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File: 2504141

August 1, 2025

Leif Palmberg
Galiano Island BC

Attention: Leif Palmberg

Re: Water Management Plan for Lot A, District Lot 15, Plan 22128 Galiano Island

As requested, Hy-Geo Consulting has prepared a water management plan for the proposed rezoning of the above property as required by the Islands Trust. The proposed land uses for the property would include:

- a residence,
- a contractor's workshop and yard,
- storage and sale of gravel, soil and aggregate materials,
- sawmilling, planing and manufacturing of wood products,
- a commercial orchard, production and sales of cider.

The subject property is currently zoned Rural 2 (R2) in the Galiano Island Land Use Bylaw No. 103. This permits dwellings, cottages, home occupations, farm use, and secondary suites. An amendment to the Land Use Bylaw would be required to allow for light industrial and establishment of a cidery.

In preparing the water management plan, the following was undertaken:

1. A site visit on May 20, 2025 to meet with the landowner to discuss the proposed land uses and activities on the property and to verify current activities and the site conditions including topography, drainage, soils and vegetation.

2. Compilation and review of reported geologic information, climate, topography, soils, drainage conditions, well records and water quality data for the property and surrounding region.

3. Examination of the water demand requirements for the proposed facilities and activities on the property.

4. Preliminary assessment of the capacity of existing water sources to meet the anticipated water demands.

5. Examination of potential issues including salt water intrusion, potential impacts on neighbouring properties and water sources, flooding potential, erosion control and monitoring requirements.

This report constitutes the water management plan and presents the findings of the site visit, compilation, review and assessment of the available land and water information for the subject property.

Property Location

The subject property (Figure 1), is situated in the south-eastern portion of Galiano Island about 5 km northwest of Sturdies Bay. The land parcel is wedge-shaped and designated as PID 3321649 with an area of 79607.1734m^2 (Province of British Columbia, 2025a).

The property is bounded on the north by a BC Hydro right of way. The eastern boundary lies within 100 m of Taylor Creek that drains northerly to the ocean at Taylor Cove. Elevations fall northeasterly across the property from 80 m near Galiano Way to 30 m near Taylor Creek. Drainage is northeasterly towards Taylor Creek.

Figure 1. Location of Lot A of District Lot 15, reported wells and topography. Contour interval is 20 m. Basemap from Province of British Columbia (2025a).

Climate

The climate of Galiano Island is characterized by cool dry summers and humid mild winters. Based on records from 1951 to 1980 (Environment Canada, 198_) the normal annual precipitation for a climate station on Galiano Island was 33.7 inches (856 mm).

More recent precipitation data for the period 1981-2010, reported by Government of Canada (2025a) for a climate station on nearby Mayne Island showed a normal annual precipitation amount of 842.0 mm. With the absence of a current climate station on Galiano Island, the Mayne Island climate station may be considered representative of the general longer-term (monthly) precipitation patterns on Galiano (Figure 2).

Over 90% of the total annual precipitation normally falls as rain with over 60% of the total falling during the period from November to February. Precipitation follows a seasonal cycle, with highest rainfall during the fall, winter and early spring months while the summer months are subject to drought conditions. Global climate models (Allen *et al*., 2008) suggest precipitation may increase slightly in the future, particularly during the winter months.

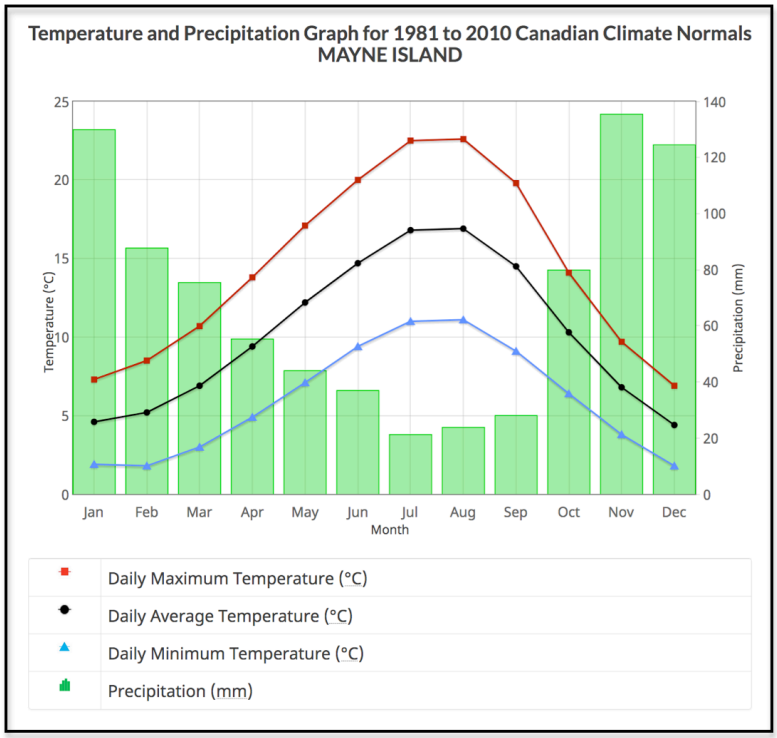


Figure 2. Graph of monthly normal precipitation for Mayne Island Station (Climate ID. 1014931). Graph from Government of Canada (2025a).

