Stantec

Memo

To:	BC Ferries	From:	Tomasz Zolyniak
File:	1161107845	Date:	January 7, 2019

Reference: Potable Water Consideration
Descanso Bay, Gabriola Island Ferry Terminal

OVERVIEW

BC Ferries (BCF) is in the process of producing a Terminal Development Plan (TDP) for the Gabriola Island Terminal. The intent of the plan is to develop a concept level plan for the upgrades to the terminal which are anticipated to include the construction and a new berth as well as improvements to parking, queuing lanes, and traffic flows. Passenger amenities such as a waiting room with washroom facilities are also included in the TDP. This plan will provide the framework for BCF to implement the upgrade strategies over the next 25 years.

The implementation of the TDP will require rezoning and updates to the Gabriola Island Official Community Plan (OCP). Stantec has been retained by BCF to aide with this process.

This memorandum reviews the potable water considerations as they correspond to the updates to the OCP.

EXISTING POTABLE WATER INFRASTRUCTURE

BC Ferries has an ongoing agreement with Gabriola General Construction Co. Ltd. (GGCC) for the provisions of potable water to the washrooms at the ferry terminal. GGCC operates a water well located on the property of 440 North Road, approximately 450m east of the ferry terminal. Water is then piped to the terminal via a 150mm Ø watermain that enters the washroom facility. The figure below depicts the approximate location of the well.

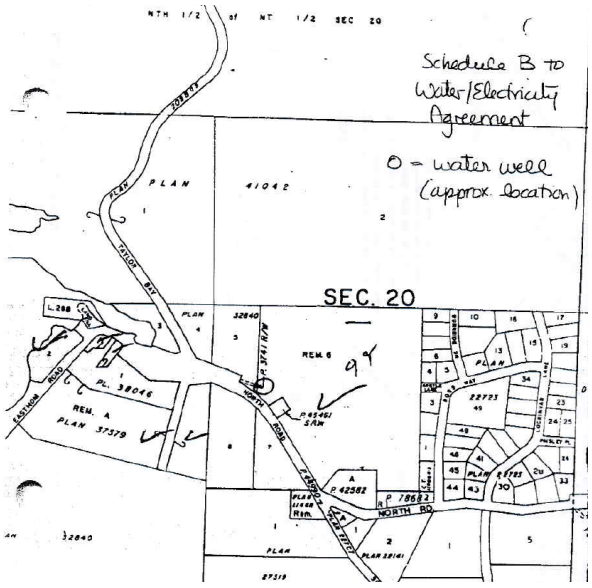

Figure 1 – Approximate Well Location

Reference: **Potable Water Consideration**
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The agreement states that 'the water from the well shall remain potable at all times', in addition BC Ferries terminal maintenance crews perform monthly water potability testing.

BC Ferries has not reported any issues with the existing water supply, however well owner has asked that during times of water scarcity, water consumption be reduced.

WATER SYSTEM OPTIONS

The following section discusses possible options for potable water supply to the new terminal facility.

Water Demand

The proposed terminal building is to include two washroom facilities that each include a sink and toilet. An additional sink will also be included in the staff only area. Foot passenger loading at the BC Ferry terminal site, for the 2017 season, shows the 90th percentile to be 50 passengers per sailing. Based on a typical demand of 10 liters / person / day, the average annual daily demand would be 500 liters / day or 20 liters / hour. Based on Master Municipal Construction Documents (MMCD) criteria, the peak hour demand would be 60 liters / hour (3 x average annual daily demand). Note that fire flows are not included in this estimate and precise water demand calculations will need to be performed by a mechanical engineer during the detailed design stage.

To reduce potable water consumption, options can be reviewed at the detailed design stage for the use of greywater or rain water for toilet flushing. This would be consistent with the Official Community plan (Bylaw no. 166 Section 7.4 – Water Supply Policy) which has the following policy:

- *Methods of water conservation such as low water use fixtures, retention of rainwater and runoff in cisterns and ponds and other means shall be encouraged.*

Water Treatment

Water usage at the BC Ferry Gabriola terminal is anticipated to fluctuate heavily, i.e high usage around the times of ferry sailings and very low usage in-between sailings. This can result in standing water within the existing pipes and other water infrastructure. The duration of standing water can further increase during winter months when ridership is lower and use of potable water is less frequent.

