
1	BOOTH WELL		WELL	2017/1/23 1055	Y	Y	Y	Y	✓						x
					N	N	N	N							
2					Y	Y	Y	Y							x
					N	N	N	N							
3					Y	Y	Y	Y							x
					N	N	N	N							
4					Y	Y	Y	Y							x
					N	N	N	N							
5					Y	Y	Y	Y							x
					N	N	N	N							

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.

DON'T:

Don't rinse or boil any bottle you receive from the lab.

Don't let the sample sit out overnight, please refrigerate.

Don't freeze the sample.

Sample Transportation & Delivery

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 (<10°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

   Overnight shipping: If you ship a sample on the same day that it was collected you can use an overnight courier.

   Same day shipping: Available from Ken's Transfer, Ace Courier, and Greyhound (Courtenay only). Please contact the lab for details.

Print name and sign: *Relinquished By:	Date (yy/mm/dd):	Time (24 hr):	Print name and sign: Received by:	Date (yy/mm/dd):	Time (24hr):	Time Sensitive	Laboratory Use Only: Temperature on Receipt (°C)	Custody Seal	Yes	No	N/A
A.P. Kohut	2017/01/23	1520	Shannon-Gray	17/01/23	15:22	☐	A) 10 B) 10 C) 10 Just sampled & rec'd on ice: ☐	Present?	☐	☐	✓
								Intact?	☐	☐	✓

BBY FCD-00189/1

For further information and resources on result interpretation, please visit our Drinking Water Resource Center:
http://maxxam.ca/maxxams-resource-centre-for-drinking-water-testing

Your C.O.C. #: WI009327

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/05/26
Report #: R2388423
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B737909
Received: 2017/05/17, 12:58

Sample Matrix: DRINKING WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	1	2017/05/18	2017/05/18	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	1	N/A	2017/05/19	BBY6SOP-00011	SM 22 4500-Cl- E m
True Colour (Single Wavelength) (1)	1	N/A	2017/05/19	VIC SOP-00010	SM 22 2120 C m
Conductance - water (1)	1	N/A	2017/05/18	BBY6SOP-00026	SM-2510B
Fluoride	1	N/A	2017/05/23	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO3)	1	N/A	2017/05/26	BBY WI-00033	Auto Calc
Mercury (Total) by CVAF	1	2017/05/24	2017/05/24	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/05/26	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by CRC ICPMS (total)	1	N/A	2017/05/23	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Nitrate + Nitrite (N)	1	N/A	2017/05/19	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2017/05/19	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2017/05/24	BBY6SOP-00010	SM 22 4500-NO3 I m
pH Water (1, 2)	1	N/A	2017/05/18	BBY6SOP-00026	SM-4500H+B
Sulphate by Automated Colourimetry	1	N/A	2017/05/19	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2017/05/26	VIC SOP-00008	Based on SM 2540C
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2017/05/18	VIC SOP 00112	Based on SM-9222
Turbidity (1)	1	N/A	2017/05/20	VIC SOP-00011	SM 22 2130B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

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

Your C.O.C. #: WI009327

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/05/26
Report #: R2388423
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B737909
Received: 2017/05/17, 12:58

dilution methods.
Results relate to samples tested.

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 Maxxam Victoria
(2) The BC-MOE and APHA Standard Method require 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 BC-MOE/APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276

==========

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Maxxam Job #: B737909
Report Date: 2017/05/26

Hy-Geo Consulting

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID					RB8156		
Sampling Date					2017/05/17 10:10		
COC Number					WI009327		
	UNITS	MAC	AO	OG	WELL S.S. BOOTH PROJECT	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	<0.0050	0.0050	8636709
Calculated Parameters							
Nitrate (N)	mg/L	10	-	-	<0.020	0.020	8632554
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.190	0.010	8637248
Alkalinity (Total as CaCO3)	mg/L	-	-	-	115	0.5	8633657
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	8633657
Bicarbonate (HCO3)	mg/L	-	-	-	141	0.5	8633657
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	8633657
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	8633657
Anions							
Dissolved Sulphate (SO4)	mg/L	-	500	-	32.1	0.50	8637621
Dissolved Chloride (Cl)	mg/L	-	250	-	54	0.50	8637618
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	**38**	5	8638502
Nutrients							
Nitrate plus Nitrite (N)	mg/L	-	-	-	<0.020	0.020	8636708
Physical Properties							
Conductivity	uS/cm	-	-	-	493	1	8633659
pH	pH	-	7.0:10.5	-	7.4		8633658
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	282	10	8640667
Turbidity	NTU	see remark	see remark	see remark	3.9	0.1	8638482

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B737909
Report Date: 2017/05/26

Hy-Geo Consulting

MICROBIOLOGY (DRINKING WATER)

Maxxam ID			RB8156	
Sampling Date			2017/05/17 10:10	
COC Number			WI009327	
	UNITS	MAC	WELL S.S. BOOTH PROJECT	QC Batch
Microbiological Param.				
Total Coliforms	CFU/100mL	0	**230**	8636156
E. coli	CFU/100mL	0	**8.0**	8636156

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

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TOT. METALS W/ CV HG FOR DRINKING WATER (DRINKING WATER)

Maxxam ID					RB8156		
Sampling Date					2017/05/17 10:10		
COC Number					WI009327		
	UNITS	MAC	AO	OG	WELL S.S. BOOTH PROJECT	RDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	42.4	0.50	8633134
Elements							
Total Mercury (Hg)	ug/L	1	-	-	<0.010	0.010	8639166
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	**125**	3.0	8638317
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	8638317
Total Arsenic (As)	ug/L	10	-	-	5.31	0.10	8638317
Total Barium (Ba)	ug/L	1000	-	-	15.7	1.0	8638317
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	8638317
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	8638317
Total Boron (B)	ug/L	5000	-	-	53	50	8638317
Total Cadmium (Cd)	ug/L	5	-	-	<0.010	0.010	8638317
Total Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	8638317
Total Cobalt (Co)	ug/L	-	-	-	<0.20	0.20	8638317
Total Copper (Cu)	ug/L	-	1000	-	1.27	0.20	8638317
Total Iron (Fe)	ug/L	-	300	-	**813**	5.0	8638317
Total Lead (Pb)	ug/L	10	-	-	0.27	0.20	8638317
Total Manganese (Mn)	ug/L	-	50	-	**319**	1.0	8638317
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	8638317
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	8638317
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	8638317
Total Silicon (Si)	ug/L	-	-	-	5890	100	8638317
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	8638317
Total Strontium (Sr)	ug/L	-	-	-	293	1.0	8638317
Total Thallium (Tl)	ug/L	-	-	-	<0.010	0.010	8638317
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	8638317
Total Titanium (Ti)	ug/L	-	-	-	5.3	5.0	8638317
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	8638317
Total Vanadium (V)	ug/L	-	-	-	<5.0	5.0	8638317
Total Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	8638317
Total Zirconium (Zr)	ug/L	-	-	-	0.14	0.10	8638317
Total Calcium (Ca)	mg/L	-	-	-	12.9	0.050	8632754
Total Magnesium (Mg)	mg/L	-	-	-	2.44	0.050	8632754

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B737909
Report Date: 2017/05/26

Hy-Geo Consulting

TOT. METALS W/ CV HG FOR DRINKING WATER (DRINKING WATER)

Maxxam ID					RB8156		
Sampling Date					2017/05/17 10:10		
COC Number					WI009327		
	UNITS	MAC	AO	OG	WELL S.S. BOOTH PROJECT	RDL	QC Batch
Total Potassium (K)	mg/L	-	-	-	0.799	0.050	8632754
Total Sodium (Na)	mg/L	-	200	-	86.2	0.050	8632754
Total Sulphur (S)	mg/L	-	-	-	13.5	3.0	8632754

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	11.3°C

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, February 2017.

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.

Results relate only to the items tested.

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Maxxam Job #: B737909
Report Date: 2017/05/26

QUALITY ASSURANCE REPORT

Hy-Geo Consulting

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8633657	Alkalinity (PP as CaCO3)	2017/05/18					<0.5	mg/L	NC	20
8633657	Alkalinity (Total as CaCO3)	2017/05/18	105	80 - 120	85	80 - 120	<0.5	mg/L	6.1	20
8633657	Bicarbonate (HCO3)	2017/05/18					<0.5	mg/L	6.1	20
8633657	Carbonate (CO3)	2017/05/18					<0.5	mg/L	NC	20
8633657	Hydroxide (OH)	2017/05/18					<0.5	mg/L	NC	20
8633658	pH	2017/05/18			99	96 - 104				
8633659	Conductivity	2017/05/18			103	90 - 110	1,RDL=1	uS/cm		
8636156	E. coli	2017/05/18							NC	N/A
8636156	Total Coliforms	2017/05/18							NC	N/A
8636708	Nitrate plus Nitrite (N)	2017/05/19	103	80 - 120	108	80 - 120	<0.020	mg/L	NC	25
8636709	Nitrite (N)	2017/05/19	101	80 - 120	106	80 - 120	<0.0050	mg/L	NC	20
8637248	Fluoride (F)	2017/05/23	106	80 - 120	102	80 - 120	<0.010	mg/L	17	20
8637618	Dissolved Chloride (Cl)	2017/05/19	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.032	20
8637621	Dissolved Sulphate (SO4)	2017/05/19	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.32	20
8638317	Total Aluminum (Al)	2017/05/23	114	80 - 120	117	80 - 120	<3.0	ug/L	NC	20
8638317	Total Antimony (Sb)	2017/05/23	102	80 - 120	100	80 - 120	<0.50	ug/L	NC	20
8638317	Total Arsenic (As)	2017/05/23	104	80 - 120	102	80 - 120	<0.10	ug/L	3.2	20
8638317	Total Barium (Ba)	2017/05/23	98	80 - 120	99	80 - 120	<1.0	ug/L	0.86	20
8638317	Total Beryllium (Be)	2017/05/23	101	80 - 120	100	80 - 120	<0.10	ug/L	NC	20
8638317	Total Bismuth (Bi)	2017/05/23	99	80 - 120	103	80 - 120	<1.0	ug/L	NC	20
8638317	Total Boron (B)	2017/05/23	95	80 - 120	94	80 - 120	<50	ug/L	NC	20
8638317	Total Cadmium (Cd)	2017/05/23	100	80 - 120	101	80 - 120	<0.010	ug/L	NC	20
8638317	Total Chromium (Cr)	2017/05/23	96	80 - 120	98	80 - 120	<1.0	ug/L	NC	20
8638317	Total Cobalt (Co)	2017/05/23	95	80 - 120	95	80 - 120	<0.20	ug/L	NC	20
8638317	Total Copper (Cu)	2017/05/23	NC	80 - 120	96	80 - 120	<0.20	ug/L	1.4	20
8638317	Total Iron (Fe)	2017/05/23	113	80 - 120	111	80 - 120	<5.0	ug/L	1.8	20
8638317	Total Lead (Pb)	2017/05/23	98	80 - 120	102	80 - 120	<0.20	ug/L	3.0	20
8638317	Total Manganese (Mn)	2017/05/23	98	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
8638317	Total Molybdenum (Mo)	2017/05/23	101	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
8638317	Total Nickel (Ni)	2017/05/23	94	80 - 120	96	80 - 120	<1.0	ug/L	NC	20
8638317	Total Selenium (Se)	2017/05/23	103	80 - 120	99	80 - 120	<0.10	ug/L	4.2	20
8638317	Total Silicon (Si)	2017/05/23					<100	ug/L	0.92	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8638317	Total Silver (Ag)	2017/05/23	104	80 - 120	104	80 - 120	<0.020	ug/L	NC	20
8638317	Total Strontium (Sr)	2017/05/23	NC	80 - 120	97	80 - 120	<1.0	ug/L	0.22	20
8638317	Total Thallium (Tl)	2017/05/23	99	80 - 120	102	80 - 120	<0.010	ug/L	NC	20
8638317	Total Tin (Sn)	2017/05/23	100	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
8638317	Total Titanium (Ti)	2017/05/23	108	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
8638317	Total Uranium (U)	2017/05/23	98	80 - 120	97	80 - 120	<0.10	ug/L	NC	20
8638317	Total Vanadium (V)	2017/05/23	97	80 - 120	94	80 - 120	<5.0	ug/L	NC	20
8638317	Total Zinc (Zn)	2017/05/23	102	80 - 120	100	80 - 120	<5.0	ug/L	NC	20
8638317	Total Zirconium (Zr)	2017/05/23					<0.10	ug/L	NC	20
8638482	Turbidity	2017/05/20			100	80 - 120	<0.1	NTU	6.9	20
8638502	True Colour	2017/05/19			94	80 - 120	<5	Col. Unit	NC	10
8639166	Total Mercury (Hg)	2017/05/24	92	80 - 120	96	80 - 120	<0.010	ug/L	NC	20
8640667	Total Dissolved Solids	2017/05/26			99	80 - 120	<10	mg/L	9.5	20

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).