Bedrock Geology and Groundwater Conditions

Galiano Island is underlain by sedimentary clastic rocks belonging to the Nanaimo Group of Late Cretaceous age (Muller and Jeletzky, 1970). The general groundwater conditions of Galiano Island have been reported by Harrison (1994), Kohut and Johanson (1998) and Waterline Resources Inc. (2011). The subject property and surrounding region is principally underlain by the Gabriola Formation that is dominantly sandstone with some shale (mudstone) interbeds and conglomerate.

Groundwater on the island is found primarily in open fractures in the bedrock formations. These fractures constitute the major zones for groundwater storage and movement. The region is underlain by fractured bedrock Aquifer 320 that has been identified, classified and

mapped by the province in the region as being moderately developed and moderately vulnerable to surface sources of pollution, (Province of British Columbia, 2025a). The subject property lies within the Finlay Lake groundwater region as outlined by Kohut and Johanson (1998). In 1998, Kohut and Johanson estimated the demand to groundwater in storage ratio in this region to be moderate at 0.18. Existing well density at that time was also determined to be low to medium at 0.051 wells/acre. Based on available well records currently in GWELLS (Province of British Columbia, 2025b) there are 44 reported wells in the region. These would have increased the well density to approximately 0.07 wells/acre; still within the low to medium range for this region. The locations of reported wells at and in the vicinity of the subject property are shown in Figure 1. A tabulation of these wells is provided in Appendix A, Table A1.

The topographically low-lying area on the property has been mapped as a groundwater discharge area as evidenced by high groundwater levels at and close to the land surface. A flowing artesian well was also drilled at the BC Hydro Substation. This is an area receiving groundwater from adjacent bedrock upland areas through lateral and upward flow conditions. 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).

Soils

The soils of Galiano Island have been mapped by Green *et al*.,(1989). Figure 3 shows the distribution of soil types within the subject property and adjacent areas. The upland areas on the property are dominated by gravelly and sandy soils of the *Saturna* and *Trincomali* soil map units. The lower lying area adjacent to Taylor Creek is underlain by sandy loam colluvial and glacial drift materials less than 100 cm deep over sandstone bedrock. Water table conditions in the lower lying portion of the property are close to the land surface indicative of groundwater discharge conditions. Moisture conditions in the lower lying soils are likely to remain relatively high even during the dry summer months.

Sensitive Ecosystems

Under the *Galiano Island Official Community Plan (OCP),* the Islands Trust (1995) has mapped the sensitive ecosystems on the island at a broad regional scale as Schedule H. A small wetland area is depicted along the eastern portion Lot A of District Lot 15 coinciding with Taylor Creek.

According to the *Galiano Island OCP*, wetland ecosystems “include areas on the island that are characteristically wet or contain saturated soils and are dominated by water-loving plants. Classes of wetlands include swamps, marshes, bogs, fens, wet meadows, estuaries and similar shallow water areas that are not part of an active floodplain or stream.”

The sensitive ecosystems also include riparian areas. According to the *Galiano Island OCP*, these are “areas that occur adjacent to lakes, streams, and wetlands where the increased soil moisture supports and enhances plant communities distinct from the adjacent terrestrial areas. Riparian ecosystems support a high concentration of vascular plants, mosses, amphibians and small mammal species. Riparian areas function as natural

water storage and purifying systems for improved water quality and provide safe corridors for wildlife movement." The Islands Trust (2024) have designated a riparian zone along Taylor Creek that skirts the eastern boundary of the subject property.