Chemical water treatment is recommend for this site to maintain water quality standards given that water will be used in the sink and water fountain facilities for human ingestion. It is proposed that a chlorine dosing system be included along with a pressure tank. The pressure tank will maintain a continuous supply of water for the terminal users with a steady pressure head, while the dosing system will introduce chlorine into the water for water quality needs. The use of a pressure tank will also reduce the frequency for which the water source pump needs to operate.

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OPTION 1 – EXISTING WATER SUPPLY

For the 2018 fiscal year, BC Ferries paid $2,500 for water supply at the Gabriola ferry terminal. If the contract is continued with Gabriola General Construction Co. Limited (or other third party should the land where the well is situated change ownership) to provide potable water for the new terminal facilities, minimal construction costs would be required to reroute the existing 150mmØ watermain into the new terminal building. In essence, the existing watermain could be rerouted to service the new building and any old / unused pipe could be removed or abandoned in place and capped.

As identified in the Water Treatment discussion, a pressure tank and chlorine dosing system is recommended. For a capacity of 180 liters, which represents storage of 3 x the peak hour demand, a cylindrical tank could be 1 m tall with a diameter of 0.5 m, occupying a small footprint. The dosing system could be automated with a chlorine residual analyzer. Both components are proposed to be located in the new Mechanical / Electrical room.

The state of the existing water supply piping will need to be reviewed during the detailed design stage, to verify the state of the infrastructure and address any deficiencies. The main is assumed to be aligned underneath North Road from the well source to the BC Ferry washroom facility.

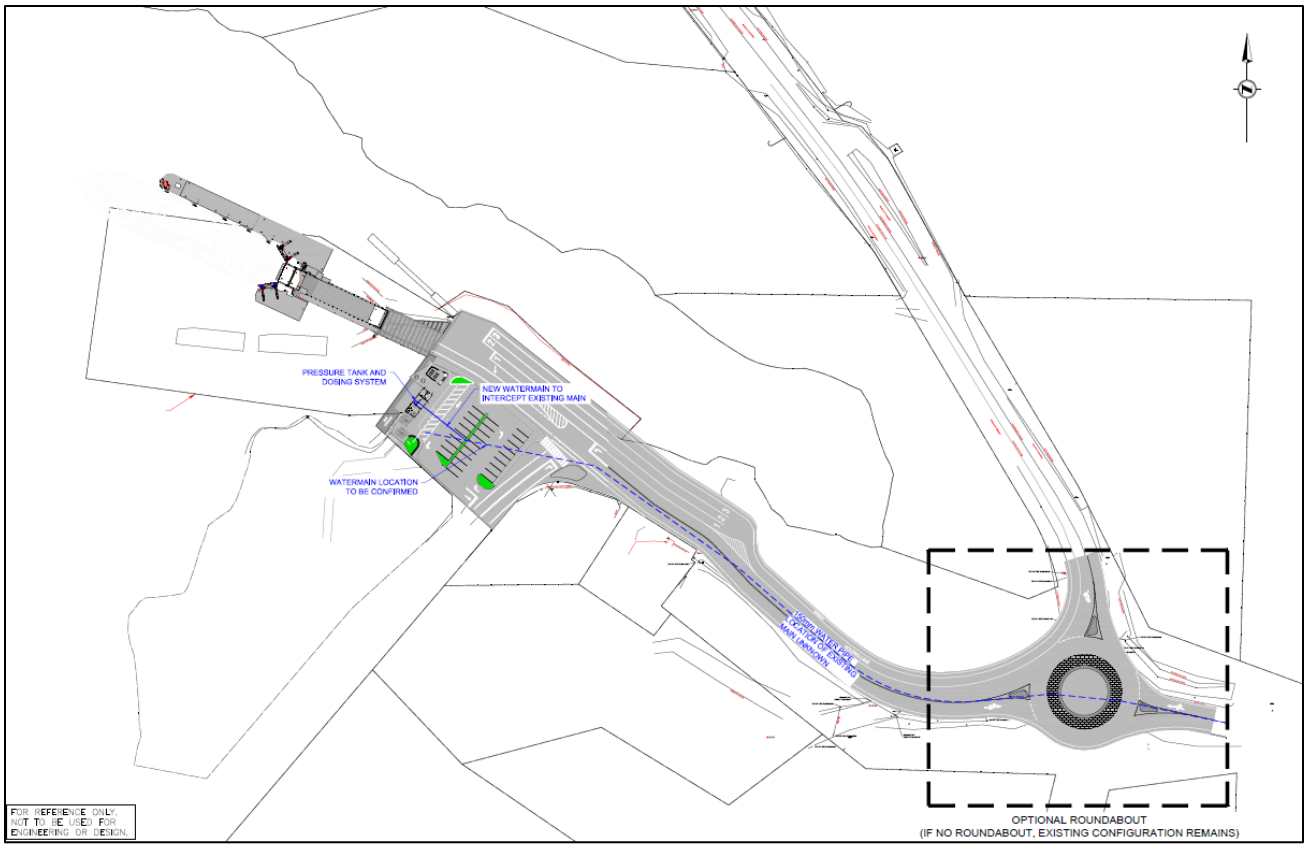

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Figure 2 - Proposed Water System