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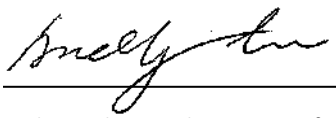
Maxxam Job #: B737909
Report Date: 2017/05/26

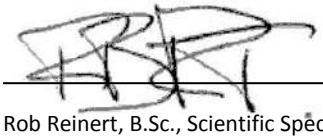
Hy-Geo Consulting

VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist



Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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WI 009327

Maxxam
A Bureau Veritas Group Company

Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Ph: (250) 385-6112 Toll Free: (866) 386-6112
Courtenay: 2755 B Moray Ave, Courtenay, BC V9N 6M9 Ph: (250) 339-7788 Toll Free: (800) 665-8566

Maxxam Job #: B737909

Company: HY-GEO CONSULTING
Contact Name: AL KOHUT
Mailing Address: 1041 LABURNUM RD
VICTORIA, BC V8Z 2M9
Phone #: 250 744 7859
E-mail apkohut@telus.net
After Hours Contact #: 250 744 7859

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.

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

Please note your invoice may be subject to a $60 minimum bill.

Payment Received: Yes ☐ **No** ☐

☑ Regular Turnaround Time (TAT) (5 days for most tests)
☐ **RUSH** Please contact the lab **Surcharges will be applied**
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)	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			Report Drinking Water Criteria DWG14
				PLEASE CIRCLE				ANALYSIS REQUESTED PLEASE SELECT BELOW						
1	WELL S.S. BOOTH PROJECT	WELL	2017/5/17 10:10	(Y) (N)	(Y) (N)	(Y) (N)	(Y) (N)	✓		✓	✓			X
2				Y N	Y N	Y N	Y N							X
3				Y N	Y N	Y N	Y N							X
4				Y N	Y N	Y N	Y N							X
5				Y N	Y N	Y N	Y N							X

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.

DON'T:

Don't rinse or boil any bottle you receive from the lab.

Don't let the sample sit out overnight, please refrigerate.

Don't freeze the sample.

Sample Transportation & Delivery

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

   Overnight shipping: If you ship a sample on the same day that it was collected you can use an overnight courier.

   Same day shipping: Available from Ken's Transfer, Ace Courier, and Greyhound (Courtenay only). Please contact the lab for details.

Print name and sign	Date (yy/mm/dd):	Time (24 hr):	Print name and sign	Date (yy/mm/dd):	Time (24hr):	Time Sensitive	Laboratory Use Only			
*Relinquished By: AL KOHUT	2017/5/17	12:58	Received by: KWOSAN-GRAY	2017/05/17	12:58	☐	Temperature on Receipt (°C) A) 10 B) 12 C) 12	Custody Seal Present?	Yes ☐	No ☐	N/A ✓
							Just sampled & rec'd on ice: ✓	Intact?	☐	☐	✓

For further information and resources on result interpretation, please visit our Drinking Water Resource Center:
http://maxxam.ca/maxxams-resource-centre-for-drinking-water-testing

BBY FCD-00189/2

Your C.O.C. #: WI009152

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/06/06
Report #: R2392902
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B741152
Received: 2017/05/29, 08:35

Sample Matrix: DRINKING WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	1	2017/05/30	2017/05/30	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	1	N/A	2017/05/31	BBY6SOP-00011	SM 22 4500-Cl- E m
True Colour (Single Wavelength) (1)	1	N/A	2017/06/01	VIC SOP-00010	SM 22 2120 C m
Conductance - water (1)	1	N/A	2017/05/30	BBY6SOP-00026	SM-2510B
Fluoride	1	N/A	2017/05/31	BBY6SOP-00048	SM 22 4500-F C m
Iron Bacteria (1)	1	N/A	2017/05/29	VIC SOP-00114	SM 22 9240 m
Hardness Total (calculated as CaCO3)	1	N/A	2017/06/01	BBY WI-00033	Auto Calc
Mercury (Total) by CVAF	1	2017/06/01	2017/06/01	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Heterotropic Plate Count Water Mem. Filt (1)	1	N/A	2017/05/29	BBY4 SOP-00003	Based on SM-9215
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/06/01	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by CRC ICPMS (total)	1	N/A	2017/05/31	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Nitrogen (Total)	1	2017/06/01	2017/06/01	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2017/06/02	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate + Nitrite (N)	1	N/A	2017/05/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2017/05/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2017/05/31	BBY6SOP-00010	SM 22 4500-NO3 I m
Nitrogen (Organic) (Cal. TKN, NH4,N/N)	1	N/A	2017/06/05	BBY WI-00033	Auto Calc
pH Water (1, 2)	1	N/A	2017/05/30	BBY6SOP-00026	SM-4500H+B
Sat. pH and Langelier Index (@ 4.4C)	1	N/A	2017/06/01	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C)	1	N/A	2017/06/01	BBY WI-00033	Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2017/05/31	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate Reducing Bacteria (1)	1	N/A	2017/06/02	VIC SOP-00114	SM 22 9240 m
Sulphide - total	1	N/A	2017/06/02	BBY6SOP-00006	SM 22 4500-S2- D m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2017/05/31	VIC SOP-00008	Based on SM 2540C
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2017/05/29	VIC SOP 00112	Based on SM-9222
Carbon (Total Organic) (3)	1	N/A	2017/05/31	BBY6SOP-00003	SM 22 5310 C m
Turbidity (1)	1	N/A	2017/06/01	VIC SOP-00011	SM 22 2130B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Your C.O.C. #: WI009152

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/06/06
Report #: R2392902
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B741152
Received: 2017/05/29, 08:35

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

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.
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 Maxxam Victoria
(2) The BC-MOE and APHA Standard Method require 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 BC-MOE/APHA Standard Method holding time.
(3) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID					RD6062		
Sampling Date					2017/05/28 10:10		
COC Number					WI009152		
	UNITS	MAC	AO	OG	BOOTH WELL	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	<0.0050	0.0050	8646944
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	45.1	0.50	8643885
Nitrate (N)	mg/L	10	-	-	<0.020	0.020	8644321
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.170	0.010	8649169
Alkalinity (Total as CaCO3)	mg/L	-	-	-	109	0.5	8644995
Total Organic Carbon (C)	mg/L	-	-	-	5.83	0.50	8647623
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	8644995
Bicarbonate (HCO3)	mg/L	-	-	-	133	0.5	8644995
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	8644995
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	8644995
Anions							
Dissolved Sulphate (SO4)	mg/L	-	500	-	25.1	0.50	8648221
Dissolved Chloride (Cl)	mg/L	-	250	-	47	0.50	8648215
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	**28 (1)**	5	8650085
Nutrients							
Total Organic Nitrogen (N)	mg/L	-	-	-	0.386	0.020	8644393
Total Ammonia (N)	mg/L	-	-	-	0.11	0.0050	8652414
Nitrate plus Nitrite (N)	mg/L	-	-	-	<0.020	0.020	8646943
Total Nitrogen (N)	mg/L	-	-	-	0.495	0.020	8648336
Physical Properties							
Conductivity	uS/cm	-	-	-	419	1	8644994
pH	pH	-	7.0 : 10.5	-	7.5		8644993
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	263	10	8645840
Turbidity	NTU	see remark	see remark	see remark	2.5	0.1	8650554

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
(1) Sample ran past hold time

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Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

MERCURY BY COLD VAPOR (DRINKING WATER)

Maxxam ID			RD6062		
Sampling Date			2017/05/28 10:10		
COC Number			WI009152		
	UNITS	**MAC**	**BOOTH WELL**	**RDL**	**QC Batch**
Elements					
Total Mercury (Hg)	ug/L	1	<0.010	0.010	8648619

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID					RD6062		
Sampling Date					2017/05/28 10:10		
COC Number					WI009152		
	UNITS	MAC	AO	OG	BOOTH WELL	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	**104**	3.0	8646982
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	8646982
Total Arsenic (As)	ug/L	10	-	-	5.17	0.10	8646982
Total Barium (Ba)	ug/L	1000	-	-	17.7	1.0	8646982
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	8646982
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	8646982
Total Boron (B)	ug/L	5000	-	-	51	50	8646982
Total Cadmium (Cd)	ug/L	5	-	-	<0.010	0.010	8646982
Total Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	8646982
Total Cobalt (Co)	ug/L	-	-	-	<0.20	0.20	8646982
Total Copper (Cu)	ug/L	-	1000	-	0.90	0.20	8646982
Total Iron (Fe)	ug/L	-	300	-	**650**	5.0	8646982
Total Lead (Pb)	ug/L	10	-	-	<0.20	0.20	8646982
Total Manganese (Mn)	ug/L	-	50	-	**377**	1.0	8646982
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	8646982
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	8646982
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	8646982
Total Silicon (Si)	ug/L	-	-	-	5290	100	8646982
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	8646982
Total Strontium (Sr)	ug/L	-	-	-	304	1.0	8646982
Total Thallium (Tl)	ug/L	-	-	-	<0.010	0.010	8646982
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	8646982
Total Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	8646982
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	8646982
Total Vanadium (V)	ug/L	-	-	-	<5.0	5.0	8646982
Total Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	8646982
Total Zirconium (Zr)	ug/L	-	-	-	0.15	0.10	8646982
Total Calcium (Ca)	mg/L	-	-	-	13.6	0.050	8644320
Total Magnesium (Mg)	mg/L	-	-	-	2.73	0.050	8644320
Total Potassium (K)	mg/L	-	-	-	0.850	0.050	8644320
Total Sodium (Na)	mg/L	-	200	-	73.2	0.050	8644320
Total Sulphur (S)	mg/L	-	-	-	8.9	3.0	8644320

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

MICROBIOLOGY (DRINKING WATER)

Maxxam ID			RD6062		
Sampling Date			2017/05/28 10:10		
COC Number			WI009152		
	UNITS	**MAC**	**BOOTH WELL**	**RDL**	**QC Batch**
Microbiological Param.					
Heterotrophic Plate Count	CFU/mL	-	26	1	8647528
Iron Bacteria	CFU/mL	-	2200	25	8653651
Sulphate reducing bacteria	CFU/mL	-	27000	75	8653652
Total Coliforms	CFU/100mL	0	**210**	N/A	8646285
E. coli	CFU/100mL	0	0	N/A	8646285

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

CALCULATED PARAMETERS (DRINKING WATER)

Maxxam ID		RD6062	
Sampling Date		2017/05/28 10:10	
COC Number		WI009152	
	UNITS	BOOTH WELL	QC Batch
Parameter			
Langelier Index (@ 4.4C)	N/A	-1.26	8644396
Langelier Index (@ 60C)	N/A	-0.219	8644397
Saturation pH (@ 4.4C)	N/A	8.77	8644396
Saturation pH (@ 60C)	N/A	7.73	8644397

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Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

MISCELLANEOUS (DRINKING WATER)

Maxxam ID			RD6062		
Sampling Date			2017/05/28 10:10		
COC Number			WI009152		
	UNITS	AO	BOOTH WELL	RDL	QC Batch
MISCELLANEOUS					
Total Sulphide	mg/L	0.05	**0.165**	0.0050	8649919

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.0°C

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, February 2017.