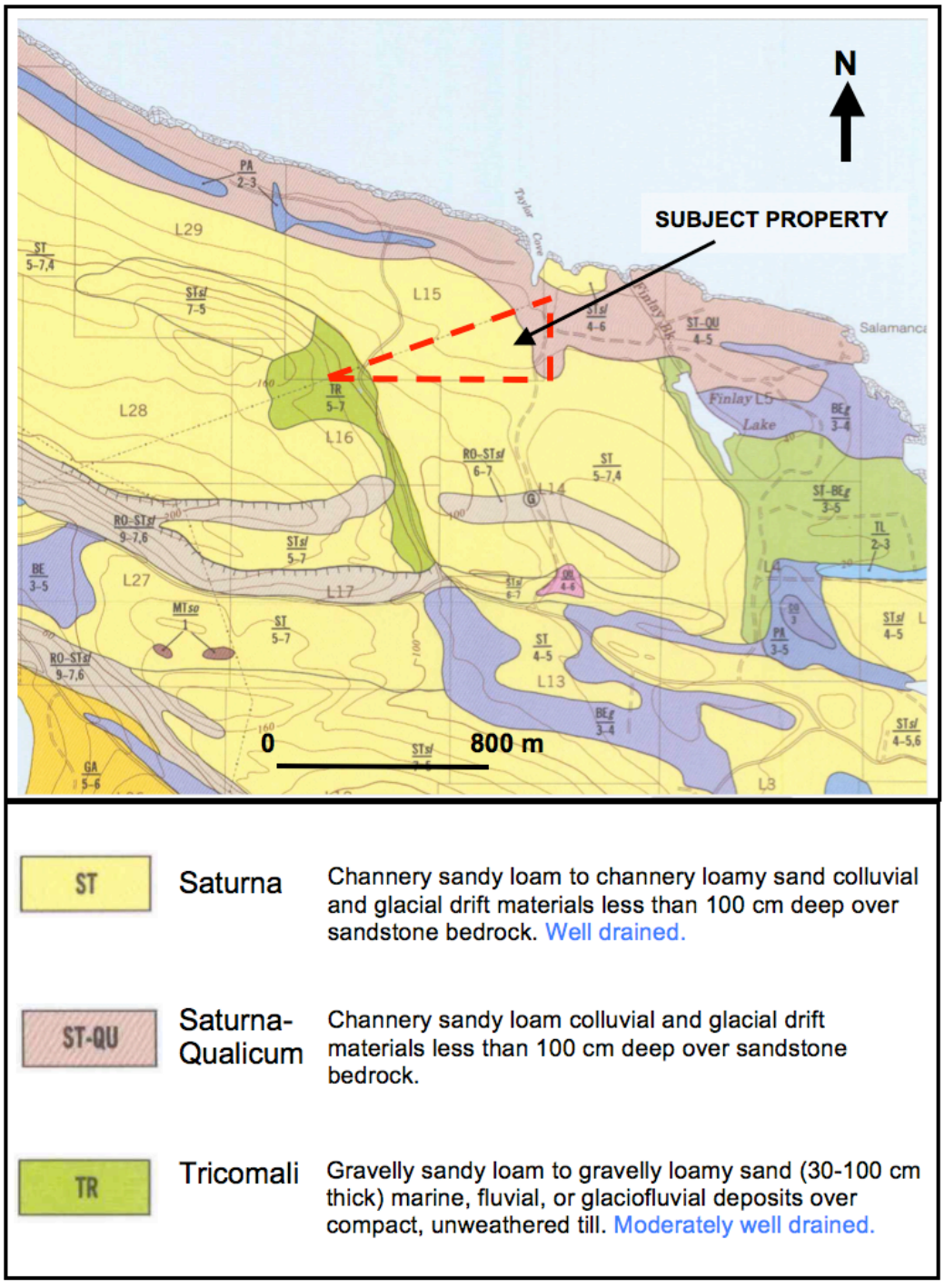


Figure 3. Soils within the subject property. Adapted from Green *et al*., (1989).

Water Sources on the Subject Property

Current water sources on the property include a drilled well and excavated pond that captures surface water drainage and shallow groundwater seepage. These two sources are discussed as follows:

Existing Well WTN 131111 (WID 72049)

Well WTN 131111 was completed on the property on September 24, 2024 to a depth of 165 feet (50.29 m) in grey sandstone. The well was air-lift tested by the well driller for 1 hour and rated at 10 USgpm. Non-pumping water level before testing was 60 feet (18.29 m) below ground. The well is situated at an elevation of 60 m above sea level with the bottom of the well completed approximately 10 m above sea level. While the well has not been pump tested to determine the long term well capacity it is highly probable that it would be able to meet the minimum water supply requirements of 2275 L/day for a domestic residence as outlined under the *Galiano Island Land Use Bylaw, No. 127*, *Standards for Potable Water Supply, Sections 13.24 to 13.29* (Galiano Island Local Trust Committee, 2025). Pump testing and water quality sampling of the well would be necessary to confirm the long-term capacity of the well if it is to be used for commercial purposes such as cidery production and for irrigation.

Excavated Pond

In 2022, the property owner excavated a large pond in the northeast corner of the property as shown In Figure 4 and Photo 1, Appendix B. Surface water runoff is directed to the pond via a series of drainage ditches. The property owner also observed some shallow groundwater seepage from a silty sand deposit overlying grey marine clay with shells during excavation. The pond is rectilinear in shape with approximate sides of 20 x 15 m (65 x 50 feet). The deepest portion of the pond is about 15 feet (4.57 m). The area of water measured on 2023 imagery at the CRD Regional Map website indicates an area of 333.73 m^2 (Figure 4). Based on an average depth of say 7 feet (2.13 m) the pond would have been holding approximately 710.8 m^3 of water. This would be equivalent to 187,785 USgals.

Estimated Water Demand

The estimated water requirements for all proposed activities on the property are outlined in Table 1. The quantities presented represent maximum values anticipated and are discussed below:

Residential Use

The maximum daily water use for a residence is estimated at 2275 L/day based on the water supply requirements as outlined under the *Galiano Island Land Use Bylaw, No. 127*, *Standards for Potable Water Supply, Sections 13.24 to 13.29* (Galiano Island Local Trust Committee, 2025). Water would be sourced from the existing bedrock well on the property.

Table 1. Estimates of water demand for various activities on the subject property.