Water License

Water licenses are administered through the Water Sustainability Act (WSA). Previously, only surface water users were licensed and paid fees. Now non-domestic groundwater users, who divert water from an aquifer for a purpose beyond meeting their household needs, will start paying the same rates as surface water users. The increase in the water bill will depend on the water use purpose(s) specified in the water license. Industrial and commercial rates are in the highest rate category of $2.25/1000 m3. The minimum annual water rental rate has doubled in most cases, except for conservation and storage purposes which have remained unchanged. The majority of licences are for domestic surface water use, for which the minimum annual water rental will increase from $25 to $50[1] Further details on pricing is provided in the Water Sustainability Fees, rentals and Charge Tarif Regulations of the WSA.

Well records have been found for source lot, however, there does not appear to be an active water license in place for the source well. A commercial water license will need to be secured to provide water to the new BC Ferries Gabriola terminal.

OPTION 1A – OTHER EXISTING WELL

Additional review could also be performed for acquire water from other nearby wells. Existing registered wells located in the surrounding area are shown in the figure on the following page. The wells are depicted as small blue dots.

[1] "Water Pricing Changes", Government Brochure, Government of British Columbia.

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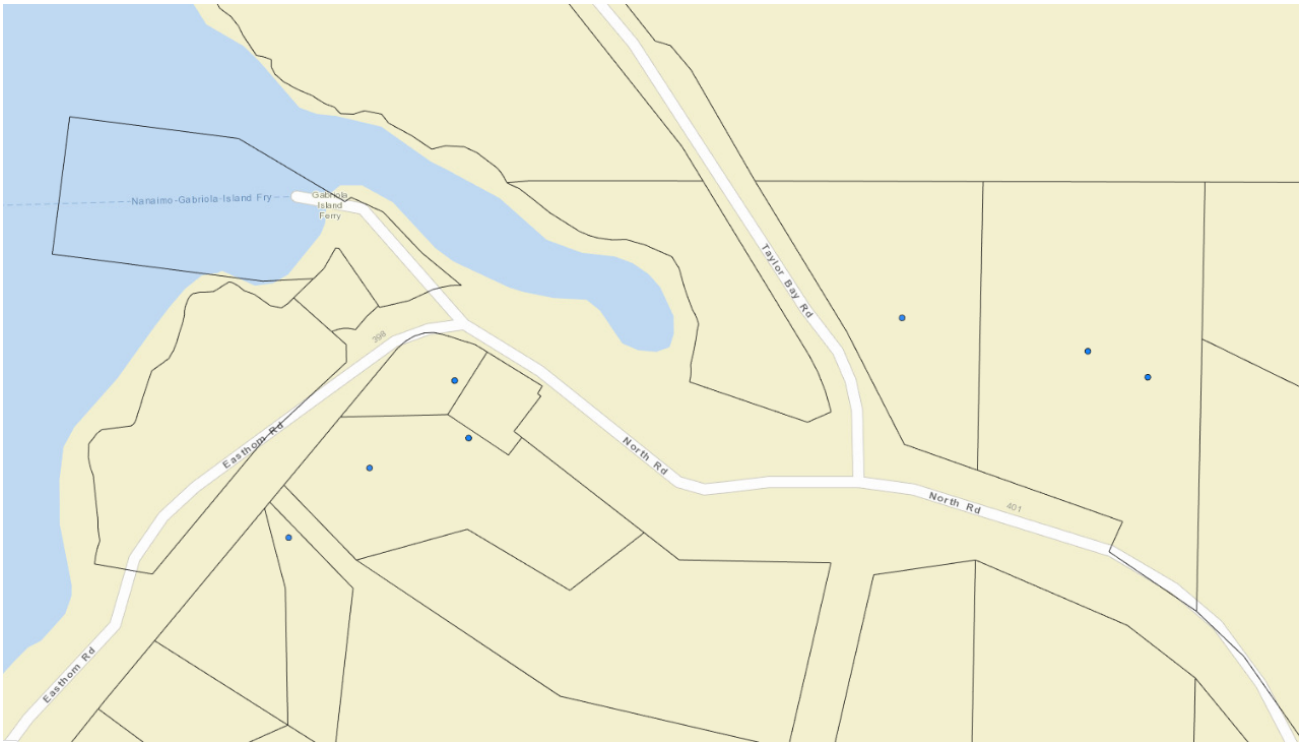

Figure 3 – Existing Wells

Basic information regarding some of the wells depicted in Figure 3 is identified below.