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.

Results relate only to the items tested.

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Maxxam Job #: B741152
Report Date: 2017/06/06

QUALITY ASSURANCE REPORT

Hy-Geo Consulting

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8644993	pH	2017/05/30			100	96 - 104			0.26	N/A
8644994	Conductivity	2017/05/30			102	90 - 110	<1	uS/cm	0.12	20
8644995	Alkalinity (PP as CaCO3)	2017/05/30	4.4	N/A			<0.5	mg/L	NC	20
8644995	Alkalinity (Total as CaCO3)	2017/05/30	NC	80 - 120	91	80 - 120	<0.5	mg/L	0.39	20
8644995	Bicarbonate (HCO3)	2017/05/30					<0.5	mg/L	0.39	20
8644995	Carbonate (CO3)	2017/05/30					<0.5	mg/L	NC	20
8644995	Hydroxide (OH)	2017/05/30					<0.5	mg/L	NC	20
8645840	Total Dissolved Solids	2017/05/31			98	80 - 120	12, RDL=10	mg/L	NC	20
8646285	E. coli	2017/05/29							NC	N/A
8646285	Total Coliforms	2017/05/29							NC	N/A
8646943	Nitrate plus Nitrite (N)	2017/05/30	109	80 - 120	106	80 - 120	<0.020	mg/L	NC	25
8646944	Nitrite (N)	2017/05/30	104	80 - 120	100	80 - 120	<0.0050	mg/L	NC	20
8646982	Total Aluminum (Al)	2017/05/31	107	80 - 120	104	80 - 120	<3.0	ug/L		
8646982	Total Antimony (Sb)	2017/05/31	103	80 - 120	100	80 - 120	<0.50	ug/L		
8646982	Total Arsenic (As)	2017/05/31	101	80 - 120	101	80 - 120	<0.10	ug/L		
8646982	Total Barium (Ba)	2017/05/31	102	80 - 120	100	80 - 120	<1.0	ug/L		
8646982	Total Beryllium (Be)	2017/05/31	105	80 - 120	104	80 - 120	<0.10	ug/L		
8646982	Total Bismuth (Bi)	2017/05/31	96	80 - 120	101	80 - 120	<1.0	ug/L		
8646982	Total Boron (B)	2017/05/31	99	80 - 120	96	80 - 120	<50	ug/L		
8646982	Total Cadmium (Cd)	2017/05/31	101	80 - 120	105	80 - 120	<0.010	ug/L		
8646982	Total Chromium (Cr)	2017/05/31	98	80 - 120	101	80 - 120	<1.0	ug/L		
8646982	Total Cobalt (Co)	2017/05/31	96	80 - 120	100	80 - 120	<0.20	ug/L		
8646982	Total Copper (Cu)	2017/05/31	NC	80 - 120	98	80 - 120	<0.20	ug/L		
8646982	Total Iron (Fe)	2017/05/31	101	80 - 120	104	80 - 120	<5.0	ug/L		
8646982	Total Lead (Pb)	2017/05/31	104	80 - 120	102	80 - 120	<0.20	ug/L	NC	20
8646982	Total Manganese (Mn)	2017/05/31	96	80 - 120	100	80 - 120	<1.0	ug/L		
8646982	Total Molybdenum (Mo)	2017/05/31	94	80 - 120	100	80 - 120	<1.0	ug/L		
8646982	Total Nickel (Ni)	2017/05/31	97	80 - 120	100	80 - 120	<1.0	ug/L		
8646982	Total Selenium (Se)	2017/05/31	105	80 - 120	106	80 - 120	<0.10	ug/L		
8646982	Total Silicon (Si)	2017/05/31					<100	ug/L		
8646982	Total Silver (Ag)	2017/05/31	99	80 - 120	102	80 - 120	<0.020	ug/L		
8646982	Total Strontium (Sr)	2017/05/31	NC	80 - 120	100	80 - 120	<1.0	ug/L		

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QUALITY ASSURANCE REPORT(CONT'D)

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8646982	Total Thallium (Tl)	2017/05/31	102	80 - 120	101	80 - 120	<0.010	ug/L		
8646982	Total Tin (Sn)	2017/05/31	96	80 - 120	100	80 - 120	<5.0	ug/L		
8646982	Total Titanium (Ti)	2017/05/31	94	80 - 120	99	80 - 120	<5.0	ug/L		
8646982	Total Uranium (U)	2017/05/31	105	80 - 120	104	80 - 120	<0.10	ug/L		
8646982	Total Vanadium (V)	2017/05/31	96	80 - 120	105	80 - 120	<5.0	ug/L		
8646982	Total Zinc (Zn)	2017/05/31	101	80 - 120	100	80 - 120	<5.0	ug/L		
8646982	Total Zirconium (Zr)	2017/05/31					<0.10	ug/L		
8647528	Heterotrophic Plate Count	2017/05/29							15	N/A
8647623	Total Organic Carbon (C)	2017/05/31	102	80 - 120	112	80 - 120	<0.50	mg/L	9.9	20
8648215	Dissolved Chloride (Cl)	2017/05/31	102	80 - 120	104	80 - 120	<0.50	mg/L	1.4	20
8648221	Dissolved Sulphate (SO4)	2017/05/31	100	80 - 120	102	80 - 120	<0.50	mg/L	0.59	20
8648336	Total Nitrogen (N)	2017/06/01	NC	80 - 120	104	80 - 120	<0.020	mg/L	2.3	20
8648619	Total Mercury (Hg)	2017/06/01	89	80 - 120	95	80 - 120	<0.010	ug/L	NC	20
8649169	Fluoride (F)	2017/05/31	106	80 - 120	100	80 - 120	0.012, RDL=0.010	mg/L	1.3	20
8649919	Total Sulphide	2017/06/02	84	80 - 120	95	80 - 120	<0.0050	mg/L	NC	20
8650085	True Colour	2017/06/01			91	80 - 120	<5	Col. Unit	NC	10
8650554	Turbidity	2017/06/01			98	80 - 120	<0.1	NTU	4.3	20
8652414	Total Ammonia (N)	2017/06/02	105	80 - 120	113	80 - 120	<0.0050	mg/L	7.3	20

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).

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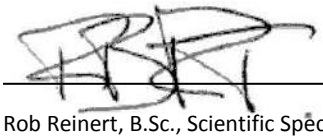
Maxxam Job #: B741152
Report Date: 2017/06/06

Hy-Geo Consulting

VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Specialist

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Maxxam
A Bureau Veritas Group Company

Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Ph: (250) 385-6112 Toll Free: (866) 385-6112
Courtenay: 2755 B Moray Ave, Courtenay, BC V9N 8M9 Ph: (250) 338-7786 Toll Free: (800) 665-8566

WI 009152

Maxxam Job #: B741152

Company: MY-GEO CONSULTING
Contact Name: AL KOHUT
Mailing Address: 1041 LABURNUM RD
VICTORIA, BC
Phone #: 250 744-7859
E-mail apkohut@telus.net

After Hours Contact #:

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

SPECIAL INSTRUCTIONS:
Return Cooler ☐ Ship Sample Bottles (please specify) ☐

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.

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

Please note your invoice may be subject to a $60 minimum bill.

Payment Received: Yes ☐ No ☐

	Sample Identification (Sample Location &/or Description)	Sample Location (eg. Tap, Wellhead)	Date/Time Sampled (24hr)	PLEASE CIRCLE: 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	ANALYSIS REQUESTED PLEASE SELECT BELOW: Drinking Water Scan	Home Safety Scan	Total Metals Scan Including Hardness & Hg	Total Coliform and E. Coli	VIHA PACKAGE		Report Drinking Water Criteria DWG14
1	BOOTH WELL	WELL	28/05/17 10:10	(Y) N	Y (N)	Y (N)	Y (N)	#1		#2	#3	✓		x
2				Y N	Y N	Y N	Y N							x
3				Y N	Y N	Y N	Y N							x
4				Y N	Y N	Y N	Y N							x
5				Y N	Y N	Y N	Y N							x

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.

DON'T:

Don't rinse or boil any bottle you receive from the lab.

Don't let the sample sit out overnight, please refrigerate.

Don't freeze the sample.

Sample Transportation & Delivery

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

   Overnight shipping: If you ship a sample on the same day that it was collected you can use an overnight courier.

   Same day shipping: Available from Ken's Transfer, Ace Courier, and Greyhound (Courtenay only). Please contact the lab for details.

Print name and sign: *Relinquished By:	Date (yy/mm/dd):	Time (24 hr):	Print name and sign: Received by:	Date (yy/mm/dd):	Time (24hr):	Time Sensitive	Laboratory Use Only: Temperature on Receipt (°C)	Custody Seal	Yes	No	N/A
A.P. Kohut	2017/05/29	8:35		2017/05/29	8:35	☐	A) 7 B) 6 C) 5	Present?	✓		☐
							Just sampled & rec'd on ice: ☐	Intact?	✓		☐

BBY FCD-00189/2

For further information and resources on result interpretation, please visit our Drinking Water Resource Center:
http://maxxam.ca/maxxams-resource-centre-for-drinking-water-testing

Your C.O.C. #: WI009332

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/01/18
Report #: R2334505
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B701774
Received: 2017/01/10, 15:22

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	1	2017/01/16	2017/01/17	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	1	N/A	2017/01/13	BBY6SOP-00011	SM 22 4500-Cl- E m
True Colour (Single Wavelength) (1)	1	N/A	2017/01/13	VIC SOP-00010	Based on SM-2120 C
Conductance - water (1)	1	N/A	2017/01/17	BBY6SOP-00026	SM-2510B
Fluoride	1	N/A	2017/01/13	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO3)	1	N/A	2017/01/16	BBY WI-00033	Auto Calc
Mercury (Total) by CVAF	1	2017/01/16	2017/01/16	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2017/01/16	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Elements by CRC ICPMS (total)	1	2017/01/13	2017/01/14	BBY7SOP-00003,	BCLM2005,EPA6020bR2m
Nitrate + Nitrite (N)	1	N/A	2017/01/12	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2017/01/12	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2017/01/13	BBY6SOP-00010	SM 22 4500-NO3 I m
pH Water (1, 2)	1	N/A	2017/01/17	BBY6SOP-00026	SM-4500H+B
Sulphate by Automated Colourimetry	1	N/A	2017/01/13	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2017/01/18	VIC SOP-00008	Based on SM 2540C
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2017/01/10	VIC SOP 00112	Based on SM-9222
Turbidity (1)	1	N/A	2017/01/12	VIC SOP-00011	Based on SM - 2130

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing.