Area of Demand	Facility	Water Use Activity	MDD Demand (L/day)	Annual Demand (m^3/year)	Continuous Flow (Usgpm)	Seasonal Demand (m^3)	Water Source	Comments
A. Indoor Water Use	Residence	Kitchen, laundry, bath rooms	2275	830	0.420		existing well	based on 2275 L/day, 365 days a year
	Workshop	Washroom	25	4.6	0.002		existing well	occasional use, 50% per year
	Cidery Production	Processing and Bottling	10860	228	1.992	228[t]	existing well	3 weeks per year 6 hours/day
	On site Cidery Sales	Washroom	120	21.9	0.011		existing well	occasional seasonal use, 50% per year
	Aggregate Storage	none					not required	dry storage only, no washing
	Saw Mill	fire prevention	1817				pond and well	occasional use, 4 hours/day for 20 days at 2 USgpm
Subtotal:			15097	1084.5	2.425			
B. Irrigation Use	Orchard	Irrigation (2.5 acres)	10752	1000	1.973	1000*	pond and well	seasonal, 3 to 4 months per year
Subtotal:			10752					
C. Fire Protection							pond	Emergency if required
		Total:	25849					

* Based on 93 day irrigation season for sandy loam soil

t Based on processing over 21 days.

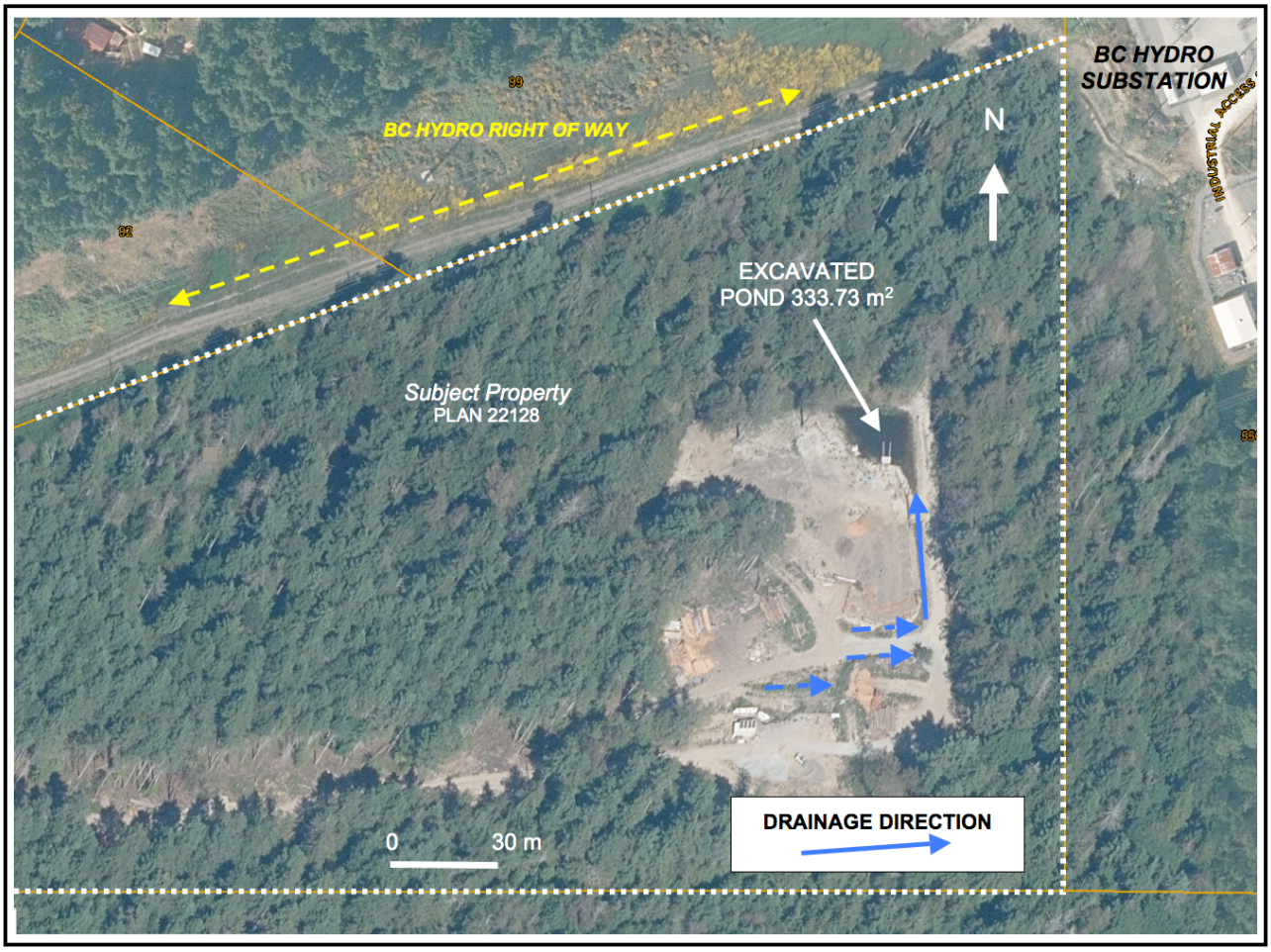


Figure 4. Location of excavated pond from CRD imagery dated 2023 (CRD, 2025).