- Plan 32840 Section 20 Lot 4; Well depth 170 feet, Yield 6 GPM
- Plan 32840 Section 20 Lot 5; Well depth 220 feet, Yield 2 GPM
- Plan VIS 2994 Section 20 Lot 2; Well depth 140 feet, Yield 0.75 GPM
- Plan VIS 2994 Section 20 Lot 3; Well depth 280 feet, Yield n/a
- Section 20; Well depth 537 feet, Yield 10 GPM

The majority of these wells fall under ownership of Clyde Coates, W H Coates, or Hung Ngo. None of the wells are licensed and would need to go through licensing process as identified under Option 1.

Treatment and storage of potable water for the new terminal would also include a chemical dosing system and a pressure tank as identified in Option 1.

This option would also need new potable water conveyance (i.e. piping) to be installed to route from the source well to the BC Ferry Terminal.

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OPTION 3 – NEW WATER SOURCE

Another option for water supply to the new terminal facility involves BC Ferries constructing a new well at the project site.

In accordance with the British Columbia Public Health Act, Sewerage System Regulations, clause 3.1, a sewage Holding tank should be a minimum of 15m from a water well, and a sewerage system should be no less than 30 m from a well.

BC Ferries would need to apply for and secure a Water Licenses through the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR) for the use of the water from the well.

The cost for construction of a water well along with the basic water supply system could cost in estimated at approximately $20,000 +/- 20% contingency. In addition, BC Ferries would need to pay for a Water License application fee and an annual water rental fee. Furthermore, BC Ferries would need to maintain on ongoing water testing program.

Typical components of a well water supply system include

- Water well (assumed depth of 200 feet with casing pipe)
- Potable water drop pipe and tie in to the new terminal building
- Submersible water pump
- Pressure tank
- Controller and enclosure
- Power supply
- Chemical treatment
- Ancillary equipment

Most of these components could be located within the new terminal building.

REZONING AND OFFICIAL COMMUNITY PLAN POLICY

The following section identifies relevant policies and discusses how the proposed terminal upgrades support the policies.

Gabriola Island Official Community Plan Bylaw no. 166 Section 7.4 – Water Supply Policy

> *a) Methods of water conservation such as low water use fixtures, retention of rainwater and runoff in cisterns and ponds and other means shall be encouraged.*

TDP Impact: Amenities provided as part of the Terminal Development Plan will support several aspects of this clause.

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- BC Ferries is encouraged to review the feasibility of reusing grey water or rainwater for toiled flushing thereby reducing the amount of potable water consumption and reducing blackwater generation.

Gabriola Island Official Community Plan Bylaw no. 166 Section 7.4 – Water Supply Policy

f) Industrial or recreational uses which are consumptive of large quantities of water shall be discouraged.

TDP Impact: Amenities provided as part of the Terminal Development Plan will support several aspects of this clause.

- As per the BC Ferries Terminal Network Master Plan (2018), BC Ferries encourages new terminal buildings to provide water fountains / bottle filling station

CONCLUSION

Three options have been presented for acquiring water for the new BC Ferry Gabriola terminal. The first option is to continue the existing agreement to acquire water from GGCC and include new infrastructure (pressure tank and chemical dosing system) at the terminal. The pressure tank would be designed to handle peak water demands while reducing the frequency of use of the well pump. The chlorine treatments system would be used for water disinfection. This is the preferred option at this time.

Option two is similar to the first option with the exception that a different existing well would be utilized for the source water. The pressure tank and chemical system would remain the same. The additional cost for this system would be in constructing new piping between the alternate well and terminal locations.

Option three include the construction of a new well on the BC Ferry land. This is likely to have the highest initial construction costs as it would require drilling a new well and include pumping equipment. Siting the new well location could also be challenging due to the small size of the terminal lot and potential sanitary infrastructure setback requirement.

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