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

Your C.O.C. #: WI009332

Attention:Al Kohut

Hy-Geo Consulting
1041 Laburnum Rd
Victoria, BC
Canada V8Z 2M9

Report Date: 2017/01/18
Report #: R2334505
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B701774
Received: 2017/01/10, 15:22

dilution methods. Results relate to samples tested.

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 Maxxam Victoria

(2) The BC-MOE and APHA Standard Method require 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 BC-MOE/APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276

==========

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Maxxam Job #: B701774
Report Date: 2017/01/18

Hy-Geo Consulting

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					QJ3623		
Sampling Date					2017/01/10 11:30		
COC Number					WI009332		
	UNITS	MAC	AO	OG	HICKEY SPRING	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	0.0136	0.0050	8526831
Calculated Parameters							
Nitrate (N)	mg/L	10	-	-	0.771	0.020	8524846
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.064	0.010	8528512
Alkalinity (Total as CaCO3)	mg/L	-	-	-	58.9	0.5	8528833
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	8528833
Bicarbonate (HCO3)	mg/L	-	-	-	71.9	0.5	8528833
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	8528833
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	8528833
Anions							
Dissolved Sulphate (SO4)	mg/L	-	500	-	13.1	0.50	8528017
Dissolved Chloride (Cl)	mg/L	-	250	-	20	0.50	8528016
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	**75**	5	8530564
Nutrients							
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.784	0.020	8526823
Physical Properties							
Conductivity	uS/cm	-	-	-	219	1	8528835
pH	pH	-	6.5:8.5	-	7.0		8528834
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	155	10	8529527
Turbidity	NTU	see remark	see remark	see remark	50.0	0.1	8528453

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B701774
Report Date: 2017/01/18

Hy-Geo Consulting

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID					QJ3623		
Sampling Date					2017/01/10 11:30		
COC Number					WI009332		
	UNITS	MAC	AO	OG	HICKEY SPRING	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	**3080**	3.0	8527018
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	8527018
Total Arsenic (As)	ug/L	10	-	-	0.65	0.10	8527018
Total Barium (Ba)	ug/L	1000	-	-	53.5	1.0	8527018
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	8527018
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	8527018
Total Boron (B)	ug/L	5000	-	-	<50	50	8527018
Total Cadmium (Cd)	ug/L	5	-	-	0.041	0.010	8527018
Total Chromium (Cr)	ug/L	50	-	-	2.9	1.0	8527018
Total Cobalt (Co)	ug/L	-	-	-	0.78	0.50	8527018
Total Copper (Cu)	ug/L	-	1000	-	7.94	0.50	8527018
Total Iron (Fe)	ug/L	-	300	-	**2470**	10	8527018
Total Lead (Pb)	ug/L	10	-	-	0.93	0.20	8527018
Total Lithium (Li)	ug/L	-	-	-	8.0	5.0	8527018
Total Manganese (Mn)	ug/L	-	50	-	**77.6**	1.0	8527018
Total Mercury (Hg)	ug/L	1	-	-	<0.050	0.050	8527018
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	8527018
Total Nickel (Ni)	ug/L	-	-	-	3.5	1.0	8527018
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	8527018
Total Silicon (Si)	ug/L	-	-	-	10500	100	8527018
Total Silver (Ag)	ug/L	-	-	-	0.030	0.020	8527018
Total Strontium (Sr)	ug/L	-	-	-	129	1.0	8527018
Total Thallium (Tl)	ug/L	-	-	-	<0.050	0.050	8527018
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	8527018
Total Titanium (Ti)	ug/L	-	-	-	104	5.0	8527018
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	8527018
Total Vanadium (V)	ug/L	-	-	-	5.0	5.0	8527018
Total Zinc (Zn)	ug/L	-	5000	-	12.4	5.0	8527018
Total Zirconium (Zr)	ug/L	-	-	-	0.50	0.50	8527018

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B701774
Report Date: 2017/01/18

Hy-Geo Consulting

MICROBIOLOGY (WATER)

Maxxam ID			QJ3623		
Sampling Date			2017/01/10 11:30		
COC Number			WI009332		
	UNITS	MAC	HICKEY SPRING	RDL	QC Batch
Microbiological Param.					
Total Coliforms	CFU/100mL	<1	SEE NOTE (1)	1	8525879
E. coli	CFU/100mL	<1	87	1	8525879

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

(1) Due to confluent growth a calculated estimate of >2800 is given.

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Maxxam Job #: B701774
Report Date: 2017/01/18

Hy-Geo Consulting

TOT. METALS W/ CV HG FOR DRINKING WATER (WATER)

Maxxam ID				QJ3623		
Sampling Date				2017/01/10 11:30		
COC Number				WI009332		
	UNITS	MAC	AO	HICKEY SPRING	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO3)	mg/L	-	-	71.9	0.50	8524840
Elements						
Total Mercury (Hg)	ug/L	1	-	<0.010	0.010	8528115
Total Metals by ICPMS						
Total Calcium (Ca)	mg/L	-	-	20.0	0.050	8524841
Total Magnesium (Mg)	mg/L	-	-	5.33	0.050	8524841
Total Potassium (K)	mg/L	-	-	1.76	0.050	8524841
Total Sodium (Na)	mg/L	-	200	17.2	0.050	8524841
Total Sulphur (S)	mg/L	-	-	4.7	3.0	8524841

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.7°C

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, October 2014.

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.

Results relate only to the items tested.

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Maxxam Job #: B701774
Report Date: 2017/01/18

QUALITY ASSURANCE REPORT

Hy-Geo Consulting

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8526823	Nitrate plus Nitrite (N)	2017/01/12	104	80 - 120	107	80 - 120	<0.020	mg/L	NC	25
8526831	Nitrite (N)	2017/01/12	98	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20
8527018	Total Aluminum (Al)	2017/01/13	NC	80 - 120	110	80 - 120	<3.0	ug/L		
8527018	Total Antimony (Sb)	2017/01/13	98	80 - 120	103	80 - 120	<0.50	ug/L		
8527018	Total Arsenic (As)	2017/01/13	101	80 - 120	107	80 - 120	<0.10	ug/L		
8527018	Total Barium (Ba)	2017/01/13	95	80 - 120	99	80 - 120	<1.0	ug/L		
8527018	Total Beryllium (Be)	2017/01/13	103	80 - 120	108	80 - 120	<0.10	ug/L		
8527018	Total Bismuth (Bi)	2017/01/13	98	80 - 120	94	80 - 120	<1.0	ug/L		
8527018	Total Boron (B)	2017/01/13	98	80 - 120	102	80 - 120	<50	ug/L		
8527018	Total Cadmium (Cd)	2017/01/13	98	80 - 120	108	80 - 120	<0.010	ug/L		
8527018	Total Chromium (Cr)	2017/01/13	101	80 - 120	100	80 - 120	<1.0	ug/L		
8527018	Total Cobalt (Co)	2017/01/13	103	80 - 120	105	80 - 120	<0.50	ug/L		
8527018	Total Copper (Cu)	2017/01/13	NC	80 - 120	106	80 - 120	<0.50	ug/L		
8527018	Total Iron (Fe)	2017/01/13	NC	80 - 120	108	80 - 120	<10	ug/L		
8527018	Total Lead (Pb)	2017/01/13	NC	80 - 120	97	80 - 120	<0.20	ug/L	5.1	20
8527018	Total Lithium (Li)	2017/01/13	98	80 - 120	104	80 - 120	<5.0	ug/L		
8527018	Total Manganese (Mn)	2017/01/13	NC	80 - 120	101	80 - 120	<1.0	ug/L		
8527018	Total Mercury (Hg)	2017/01/13	100	80 - 120	107	80 - 120	<0.050	ug/L		
8527018	Total Molybdenum (Mo)	2017/01/13	105	80 - 120	110	80 - 120	<1.0	ug/L		
8527018	Total Nickel (Ni)	2017/01/13	106	80 - 120	107	80 - 120	<1.0	ug/L		
8527018	Total Selenium (Se)	2017/01/13	103	80 - 120	113	80 - 120	<0.10	ug/L		
8527018	Total Silicon (Si)	2017/01/13					<100	ug/L		
8527018	Total Silver (Ag)	2017/01/13	102	80 - 120	109	80 - 120	<0.020	ug/L		
8527018	Total Strontium (Sr)	2017/01/13	NC	80 - 120	97	80 - 120	<1.0	ug/L		
8527018	Total Thallium (Tl)	2017/01/13	100	80 - 120	101	80 - 120	<0.050	ug/L		
8527018	Total Tin (Sn)	2017/01/13	NC	80 - 120	98	80 - 120	<5.0	ug/L		
8527018	Total Titanium (Ti)	2017/01/13	106	80 - 120	99	80 - 120	<5.0	ug/L		
8527018	Total Uranium (U)	2017/01/13	98	80 - 120	96	80 - 120	<0.10	ug/L		
8527018	Total Vanadium (V)	2017/01/13	102	80 - 120	105	80 - 120	<5.0	ug/L		
8527018	Total Zinc (Zn)	2017/01/13	NC	80 - 120	113	80 - 120	<5.0	ug/L		
8527018	Total Zirconium (Zr)	2017/01/13					<0.50	ug/L		
8528016	Dissolved Chloride (Cl)	2017/01/13	NC	80 - 120	103	80 - 120	<0.50	mg/L	0.46	20

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QUALITY ASSURANCE REPORT(CONT'D)

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8528017	Dissolved Sulphate (SO4)	2017/01/13			102	80 - 120	0.64, RDL=0.50	mg/L	0.14	20
8528115	Total Mercury (Hg)	2017/01/16	91	80 - 120	96	80 - 120	<0.010	ug/L	NC	20
8528453	Turbidity	2017/01/12			95	80 - 120	<0.1	NTU	NC	20
8528512	Fluoride (F)	2017/01/13	98	80 - 120	98	80 - 120	0.011, RDL=0.010	mg/L	0	20
8528833	Alkalinity (PP as CaCO3)	2017/01/17	0	N/A			<0.5	mg/L	NC	20
8528833	Alkalinity (Total as CaCO3)	2017/01/17	NC	80 - 120	92	80 - 120	<0.5	mg/L	2.5	20
8528833	Bicarbonate (HCO3)	2017/01/17					<0.5	mg/L	2.5	20
8528833	Carbonate (CO3)	2017/01/17					<0.5	mg/L	NC	20
8528833	Hydroxide (OH)	2017/01/17					<0.5	mg/L	NC	20
8528834	pH	2017/01/17			101	96 - 104			0.29	N/A
8528835	Conductivity	2017/01/17			105	90 - 110	1,RDL=1	uS/cm	0.46	20
8529527	Total Dissolved Solids	2017/01/18			82	80 - 120	<10	mg/L	NC	20
8530564	True Colour	2017/01/13			93	80 - 120	<5	Col. Unit	0	10

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

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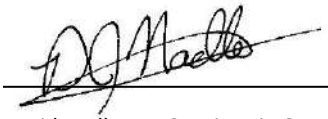
Maxxam Job #: B701774
Report Date: 2017/01/18

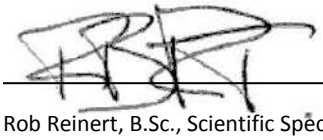
Hy-Geo Consulting

VALIDATION SIGNATURE PAGE

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



David Nadler, AASc, Victoria Operations Manager



Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam
A Bureau Veritas Group Company

Victoria: 460 Tennyson Place, Unit 1, Victoria, BC V8Z 6S8 Ph: (250) 385-6112 Toll Free: (866) 385-6112
Courtenay: 2755 E Moray Ave, Courtenay, BC V9N 8M9 Ph: (250) 338-7786 Toll Free: (800) 665-8566

WI 009332

Maxxam Job #: B701774

Company: HY-GEO CONSULTING
Contact Name: AL KOHUT
Mailing Address: 1041 LABURNUM RD
VICTORIA, BC V8Z 2M9
Phone #: 250 744-7859
E-mail: apkohut@telus.net
After Hours Contact #: 250 477 3418

☑ Regular Turnaround Time (TAT) (5 days for most tests) ☐ **RUSH** Please contact the lab **Surcharges will be applied**
Date Required:

SPECIAL INSTRUCTIONS:
Return Cooler ☐ **Ship Sample Bottles (please specify)** ☐

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.