Contractor's Workshop

The contractor's workshop would include provisions for a washroom that would only have occasional use based on 25 L/day and 50 % of the time (25 L/day x 365 days X 0.5) for an annual demand of 4.6 m^3. Water would be sourced from the existing well on the property.

Cidery

The cidery may eventually produce up to 91000 L of product on an annual basis. This would require approximately 2.5 L of potable water per litre of product produced for washing of apples and cleaning of processing equipment. Fruit washing would take place in the fall during a short period of time, estimated at 3 weeks based on 6 hours/day. The maximum daily demand for washing would amount to 10, 857 L/day. Water would need to be sourced from the existing well on the property.

On Site Cidery Sales

For on site cidery sales and tasting facilities a washroom and sinks may be required. Water requirements are estimated at 120 L/day based on occasional seasonal use 50 % of the time (120 L/day x 365 days X 0.5) for an annual demand of 21.9 m^3. Water would be sourced from the existing well on the property.

Aggregate Storage

Storage of gravel, clean soil and other aggregate products on the property will not require any water. Washing of aggregate products is not being planned.

Sawmill

A sawmill on the property would not require any water for operating. Some limited sprinkling of water from the pond on wood waste piles may be needed occasionally during extremely dry periods for fire prevention purposes. Based on sprinkling 2 USgpm for 4 hours a day for 20 days would indicate a maximum day demand of 1817 L/day.

Orchard

It is my understanding that cultivation of up to 2.5 acres of apple orchard is being planned. Keefer (2025) has estimated the seasonal irrigation demand would be 2110 m^3 based on an irrigation season of 93 days for sandy loam soils utilizing the *BC Agriculture Water Calculator* (Province of British Columbia, 2025c). Based on further consideration of local knowledge of orchard water use in the region and soil conditions at the site Keefer (2025) recommended that 1000 m^3 of water per irrigation season is a reasonable number that should allow for a secure amount of water to irrigate the orchard (Appendix C). Water would be sourced from the pond on the property with augmentation from the existing well. With approximately 187,000 US gals (707.9 m^3) storage in the pond at the start of the irrigation season, the pond may be capable of only meeting about 70% of the irrigation demand not considering pond evaporation or additional inputs from storm runoff and groundwater seepage during the growing season. It is evident that additional water would be required from the existing well. An irrigation scheduling plan for the orchard at this time is, however, beyond the scope of this report and would depend upon various factors such as the number of sprinklers employed, water pressure, nozzle sizes, soil moisture conditions and climatic factors. A maximum continuous flow capacity up to 2 USgpm from the well would likely be required for irrigation during the growing season without considering the contribution of the pond.

Fire Protection

Equipping the pond with a suction pump and having hoses on hand will enable some fire protection for buildings on the property along with water in storage. Care may need to be taken to avoid excessive drawdown of the pond for irrigation purposes during the growing season.

Storage Requirements

Based on *Design Guidelines for Rural Residential Community Water Systems* (Ministry of Forests, Lands & Natural Resource Operations, 2012), the storage required to balance the difference between instantaneous demands and the average demands should be a minimum 25% of the MDD (25849 L/day). The minimum volume requirement for balancing storage would need to be 6462 L (1710 USgals). Separate storage tanks, e.g.1000 USgals for potable water and 1000 USgals for holding mixed well and pond water are suggested. A

suggested configuration for the water distribution system is shown in Figure 5. Storage tanks would need to be situated at higher elevations on the property to provide sufficient pressure for irrigation and the cidery. A pressure tank would suffice for the residence and workshop water use.