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

Please note your invoice may be subject to a $60 minimum bill.

Payment Received: Yes ☐ **No** ☐

	Sample Identification (Sample Location &/or Description)	Sample Location (eg. Tap, Wellhead)	Date/Time Sampled (24hr)	PLEASE CIRCLE: 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	ANALYSIS REQUESTED PLEASE SELECT BELOW: Drinking Water Scan	Home Safety Scan	Total Metals Scan including Hardness & Hg	Total Coliform and E. Coli			Report Drinking Water Criteria DWG14
1	HICKEY SPRING	SPRING	2017/01/10 11:30AM	Y (N)	Y (N)	Y (N)	Y (N)	✓		4	4			x
2				Y N	Y N	Y N	Y N							x
3				Y N	Y N	Y N	Y N							x
4				Y N	Y N	Y N	Y N							x
5				Y N	Y N	Y N	Y N							x

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.

DON'T:

Don't rinse or boil any bottle you receive from the lab.

Don't let the sample sit out overnight, please refrigerate.

Don't freeze the sample.

Sample Transportation & Delivery

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

   Overnight shipping: If you ship a sample on the same day that it was collected you can use an overnight courier.

   Same day shipping: Available from Ken's Transfer, Ace Courier, and Greyhound (Courtenay only). Please contact the lab for details.

Print name and sign *Relinquished By:	Date (yy/mm/dd):	Time (24 hr):	Print name and sign Received by:	Date (yy/mm/dd):	Time (24hr):	Time Sensitive	Laboratory Use Only: Temperature on Receipt (°C)	Custody Seal	Yes	No	N/A
A.P. Kohut	2017/01/10	1622	J. Williamson	17/01/10	1520	☐	A) 8 B) 8 C) 10 Just sampled & rec'd on ice: ☐	Present?			
								Intact? N/A			

BBY FCD-00189/2

For further information and resources on result interpretation, please visit our Drinking Water Resource Center:
http://maxxam.ca/maxxams-resource-centre-for-drinking-water-testing

APPENDIX H

Photo 1. Swanson's Pond looking northwesterly, May 6, 2017.

Photo 2. Swanson's Pond looking northerly, May 28, 2017.

Photo 3. Swanson's Pond looking northwesterly, June 27, 2017.

Hy-Geo Consulting
www.hy-geo.com
Tel: (250) 744-7859 Victoria, British Columbia Canada V8Z 2M9

Appendix 5

File: 1609291

September 22, 2018

Salt Spring Ventures Inc
109 Frazier Rd
Salt Spring Island BC
Canada V8K 2B5

Attention: Eric Booth

Re: Report on Ground Water Supply for Lot 10, Section 2, Range 3 East, North Salt Spring Island

As requested I have reviewed the questions and data requests sent to you by Cali Melnechenko of FLNR as per her e-mail of September 11, 2018. Following are answers to the questions contained in the above e-mail. Data files where requested, have also been listed and attached separately. I have restated the questions in italics and provided answers as follows:

(a) What was the rational for calculation of the available drawdown reported on p.24 i.e. was this calculated as the difference between the static water level and the top of the pump or some other methodology?

Available drawdown was calculated as the difference between the static water level at the start of the test and assumed maximum depth of the major water- bearing fracture in the well at a depth of 40 feet (12.19m). The available drawdown on p.24 of the report was reported in error and the corrected version should now read "At a pumping rate of 28.8 L/min (7.6 USgpm), close to 97 percent of the available drawdown of approximately 9.78 m (32.1 feet) in the well would be utilized after 100 days." This error, however, does not change the conclusion that, "Operating at 28.2 L/min (7.6 USgpm) would not allow for a sufficient safety factor to be maintained in the well."

(b) Were seasonal effects on static water level taken into account when estimating safe available drawdown e.g. available drawdown of 11.28 m reported on p. 21 (for 11.3 day test), was the same as reported on p. 24 for the 27 day test. Was the static water level consistent on both of these days? What is the estimated seasonal fluctuation in water levels in the well and aquifer in this area? Do you have monitoring data or hydrographs for the subject well that could be provided?

Static water levels were not consistent between the tests and not properly accounted for due to transcription errors. In the case of the 11.3 day test, the available drawdown on p. 21 should now read "At a pumping rate of 28.8 L/min (7.6 USgpm), close to 44 percent of the available drawdown of approximately 10.07 m (33 feet) in the well would be utilized after 100 days but still maintaining a significant safety factor."

The estimated natural seasonal fluctuations in water levels in the well are estimated to range from 1 to 2.5 m based on reported water levels of 3.05 m (10 feet) in September 2008 when the well was drilled and January 2017 when it was measured at 0.69 m (2.26 feet) below ground. Levels at the well are dependent upon water levels of the pond and vice versa.

(c) Please provide tabulated data in MS Excel for May 2017 and June-July 2017 pumping tests, including recovery data for both the well and the pond.

See MS Excel files attached separately:

(i) May2017WellDataextract.xls
(ii) June_July2017WellDataextract.xls
(iii) Well_May6_May28_2017.xls
(iv) Pond_May6_May28_2017.xls
(v) Well_June1_July6_2017.xls
(vi) Pond_June_July_2017.xls

(d) What was the transmissivity for the aquifer estimated from the May and June-July 2017 tests?

Transmissivity values for the aquifer were not determined as it was felt that any values estimated would not be entirely meaningful due to the close proximity of the pond which supplies a significant portion of the water pumped from the well.

(e) What is the distance between the well and the pond? What are the approximate dimensions of the pond (length, width) and/or what is the estimated volume of the pond at full capacity?

As reported on page 14 of the report, " The well is situated approximately 5.3 to 7.0 m (17.5 to 23.0 feet) away from the edge of Swanson's Pond, depending upon the water level in the pond."

The dimensions of the pond vary seasonally and from year to year. Available photographs (Figures 1 and 2) of the pond surface between 2010 and 2017 indicate surface water areas ranging from 570 to 1500 m^2. Estimated pond surface areas and approximate width and length dimensions are provided in Table 1. As stated on page 29 of the report, "Without a detailed topographic survey of the pond, an accurate determination of the pond area and available water at various water levels is not currently possible." Based on an assumed average depth of say 1.52m (5 feet) at full capacity during the winter months, the minimum estimated volume of the pond would be 2280 m^3 assuming an area of 1500 m^2.

Table 1. Pond size estimates.

Date	Estimated Pond Surface Area (m^2)	Maximum Central Width (m)	Maximum Central Length (m)
September 2, 2010	835	17	58
May 12, 2012	908	17	60
July 13, 2012	926	17	62
Late summer 2013*	924	19	56
November 29, 2014	1510	22	73
June 7, 2015	934	18	61
March 31, 2016	1435	24	73
August 18, 2016	729	13	57
Spring 2017*	740	15	57
July 31, 2017	569	11	55

Data measured from Google Earth Pro images and *CRD (2018).
Note: Estimates are approximate only and dependent upon image clarity, irregular pond shape and variations in locations of measuring points.

Figure 1. Pond surface images from Google Earth Pro application and CRD (2018) for period Sept. 2010 to June 2015.

Figure 2. Pond surface images from Google Earth Pro application and CRD (2018) for period March 2016 to July 31 2017.

(f) What is the proportion of pond annual recharge that is thought to be obtained from groundwater, compared to overland flow and precipitation on the pond surface?

Available evidence from air photographic imagery and water level monitoring indicates that the water levels of the pond and groundwater levels are interdependent. During the late fall-winter recharge period, pond recharge likely results from a rising groundwater level and influx of precipitation and some overland flow. Direct precipitation over the pond basin during the 4 month period (November-February inclusive) for example, would amount to 582.8 mm (1.9 feet) based on the 1981-2010 climate normals for the St. Mary's Lake climate station, ID: 1016995 (Government of Canada, 2018). This direct precipitation amount would be equivalent to 38% of the full pond volume assuming an average pond depth of 1.52 m (5 feet) during the winter months. Overland flow is likely much less than this amount as the pond is bermed in places to prevent direct surface water flow from adjacent drainage ditches into the pond.

(g) What is the estimated volume of water that would be utilized from the pond based on the recommended long-term capacity, and pumping of the well for dry season, assuming minimal rainfall contributing to rainfall during the period of June- August annually?

When the pond was pumped in February 2017 for 8 hours the pond level dropped 6.6 cm with 36,000 USgals removed or 5455 gals/cm drop in pond level. If there was no groundwater inflow to the pond during this time the area of the pond would needed to be close to 2065 m^2. Since the pond area in early 2017 would have been closer to 740 m^2 this suggests that groundwater inflows contributed perhaps two thirds of the pumping discharge from the pond. On the other hand, extended testing of the well for 27.3 days at a rate of 7.6 USgpm in June 2017 indicated that the pond may have contributed up to 59 percent of the well flow. Based on this evidence, utilizing the well at a maximum pumping rate of 3.5 USgpm during the dry season suggests that perhaps somewhat less than 59 percent of this flow rate may be supported by the pond. These estimates would need to be confirmed with long-term water level monitoring measurements on the pond and the well. In summary, for the three month dry period, June-August (92 days), the volume pumped from the well at 3.5 USgpm would amount to 463,680 USgals (1755 m^3) with 273,571 USgals (1036 m^3) potentially derived from the pond.

(h) What are the anticipated interference effects on adjacent wells as a result of Well ID25502 pumping (distance-drawdown estimation)?

The nearest reported wells WTN 69851 and WTN 97635 are situated some 330 m northwest of Well ID25502 (Ministry of Environment, 2018). The next nearest well, WTN 81047 is situated 390 m to the southeast. Due to the interrelationship between the pond and Well ID25502, anticipated interference effects on these neighbouring wells is considered remote.

(i) Is there fish or other aquatic life in the pond that would require a minimum water depth to be maintained?

The pond is a man-made feature and not known to contain any native fish species requiring maintenance of minimum water depths.

Respectfully submitted,

Alan P. Kohut PEng
Principal and Senior Hydrogeologist

HY-GEO CONSULTING

References:

CRD. 2018. *Capital Regional District Webmap*. Internet website https://maps.crd.bc.ca/Html5Viewer/?viewer=public

Government of Canada. 2018. *Historic Climate Data*. Internet website http://climate.weather.gc.ca/index_e.html

Ministry of Environment. 2018. *British Columbia Water Resources Atlas*. Internet website http://maps.gov.bc.ca/ess/hm/wrbc/

Appendix 6

ISLAND WATERWORKS Ltd.

Design Proposal

Date: August 19, 2019

Project: Lot 10, Plan 14710, Section 2, Range 3 East
North Salt Spring Island, Cowichan District

Prepared For: Salt Spring Ventures Inc.
c/o Eric Booth

Salt Spring Ventures Inc. has requested Island Waterworks Ltd. design a treatment system capable of providing potable water for a residential housing development situated on Lot 10 as per Canadian Drinking Water Guidelines, Drinking Water Protection Act and the Drinking Water Protection Regulation.

The primary water source will be Well 25502 situated within Lot 10, which has a proven yield of 19,000L/day. Due to the close communication between this ground water source and Swanson's Pond, the engineered treatment system will be designed in accordance with GARP, Version 2 and The Drinking Water Objectives (Microbiological) for Surface Water Supplies, Version 1.1.

The treatment objectives as a minimum are as follows:

1. 4-log reduction or inactivation of viruses
2. 3-log reduction or inactivation of Giardia and Cryptosporidium
3. Two treatment processes designed for surface water
4. Less than or equal to one nephelometric turbidity unit
5. No detectable E. Coli, fecal coliform and total coliform

System Design Overview,

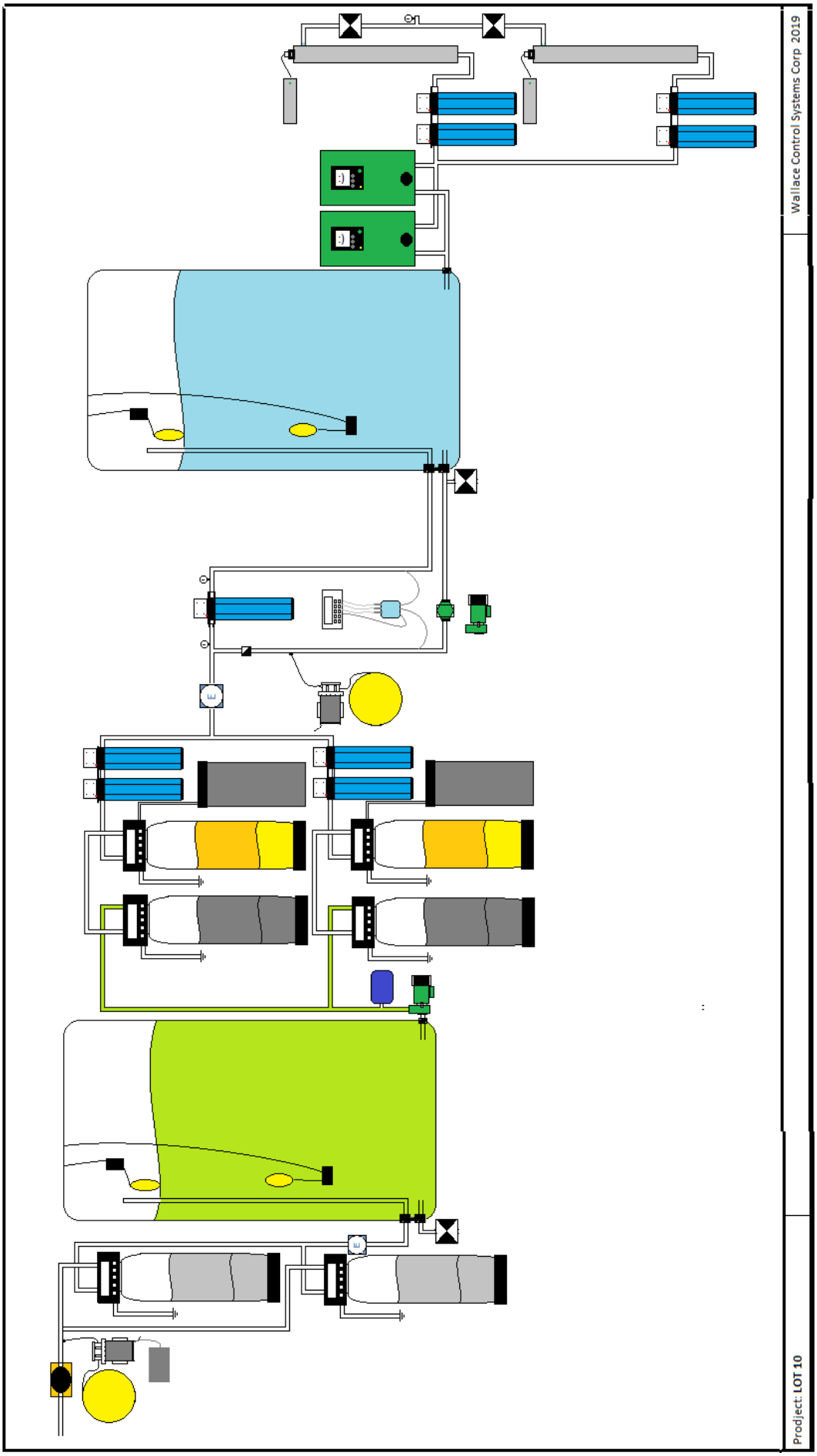
The design system will incorporate a twin holding tank strategy wherein the initial tank, 10,000 US gallons, would be automatically chlorinated to provide disinfection with additional filtration and clarification techniques.
The second product tank, 10,000 US gallons, would provide a reserve of service water which would be chlorinated with an appropriate residual chlorination target of free chorine.
The system would use NSF/CSA designated materials and in a dual capacity for a robust design redundancy.
The system will also utilize 1.0 micron absolute filtration in conjunction with NSF rated UV sterilization and will have UV intensity monitors with auto alarm solenoid shut off capability for the product water to service.

This system will meet or exceed current design and performance requirements for surface water supplies in British Columbia.

Regards,

Island Waterworks Ltd.
Harry McHugh
Chem. Eng. Tech.

Island Waterworks Ltd
6602 West Saanich Rd
Brentwood Bay, BC, V8M 1X1


Wallace Control Systems Corp 2019
Prodject: LOT 10

Appendix 7

Proposed Density vs. Available Water – Staff Comment

The applicant for SS-RZ-2013.7 contends that limiting the floor area of units will inherently reduce the number of occupants, thereby reducing the anticipated water demand. While there is a "common sense" element to this proposal, it is not consistent with the reference documents to which staff turn for guidance in such matters. Staff will concede that available reference documents that assign occupancy rates for "multi-family" dwelling units do not break that category down into unit type (eg. bachelor, one-bedroom, two-bedroom, etc). However, despite the absence of such fine-grained information, staff nonetheless rely on government or peer-reviewed publications to inform advice to the LTC, not the optimism of the applicant.

Consider the following information from government sources concerning unit occupancy:

1) In determining its water requirements, the CRD Salt Spring Island building inspector advises that the B.C. Building Code assumes an occupancy rate of two people per bedroom.

2) The British Columbia Design Guidelines for Rural Residential Community Water Systems assumes an occupancy rate of 2.5 people per multi-family dwelling unit:

> **3.1.1 Indoor Demand**
>
> MDD for Indoor Demand shall be based on a water use rate of 230 L/capita/day with the following typical occupancy rates:
>
> a) 3.5 persons per single detached dwelling and duplexes;
> b) 2.5 persons per multifamily dwelling;
> c) 4 persons per recreational property on lakes, golf courses and other recreational destinations.

3) Statistics Canada data for Salt Spring Island in 2016 shows the following mean multi-family dwelling household sizes:

- Semi-detached house -1.8
- Row house – 1.5
- Apartment or flat in a duplex – 2.0
- Apartment in a building that has fewer than five storeys – 2.0
- Moveable dwelling – 1.6

4) The Standard Practice Manual for designing sewerage systems in the province requires that systems for one-bedroom units can accommodate a flow of 700 litres per day and assumes two people per bedroom.

All of this to say that the applicant's proposed occupancy rate of 1 person per studio apartment and an average occupancy of 1.5 people per one-bedroom apartment is not consistent with available guidance.

As noted above, the applicant has received a groundwater license for 19,000 litres per day.

The applicant proposes the LTC use the 225 litres per-day per-person water use assumption contained in Island Health's Guidelines for the Approval of Water Systems. This is fairly close to the 230 litres per-day per-person

water use assumption contained in the British Columbia Design Guidelines for Rural Residential Community Water Systems.

Using the applicant's proposed occupancy rates there would be an excess of available potable water:

(24 units x 1 occupant per unit x 225 L/d = 5,400 L/d) + (24 units x 1.5 occupants per unit x 225 L/d = 8,100 L/d) **= 13,500 L/d.**

19,000 L/d - 13,500 L/d = a surplus of 5,500 L/d.

However, using the 2.5 residents per multifamily unit assumed in the British Columbia Design Guidelines for Rural Residential Community Water Systems and the 230 L/d advised in that document there is a shortfall of 8,600 litres per day:

48 units x 2.5 occupants per unit x 230 L/d = **27,600 L/d**

19,000 L/d - 27,600 = a deficit of 8,600 L/d.

Following is a calculation of how many units the proposed groundwater well could support based on the applicant's proposed occupancy scenario and then based on the provincial guidelines:

Applicant Scenario

(19,000 L/d) / (225 L/pp/d) = 84 people

(84 people) / (1.25 p/unit) = **67 units**

Provincial Guidelines

(19,000 L/d) / (225 L/pp/d) = 84 people

(84 people) / (2.5 p/unit) = **33 units**

From here it should be clear that a range of occupancy and water use assumptions will yield a range of water demand results, either more than enough, just enough, or not enough available potable water to service the proposed density. Regardless of the assumptions used, good planning practice would have land use decisions made on the knowledge that there is ample potable water to accommodate all potential occupancy scenarios in accordance with published guidelines for such. In the present situation, staff do not find this to be the case.

Appendix 8

From: Meghan McKee <meghan@nsswaterworks.ca>
Sent: Monday, February 3, 2020 4:22 PM
To: Daniela Murphy
Cc: 'Ron Stepaniuk'
Subject: FW: Water Servicing Plan Referral for Salt Spring Island Rezoning application SS-RZ-2013.7, Lot 10 Park Drive, SSI
Attachments: Response to referral for Lot 10, Park Drive.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon Daniela,

Please find attached the NSSWD's response to the Water Servicing Plan Referral for Salt Spring Island Rezoning application SS-RZ-2013.7, Lot 10 Park Drive, SSI.

Regards,

Meghan McKee, MPA, BSc
Environmental Manager

NORTH SALT SPRING WATERWORKS DISTRICT
Every Drop Counts.