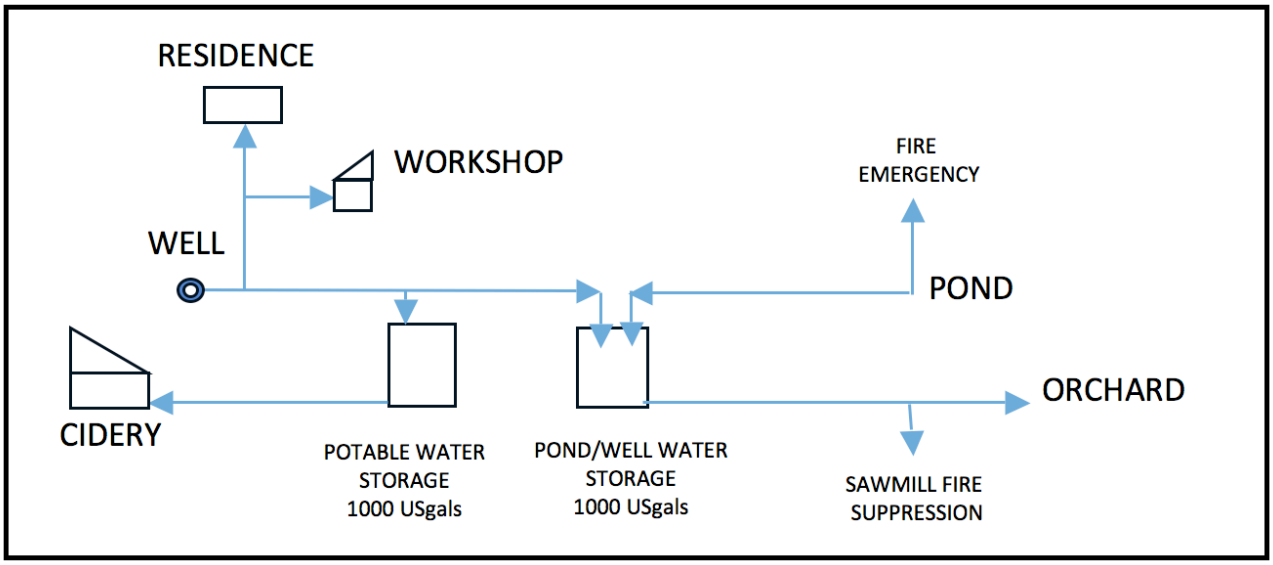


Figure 5. Schematic showing potential configuration of the water supply system for the subject property and water flow directions.

Potential Impacts of Water Use

The overall water requirements for the proposed property activities are not exceptionally large. The largest potential use of water would be for irrigation of the orchard at 1000 m^3 curing the growing season. This would require a maximum water flow from the well of about 2 USgpm. Use of the pond for irrigation, however, would also reduce complete dependence on the well.

The second largest use would be for washing of fruit and cleaning of equipment during processing at the cidery for approximately 3 weeks a year requiring about 2 USgpm pumping from the well. It should be noted that irrigation demand from the well would not be taking place when the well water is required for cidery production.

Potable water requirements for a residence, workshop and cidery washrooms would be less than 1 USgpm.

It is anticipated that operation of the existing well at rates around 3 USgpm would have an insignificant effect on neighbouring wells and Taylor Creek. The existing well is situated 350 m from Taylor Creek and 200 m from the closest neighbouring well. It is also situated some 390 m from the Sticks Allison Subdivision licenced well, operated by the Capital Regional District. Pump testing of the existing well at a rate of 5 USgpm and monitoring of neighbouring well(s) could be carried out to confirm any potential effects. Pump testing would also be necessary to support the application of a water licence for commercial/agricultural purposes.

Other Potential Issues

As the bottom of the well is completed 10 m above sea level, the possibility of well pumping causing sea water intrusion is non existent. Flooding potential on the property and to areas downslope would be minimal. The existing drainage network of ditches directed to the pond and towards Taylor Creek will need to be maintained. During logging and land clearing operations it would be important to control potential erosion and sediment deposition by installing silt traps and or straw bales to prevent sediment transport into Taylor Creek or onto neighbouring properties.

Water Conservation

All water using appliances and water fixtures will need to be of low flow use to conserve water. Water metres should be installed at key points in the water distribution system to monitor and record on a monthly basis, well use, pond use, residential water use, irrigation use and cidery production use. A staff gauge on the pond should also be considered to monitor and record fluctuations of water levels. This information would assist in monitoring water consumption and determining if there are any water leaks in the system.

Conclusions

Based on the above the findings for the proposed use of the subject property the following conclusions can be made:

1. Current water sources on the property include a drilled well and excavated pond that captures surface water drainage and shallow groundwater seepage.

2. The overall water requirements for the proposed property activities are not exceptionally large. The largest potential use of water would be for irrigation of the orchard at 1000 m^3 during the growing season. This would require a maximum water flow from the well of about 2 USgpm. Use of the pond for irrigation, however, would also reduce complete dependence on the well.

3. The second largest use would be for washing of fruit and cleaning of equipment during processing at the cidery for approximately 3 weeks a year requiring about 2 USgpm pumping from the well. It should be noted that irrigation demand from the well would not be taking place when the well water is required for cidery production.

4. It is anticipated that operation of the existing well at rates around 3 USgpm would have an insignificant effect on neighbouring wells and Taylor Creek.

5. The possibility of well pumping causing sea water intrusion is non existent as the bottom of the well is completed 10 m above sea level.

6. Development of the orchard on the property and full production at the cidery would take place over a number of years providing the opportunity to monitor water consumption and any potential land use effects.

Recommendations

The following recommendations are provided for consideration:

1. Conduct a pumping test and water quality sampling of the existing well to verify its capacity and potability for meeting the projected water demands for the property. The test will need to be conducted by a registered well pump installer.

2. Obtain permission from one or more neighbouring well owners to monitor their wells during the pump testing of the existing well on the subject property

3. Install a staff gauge on the pond to monitor water fluctuations during the year.

4. Apply for a water licence for commercial and irrigation purposes on the well and the pond.

5. As the orchard is being developed it may be beneficial to develop an *Environmental Farm Plan* for the property (Province of British Columbia, 2025d).

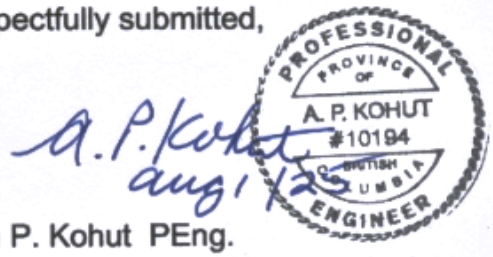
6. Install a sounding tube in the well to enable monitoring of water levels including a water meter at the well to monitor water consumption.

7. Install water meters on the storage tank outlets to monitor water use for the cidery and the orchard. This will be beneficial for detecting any leaks in the water system.

Closure

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

Respectfully submitted,



Alan P. Kohut PEng.
Principal and Senior Hydrogeologist

HY-GEO CONSULTING
Permit to Practice Number: 1001034

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Appendix A

Table A1. Summary of reported wells at and in the vicinity of the subject property.

Table A1. Summary of reported wells at and in the vicinity of the subject property.

Well Tag No. (WTN)	Well Identification Plate No. (WID)	Depth Drilled or Dug (feet)	Depth Well Drilled (m)	Diameter (inches)	Diameter (cm)	Driller's Estimated Yield Value(Usgpm)	Water Depth (feet)	Water Depth (m)	Depth to Bedrock (feet)	Depth to Bedrock (m)	Construction Completion Date	General Remarks	Legal Plan	Lot No.	Owner When Constructed	Well Purpose	Comments
11933	43824	140	42.67	6	15.24	2	8	2.44	14	4.27	Nov.26-2019	completed in sandstone, water bearing 126 to 140 feet	VIP 35698	8	Nicolas Benger	Private Domestic	
21272		150	45.72	6	15.24	3	24	7.32	3	0.91	Jan.22-1968	completed in shaley sndstone	22765	37	Alnor Propertiers		
21281		150	45.72			8	29	8.84	9	2.74	Jan.30-1968	completed in very hard shale			Dianne Laronde		cleaned out and tested Apr 17/90, 0.5 gpm at 57 ft., 1 gpm at 103 ft, at 140 feet total 8 gpm
21934		225	68.58			65	2	0.61	8	2.44	Nov. 1-1968	completed in shale and water-bearing sandstone			Nicolas Stamatiou		well not in use, affected by Well #5
21935	12905	225	68.58	6	15.24	30	2	0.6096	8	2.44	Nov. 1-1968	water bearing shale 0.25 gpm at 15 feet, sandstone 8.25 gpm at 114 feet, water bearing shale 6.5 gpm at 195 feet, water bearing sandstone 45 gpm at 205 feet	35698	7	Capital Regional District	Water Supply System	Sticks Allison Subdivsion, Licensed Well
59604		280	85.34	6	15.24	5	25	7.62	1	0.30	Feb. 16-1991	completed in grey and shaley sandstone,		9	Kim Lenglet	Private Domestic	Field water quality test available.
63030		285	86.87	6	15.24	2	Flows	Flows	25	7.62	Jul.25-1992	completed in grey and black shaley sandstone, water at 275 feet			BC Hydro Substation	Commercial	Well flows 1/2 gpm
91437		303	92.35	6	15.24	1					Feb 3-1992	completed in grey sandstone with lenses of shaley sandstone		8	Lpyd Bains	Private Domestic	well deepened from 180 to 303, previous static was 90 feet
93636		240	73.15	6.125	15.56	12			4	1.22	Jul. 29-2004	fracture at 70 feet with 0.5 gpm, 160 feet increased to 1 gpm, fracture at 200 feet no increase, fracture at 220 feet increase to 12 gpm	35698	10	Les Laronde	Private Domestic	
97149	20147	180	54.86	6	15.24	20			8	2.44	Nov.11-2007	fracture at 95 feet in soft sandstone producing 1.5 gpm, well completed in hard sandstone, fracture at 165 feet increasing to 20 gpm	35698	10 + 9	Kim Lenglet	Private Domestic	Liner recommendaed and installed.
105769		280	85.34	6	15.24	2	20	6.10	0	0.00	Feb. 18-1991	completed in shaley sandstone with grey sandstone lenses		9	Allan Rudrum	Private Domestic	
131111	72049	165	50.29	6	15.24	10	60	18.29	0	0.00	Sep.24-2024	completed in hard sandstone	VIP22128	A	1230869 BC Ltd.	Private Domestic	Well on subject property.

Data from Province of British Columbia, 2025a and 2025b.

Appendix B

Photographs taken May 20, 2025.

Photo 1. Excavated pond in northeastern part of Lot A, DL 15, looking northwesterly, May 20, 2025.

Photo 2. Excavated pond looking westerly near inlet, May 20, 2025

Photo 3. Drainage ditch feeding pond along east side of property looking northerly. May 20, 2025. White arrow indicates drainage flow direction.