761 Upper Ganges Road
Salt Spring Island, B.C. V8K 1S1
250.537.9902
www.northsaltspringwaterworks.ca

From: Ron Stepaniuk <ronstep@nsswaterworks.ca>
Sent: December-19-19 4:05 PM
To: Meghan McKee <meghan@nsswaterworks.ca>
Subject: FW: Water Servicing Plan Referral for Salt Spring Island Rezoning application SS-RZ-2013.7, Lot 10 Park Drive, SSI

From: Tandy Cudmore <tandy@nsswaterworks.ca>
Sent: 19 December 2019 15:46
To: Ron Stepaniuk <ronstep@nsswaterworks.ca>
Subject: FW: Water Servicing Plan Referral for Salt Spring Island Rezoning application SS-RZ-2013.7, Lot 10 Park Drive, SSI

From: Daniela Murphy <dmurphy@islandstrust.bc.ca>
Sent: December-19-19 3:32 PM
To: Lynne.Magee@viha.ca; BISaltspring <bisaltspring@crd.bc.ca>; Christine Condron <ccondron@crd.bc.ca>; kcampbell@crd.bc.ca; info@nsswaterworks.ca; Chris.McMillan@gov.bc.ca
Cc: Jason Youmans <jyoumans@islandstrust.bc.ca>; Salt Spring Island Local Trust Committee <SaltSpringIslandLocalTrustCommittee@islandstrust.bc.ca>; jarnet@crd.bc.ca
Subject: Water Servicing Plan Referral for Salt Spring Island Rezoning application SS-RZ-2013.7, Lot 10 Park Drive, SSI

Dear Referral Coordinator,

The Salt Spring Island Local Trust Committee (LTC) respectfully requests your review and comment on the attached document titled “Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, B.C.” from Stantec Consulting Ltd.

This report was procured by the applicant of a rezoning proposal that would increase the permitted residential density on the subject property from 33 units to 49 units.
As you will see from the report, the applicant plans to allocate residential densities on the property as follows:

- 24 studio (bachelor) apartments
- 24 one-bedroom apartments
- 1 single-family dwelling

When this matter was last considered by the LTC in 2016, it requested the applicant to provide a water servicing plan prepared by a professional engineer that addresses a number of issues identified in the Salt Spring Island Official Community Plan concerning development proposals serviced by groundwater (see resolutions at the end of this email). The attached Stantec report seeks to address some of those issues. The LTC also directed staff to refer the water servicing plan, when received, to other agencies that may have a role in the water system and building permitting process.

It is hoped that this referral will advance the understanding of whether a viable, long-term supply of potable water for the proposed residential density is feasible based on the proposed servicing plan.

Also attached for your reference is a copy of the well water license issued for the subject property by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) in January 2019, as well as the groundwater supply report obtained in support of the well license application.

A reply is respectfully requested by Friday, February 14, 2020.
We understand that there are numerous demands on your time. Please know that your comments regarding this matter are greatly valued.

Should you have any questions, or require further information, please contact Planner Jason Youmans at jyoumans@islandstrust.bc.ca or 250-538-5603.

Please direct referral responses to ssiinfo@islandstrust.bc.ca
Or by mail to: Islands Trust, 1 – 500 Lower Ganges Road, Salt Spring Island, BC V8K 2N8

Thank you for your time and attention to this matter.

Yours truly,
Daniela Murphy

Daniela Murphy

Legislative Clerk/Deputy Secretary
Islands Trust, Salt Spring Island

#1 – 500 Lower Ganges Road
Salt Spring Island, BC V8K 2N8
Phone: 250-538-5606
Enquiry BC Toll-free call 1-800-663-7867

Websites: www.islandstrust.bc.ca I www.islandstrustconservancy.ca
Preserving Island communities, culture and environment since 1974.

……

SS-2016-136
It was MOVED and SECONDED,
that the Salt Spring Island Local Trust Committee request that the applicant provide a water servicing plan prepared by a professional engineer that contains the following related to the provision of potable and non-potable water to the subject lot:

1. Confirmation that potable water in the amount required to obtain occupancy permits can be provided under the plan for all proposed units and that water in the amount required for fire suppression and irrigation can also be provided;
2. Where potable water is to be supplied by groundwater, a pump test(s) conducted by a professional engineer and containing supporting documentation that the test was of sufficient duration to establish the long-term reliability of the water supply in accordance with generally acceptable hydrological engineering practices;
3. Where potable water is to be supplied by groundwater, a water quality analysis that demonstrates that the groundwater from each proposed

water supply source or well is potable or can be made potable with a treatment system; and

4. Where potable water is to be supplied by groundwater, assessment of how groundwater use on site will impact:
   a. Nearby wells or other neighbourhood water supplies;
   b. Agricultural activities;
   c. Springs necessary to maintain fish habitat.
5. That the applicant makes every effort to include rainwater as part of the water supply plan.

CARRIED

SS-2016-137
It was MOVED and SECONDED,
that the Salt Spring Island Local Trust Committee direct staff, upon receipt of a water servicing plan from the applicant, to refer the plan to the Secretary to the Comptroller of Water Rights, Island Health, CRD Building Inspection and the North Salt Spring Water District for review and comment.

CARRIED

NORTH SALT SPRING WATERWORKS DISTRICT

February 3, 2020

Daniela Murphy
Legislative Clerk/Deputy Secretary
Islands Trust, Salt Spring Island

Subject: Referral of Water Servicing Plan for Lot 10, Park Drive, SSI

Dear Daniela,

Thank you for giving the North Salt Spring Waterworks District (NSSWD) the opportunity to review and comment on the "Domestic Water Study for Lot 10, Park Drive, Salt Spring Island, B.C." from Stantec Consulting Ltd. The NSSWD Board of Trustees considered the referral at the January 30, 2020 regular board meeting and directed me to respond with the comments below.

Please note that NSSWD staff are not professional engineers and a thorough technical review of the water study has not been done. General comments from staff on the Domestic Water Study (Stantec Report) are below.

- The study uses an outdated (2016) guideline for manganese. The study claims that the well water meets the guideline for manganese, when in fact, it does not because a maximum acceptable concentration (MAC) for manganese was implemented by Health Canada in 2019.
- The study states that manganese is just an aesthetic issue, when in fact, it is now regulated for health reasons because research has shown it causes developmental neurological problems in children.
- The study uses an outdated (2016) guideline for lead. The MAC for lead was reduced by half in 2019. One of the well water samples contained lead above the MAC.
- The manganese level is very high and while it can be treated, extensive backwashing of filters will likely be needed. It is not possible to tell from the report if the estimate of backwash water volume needed will be sufficient. Please note that the volume of water needed for backwashing has been estimated not by Stantec, but by a company called Island Waterworks. Island Health requires that design of public water supply systems be done by a qualified professional, which in this case means a professional engineer or applied science technologist registered with ASTTBC and with appropriate experience. If Island Waterworks treatment system design or backwash water volume estimates were done by an appropriately qualified professional, NSSWD staff are not aware of it.

- The study states that "water for fire suppression is assumed to be provided by NSSWW" but that request has not been made. The watermain in that area is four-inch diameter so a water main upgrade would be necessary to provide the required flow from a hydrant.
- The Ministry of Forests, Lands, Natural Resource Operations and Rural Development determined (and states on the water licence) that about half of the well water yield is actually from a nearby pond (Swanson's Pond), which means the supply from the pond (and therefore the well) may be reduced due to increased evaporation as the climate warms, yet no climate change analysis has been done.

Yours truly,

Meghan McKee
NSSWD Environmental Manager

cc. Ron Stepaniuk
NSSWD District Manager

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www.northsaltspringwaterworks.ca

H.3 APPENDIX 3 - AMENITY ZONING

Amenity zoning is the granting of additional development potential by the Local Trust Committee in exchange for the voluntary provision of a community amenity by the land owner. Any amenity rezoning should advance the Object of the Islands Trust and the goals and objectives of this OCP, and should be consistent with the following guidelines. Amenity rezoning may be considered on a case-by-case basis, upon application for rezoning. The approval of an amenity rezoning should be conditional on compliance with the following policy guidelines. These guidelines do not pre-determine a favourable outcome for any particular application.

H.3.1 Guidelines for Amenity Zoning Applications

H.3.1.1 Where appropriate, applications for amenity zoning should propose a density level that does not exceed the target density levels outlined in this Plan for the applicable Land Use Designation. For example, an application in the Rural Neighbourhoods Designation should propose a density level no greater than 1 lot per 1.2 ha, as outlined in the policies for that Designation (See Policy B.2.5.2.3).

H.3.1.1 Where appropriate, applications for amenity zoning should propose a density level that does not exceed the target density levels outlined in this Plan for the applicable Land Use Designation. For example, an application in the Rural Neighbourhoods Designation should propose a density level no greater than 1 lot per 1.2 ha, as outlined in the policies for that Designation (See Policy B.2.5.2.3)

H.3.1.2 Applications for amenity zoning should propose that one of the eligible community amenities listed in Section H.3.2 will be provided in exchange for the higher density level being requested.

H.3.1.3 Increased density may take the form of additional lots or additional dwelling units. The Local Trust Committee should ensure the total number of additional dwelling units allowed in exchange for community amenities on Salt Spring Island does not exceed 40. This maximum number of total additional dwelling units should be reviewed each time that the OCP is reviewed.

H.3.1.4 It is intended that applications should be for relatively modest increases in density, consequently the Local Trust Committee should not consider applications in which more than 10 additional dwelling units are proposed in exchange for any one community amenity.

H.3.1.5 Amenity Zoning Applications should be consistent with other policies of this Plan.

H.3.1.6 Prior to approving any amenity zoning application, the Local Trust Committee should give consideration to the appropriateness of the land for the increased density. The following factors should be considered where relevant:

a. environmental values are identified prior to site clearing and design.

b. development is located away from areas with high environmental values, and natural buffers are placed between the development site and sensitive features.

c. development is concentrated in areas with lower environmental values.

d. site plans protect biodiversity, clean air, and clean water.

e. development is located away from areas that may be subject to erosion, flooding, wildfires, and wildlife conflicts.

f. the impacts of roads are minimized and development is located in proximity to and accessible to existing services, constructed roads, and transit, and the development should have the potential to contribute to reducing community dependence of travel by automobile

g. the fragmentation of habitat is minimized.

h. potable water quality is maintained and an adequate supply is available to support the permitted level of development.

i. air quality is maintained and energy efficient design, greenhouse gas emissions and climate change adaption are considered.

j. energy- and water-efficient development is designed to conserve natural resources.

k. development minimizes waste, and manages waste in an environmentally sound manner.

l. that the development would not compromise archaeological, First Nations cultural, historical, heritage sites or significant or outstanding landscape features.

m. that the development would be located away from community water system supply watersheds and community well capture zones.

The Local Trust Committee should request that the applicant provide reports and other information satisfying concerns that the Local Trust Committee considers relevant, including provision of a site plan that shows how additional lots, building sites and accesses will be designed to minimize negative impacts. The Local Trust Committee may consider the use of site-specific zoning, covenants, designation of development permit areas, or a combination of tools to implement these criteria.