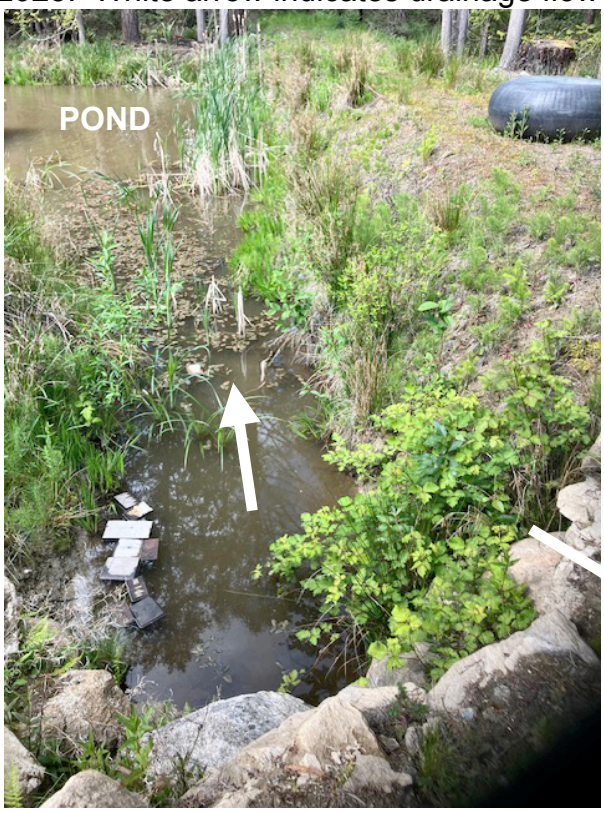

Photo 4. Drainage ditch at inlet to pond, looking northerly, May 20, 2025. White arrow indicates drainage flow direction.

Photo 5. Drainage ditch along south side of roadway looking westerly along southern side of property, May 20, 2025. White arrow indicates drainage flow direction.

Photo 6. Drainage ditch along north side of roadway looking westerly, May 20, 2025. White arrow indicates drainage flow direction.

Appendix C

Keefer Ecological Services Ltd. Report

July 28, 2025.

Keefer Ecological Services Ltd

Leif Palmberg July 28, 2025

Galiano Island, BC

Re: Irrigation Needs for Lot A, District Lot 15, Plan 22128 Galiano Island

Dear Leif,

As requested, this letter outlines my opinion on your water needs for your proposed apple orchard.

I have reviewed the Water Management Plan from Hy-Geo Consulting (June 16, 2025) and feel that this document provides excellent information for your planning purposes. While I agree with most of the findings, it is my opinion that this document overestimates your watering needs through the reported figure of 4170 m^3 per year for an irrigated area of 4 acres due to both your new smaller area (2.5 acres) and that the estimate was derived from the BC Agricultural Water Calculator.

On June 25, 2025 we walked through the property and I examined the soil and vegetation from the perspective of a forest ecologist. I had the additional perspective of you converting the forested area to that of an orchard. On the property, I collected reconnaissance level ecological information on your site following the Biogeoclimatic Ecosystem Classification (BEC) system. Soils were observed at a number of sites by scraping off the edges of cutbanks to allow for the viewing of the soil profile. Soils were hand textured.

The following is my rationale for believing you need less water than predicted:

- Following our walk through the property I noticed that all ditches were carrying moving water, that your pond was near full pool and that there were areas of standing water in undisturbed forest, based on these observations, I would suggest that your site ranges from Fresh to Very Moist under the BEC
- The terrain Galiano Island lies within the Coastal Douglas Fir Moist Maritime Subzone (CDFmm), zonal conditions in this zone are seasonally dry and the forested sites are led by Douglas fir and commonly Arbutus, on your site the forest is led by western red cedar, grand fir and western hemlock indicating an 06 site series, one of the wettest non-wetland site types found on Galiano Island
- It may be expected that after tree removal that your waterlevel will rise as it commonly does on wet, moisture receiving sites
- at your proposed orchard is a mix of toe of slope to level with some areas perhaps being in a depression, such a slope position typically leads to abundant moisture
- The soils on your orchard area classify as sandy loams and appear deep (>2m), have low amounts of organic materials and were evidently wet
- The Hy-Geo report provided you an estimate for irrigation water demand using the BC Agricultural Water Calculator, this is an excellent tool and is very well developed for uses in areas such as the Okanagan, Fraser Valley and other well-known agricultural areas. This tool is designed for predicting water use on sites with average conditions and your site is far wetter than average.
- Local anecdotal knowledge on typical Gulf Islands orchards suggests that orchardists typically budget for around 20 gallons (75.7 l) of irrigation per tree per month in the summer

Using the BC Agricultural Water Calculator I entered apple as the crop, micro sprinklers for irrigation, sandy loam soils, an irrigation season of 93 days and an irrigated area of 2.5 acres (the Hy-Geo report had an irrigated area of 4 acres). The app indicates an irrigation water demand of 2110 M^3 of irrigation water per year. It is worth noting at this point that the app does not take local site conditions into account.

During our investigations, you contacted a number of orchardists with the goal of understanding their water needs. The local lore is that apple trees need just under 19 litres of irrigation per week. On the 2.5 acre site it is planned that trees will be planted at 140/acre. Extrapolating local knowledge with the proposed orchard indicates an annual water irrigation demand of 79.5 m^3. It is likely that the orchard will see a smaller water demand than this figure given that the site conditions are so much moister than zonal sites on the Gulf Islands.

Given the above two scenarios on water demand being orders of magnitude different, it is difficult to accurately predict how much water will be needed to produce successful crops. Taking into account the effects of climate change and the uncertainty of demand from both methods, it is apparent that one should take a conservative approach to evaluating water needs to insure sufficient water resources for the future.

With the above in mind, I estimate that a total of 1000m^3 of water per irrigation season is a reasonable number that should allow for a secure amount of water to irrigate the orchard.

Yours truly,

Michael E. Keefer, MSc, PAg