H.3.2 Eligible Community Amenities

H.3.2.1 The Local Trust Committee could consider Amenity Zoning applications that would provide the following eligible community amenities:

*(Note: the amenities within this list are **not** in order of priority)*

a the dedication of intact Environmentally Sensitive Areas to a public or private conservation body, or protection through conservation covenant.
b. land for, or construction of, affordable or special needs housing.
c. the dedication of public park and recreation lands, or of funds to be held in trust for their purchase, to the Capital Regional District.
d. land that is acceptable to the Salt Spring Fire District for the location of a fire station, if provided to the District at no charge and it results in public ownership of the Ganges Firehall site.
e. land for community-owned farmland or land for community agricultural processing or storage facilities provided to the Salt Spring Farmers' Institute or a community farmland trust organization.
f. the provision and construction of bicycle lanes, pedestrian and bicycle pathways or trails that add to or support links in the island trail network.
g. the dedication of alignment and construction of a Ganges Alternate Route.
h. protection, restoration and designation of heritage property.
i. suitable, productive forest land donated to a community organization for the operation of a community owned and managed woodlot.
j. implementation of energy efficient building design criteria that exceeds that required by the B.C. Building Code or other regulations.
k. land or facilities for community cultural or recreational purposes.
l. the permanent formal protection of an archaeological site or other site of significance to First Nations peoples.

H.3.2.2 The Local Trust Committee could consider applications that would provide either a maintenance annuity or funds in trust for the purchase or development of all or part of an eligible community amenity.

H.3.3 Guidelines for Amenity and Density Valuation

H.3.3.1 The appraised dollar value of the community amenity provided should not be less than 75% of the increase in the value of the land attributable to the rezoning. The increase in the land value should be calculated as the gross difference between the appraised value of the land before and after the rezoning. Costs associated with the rezoning application, site preparation costs, and profit should not be deducted from the calculation of the increase in the value of the land.

H.3.3.2 The appraised value of both the proposed community amenity and of the increased density should be determined by means of a report provided by an independent professional appraiser, or other independent qualified professional, selected by and reporting to the Local Trust Committee. The cost of the valuation analysis should be borne by the applicant through the mechanism of a cost recovery agreement. Where valuation of the proposed amenity or of the proposed increase in land value are complex or there may be extraordinary costs, the Local Trust Committee may request that the applicant disclose financial information related to the proposal to the appraiser or to Island Trust staff and the appraiser or Islands Trust staff may enter into an agreement not to disclose confidential information.

H.3.3.3 Where the proposed community amenity includes areas of land and valuation of the amenity is difficult or impractical, the Local Trust Committee may consider an alternative to undertaking financial appraisal of the value of the amenity. In such instances, the Local Trust Committee may consider permitting a maximum of one additional parcel or one additional dwelling unit for each parcel of dedicated land that is equal to the base minimum average parcel size for the Land Use Designation where it is located. For example, if land in the Uplands Designation is dedicated, a maximum of one density could be exchanged for each 8 ha dedicated or protected.

H.3.4 Application Procedures

H.3.4.1 Applications to exchange higher density levels for community amenities should be considered by the Local Trust Committee on a case-by-case basis upon application for rezoning by the landowner.

H.3.4.2 Detailed specifications of the community amenity to be provided are to be included in the rezoning application.

H.3.4.3 Where a community amenity is to be provided to a third party for operation and maintenance, the application should be accompanied by a written agreement from that party to accept and maintain the amenity for the intended use. Covenants, housing agreements, or other tools should be used to ensure the amenity is used as intended. Parties chosen to hold an amenity should be public bodies or well-established non-profit groups with a mandate consistent with the amenity provided.

H.3.4.4 When a community amenity is provided in exchange for extra density, the amenity must be provided or legally guaranteed at the time of adoption of the rezoning.

H.3.4.5 Community amenities provided in exchange for a higher level of density should be identified with a plaque that outlines the nature of the amenity/density exchange. If the amenity is intended for public use, then the hours of operation and the body responsible for operation and maintenance should also be identified.

H.3.4.6 The Local Trust Committee shall request that the applicant provide reports prepared by a qualified licensed or registered professional satisfying any of the above concerns that the Local Trust Committee considers relevant. The Local Trust Committee may consider requiring development information through adoption of a development approval information bylaw.

POLICY STATEMENT DIRECTIVES CHECK LIST

Bylaw and File No:

PURPOSE

To provide staff with the Directives Checklist to highlight issues addressed in staff reports and as a means to ensure Local Trust Committee address certain matters in their official community plans and regulatory bylaws and Island Municipalities address certain matters in their official community plans and to reference any relevant sections of the Policy Statement.

POLICY STATEMENT

The Policy Statement is comprised of several parts. Parts I and II outline the purpose, the Islands Trust object, and Council's guiding principles. Parts III, IV and V contain the goals and policies relevant to ecosystem preservation and protection, stewardship of resources and sustainable communities.

There are three different kinds of policies within the Policy Statement as follows:

- Commitments of Trust Council which are statements about Council's position or philosophy on various matters;
- Recommendations of Council to other government agencies, non-government organizations, property owners, residents and visitors; and
- Directive Policies which direct Local Trust Committees and Island Municipalities to address certain matters.

DIRECTIVES CHECK LIST

The Policy Statement Directives Only Checklist is based on the directive policies from the Policy Statement (Consolidated April 2003) which require Local Trust Committees to address certain matters in their official community plans and regulatory bylaws and Island Municipalities to address certain a matters in their official community plans in a way that implements the policy of Trust Council.

Staff will use the Policy Statement Directives Checklist to review Local Trust Committee and Island Municipality bylaw amendment applications and proposals to ensure consistency with the Policy Statement. Staff will add the appropriate symbol to the table as follows:

- ✓ if the bylaw is **consistent** with the policy from the Policy Statement, or
- ✘ if the bylaw is **inconsistent (contrary or at variance)** with a policy from the Policy Statement, or
- **N/A** if the policy is not applicable.

Part III Policies for Ecosystem Preservation and Protection

CONSISTENT	NO.	DIRECTIVE POLICY
	3.1	**Ecosystems**
	3.1.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification and protection of the environmentally sensitive areas and significant natural sites, features and landforms in their planning area.
	3.1.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the planning, establishment, and maintenance of a network of protected areas that preserve the representative ecosystems of their planning area and maintain their ecological integrity.
	3.1.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the regulation of land use and development to restrict emissions to land, air and water to levels not harmful to humans or other species.
	3.2	**Forest Ecosystems**
	3.2.2	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the protection of unfragmented forest ecosystems within their local planning areas from potentially adverse impacts of growth, development, and land-use.
	3.3	**Freshwater and Wetland Ecosystems and Riparian Zones**
	3.3.2	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address means to prevent further loss or degradation of freshwater bodies or watercourses, wetlands and riparian zones and to protect aquatic wildlife.
	3.4	**Coastal and Marine Ecosystems**
	3.4.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the protection of sensitive coastal areas.
	3.4.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the planning for and regulation of development in coastal regions to protect natural coastal processes.

PART IV: Policies for the Stewardship of Resources

CONSISTENT	NO.	DIRECTIVE POLICY
	4.1	**Agricultural Land**
	4.1.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification and preservation of agricultural land for current and future use.
	4.1.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the preservation, protection, and encouragement of farming, the sustainability of farming, and the relationship of farming to other land uses.
	4.1.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the use of

		adjacent properties to minimize any adverse affects on agricultural land.
CONSISTENT	**NO.**	**DIRECTIVE POLICY**
	4.1.7	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the design of road systems and servicing corridors to avoid agricultural lands unless the need for roads outweighs agricultural considerations, in which case appropriate mitigation measures shall be required to derive a net benefit to agriculture
	4.1.8	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address land uses and activities that support the economic viability of farms without compromising the agriculture capability of agricultural land.
	4.1.9	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the use of Crown lands for agricultural leases.
	4.2	**Forests**
	4.2.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the need to protect the ecological integrity on a scale of forest stands and landscapes.
	4.2.7	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the retention of large land holdings and parcel sizes for sustainable forestry use, and the location and construction of roads, and utility and communication corridors to minimize the fragmentation of forests.
	4.2.8	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the designation of forest ecosystem reserves where no extraction will take place to ensure the preservation of native biological diversity.
	4.3	**Wildlife and Vegetation**
	4.4	**Freshwater Resources**
	4.4.2	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address measures that ensure neither the density nor intensity of land use is increased in areas which are known to have a problem with the quality or quantity of the supply of freshwater, water quality is maintained, and existing, anticipated and seasonal demands for water are considered and allowed for.
	4.4.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address measures that ensure water use is not to the detriment of in-stream uses
	4.5	**Coastal Areas and Marine Shorelands**
	4.5.8	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the needs and locations for marine dependent land uses.
	4.5.9	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the compatibility of the location, size and nature of marinas with the ecosystems and character of their local planning areas.
	4.5.10	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the location of buildings and structures so as to protect public access to, from and along the marine shoreline and minimize impacts on sensitive coastal environments.
	4.5.11	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address opportunities for the sharing of facilities such as docks, wharves, floats, jetties, boat houses, board walks and causeways.

	4.6	**Soils and Other Resources**
	4.6.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the protection of productive soils.

PART V: Policies for Sustainable Communities

CONSISTENT	NO.	DIRECTIVE POLICY
	5.1	**Aesthetic Qualities**
	5.1 3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the protection of views, scenic areas and distinctive features contributing to the overall visual quality and scenic value of the Trust Area.
	5.2	**Growth and Development**
	5.2.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address policies related to the aesthetic, environmental and social impacts of development.
	5.2.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address any potential growth rate and strategies for growth management that ensure that land use is compatible with preservation and protection of the environment, natural amenities, resources and community character.
	5.2.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address means for achieving efficient use of the land base without exceeding any density limits defined in their official community plans.
	5.2.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification of areas hazardous to development, including areas subject to flooding, erosion or slope instability, and strategies to direct development away from such hazards.
	5.3	**Transportation and Utilities**
	5.3.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the development of a classification system of rural roadways, including scenic or heritage road designations, in recognition of the object of the Islands Trust.
	5.3.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the impacts of road location, design, construction and systems.
	5.3.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the designation of areas for the landing of emergency helicopters.
	5.3.7	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the development of land use patterns that encourage establishment of bicycle paths and other local and inter-community transportation systems that reduce dependency on private automobile use.
	5.4	**Disposal of Waste**
	5.4.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification of acceptable locations for the disposal of solid waste.

CONSISTENT	NO.	DIRECTIVE POLICY
	5.5	**Recreation**
	5.5.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the prohibition of destination gaming facilities such as casinos and commercial bingo halls.
	5.5.4	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the location and type of recreational facilities so as not to degrade environmentally sensitive areas, and the designation of locations for marinas, boat launches, docks and anchorages so as not to degrade sensitive marine or coastal areas.
	5.5.5	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification of sites providing safe public access to beaches, the identification and designation of areas of recreational significance, and the designation of locations for community and public boat launches, docks and anchorages.
	5.5.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification and designation of areas for low impact recreational activities and discourage facilities and opportunities for high impact recreational activities.
	5.5.7	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the planning for bicycle, pedestrian and equestrian trail systems.
	5.6	**Cultural and Natural Heritage**
	5.6.2	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the identification, protection, preservation and enhancement of local heritage.
	5.6.3	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address the preservation and protection of the heritage value and character of historic coastal settlement patterns and remains.
	5.7	**Economic Opportunities**
	5.7.2	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address economic opportunities that are compatible with conservation of resources and protection of community character.
	5.8	**Health and Well-being**
	5.8.6	Local Trust Committees and Island Municipalities shall, in their official community plans and regulatory bylaws, address their community's current and projected housing requirements and the long-term needs for educational, institutional, community and health-related facilities and services, as well as the cultural and recreational facilities and services.

POLICY STATEMENT COMPLIANCE	
	COMPLIANCE WITH TRUST POLICY
	NOT IN COMPLIANCE WITH TRUST POLICY for the following reasons: