



VIA EMAIL

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Ben Greenough
Superintendent of Public Works
Village of Queen Charlotte
903 Oceanview Drive
Queen Charlotte, BC V0T1S0

Ref: D-16319.00

Proposed Village of Queen Charlotte Sewage Treatment Plant Site

Dear Mr. Greenough

The Village of Queen Charlotte (Village) requested that Opus International Consultants (Canada) Ltd. (Opus) provide a cursory review of a proposed site location for a new sewage treatment plant (STP). For the review, the Village provided an approximate site location and road alignment with topographic details. The following letter provides a general discussion on the proposed STP site and some issues to consider as the project advances.

1. Existing System

Opus (formerly Dayton & Knight Ltd.) prepared the report *Sewage Treatment and Disposal – Feasibility Study* (August 2010) which contains detailed information of the existing sanitary system.

The existing system for the Village consists of a municipal gravity collector sewer system which conveys flows to a series of lift stations located along Highway 33 and Oceanview Drive. There are 5 lift stations (LS) in total, with localized collection areas contributing to each one. The pump stations are connected in series, named LS1 through LS5, and pump sanitary flows eastward. The final station, LS5, pumps screened effluent to an outfall which extends 1000+ m out into Skidegate Inlet.

To connect the existing system to a new STP located at the proposed site, LS5 would need to be upgraded to pump to a new lift station located near the base of Eagle Hill Drive.

2. Treatment Plant Siting Criteria

Important factors to consider when selecting a site for a sewage treatment plant, with discharge to the marine environment, include the following:

- A site in close proximity to the best location for integrating the effluent discharge into the marine environment.
- A site elevation near the ocean level to minimize pumping costs
- A large and relatively flat site, suitable for minimum 50 to 100 years of growth projects.

- A site remote from existing and future residential/commercial development, ideally industrially zoned.

3. Proposed Treatment Plant Site

To comply with current Federal/Provincial regulations it is likely that the proposed STP will require, as a minimum, secondary treatment prior to effluent discharge into Skidegate Inlet. This will need to be confirmed by an Environmental Impact Study (EIS) for the upgraded discharge as required by the BC Municipal Wastewater Regulations (MWR). The proposed STP site is large enough for long term needs.

Site elevation, however, is a disadvantage in that energy costs, for pumping and maintenance of pump stations, will be high over the long term. This is discussed further in Item 4.

Zoning and the OCP designation for the proposed STP site are unknown. The Village has identified that future residential development is proposed within the southern portion of DL18. Odour mitigation will be essential in the process selection and design for the treatment plant works. A minimum of 50 m treed buffer should be secured between the STP site and the remainder of DL18 where residential development may occur.

The proposed site for the STP is the north portion of DL18 above Oceanview Drive at Eagle Hill Drive. The elevation gain is approximately 120 m above the existing sewer collection system. The proposed site has varying topography with areas in excess of 25% grades. The area likely has bedrock at a shallow depth, which is normal for this terrain. As treatment plants require level ground for treatment works, a significant blasting and grading effort would be required to clear and level the site. The topography at the proposed site would likely impact the type and design of the treatment system.

As the site is considered a greenfield, environmental and archaeological studies would need to be completed to properly plan and design the work. We are unable to comment on any environmental or archaeological aspects of the site.

Treatment plants (excluding large aerated lagoons) can be built with odour control; however, it is not technically practical to achieve 100% odour removal, under all operational conditions. Generally, odour remains local to the plant site; however, as the proposed property is elevated it is possible that foul odour would migrate downhill. Typically, in areas with steep mountains, winds will regularly sweep down the mountain face in the evening (particularly in the summer) which would carry odour to lower lying areas (katabatic winds).

Access to the site would be challenging, as the proposed road could have slopes up to 20%, based on preliminary sketches provided. For this type of road, we would typically recommend paving the sections with grades in excess of 15% to facilitate access, especially during winter months when there are heavy rains, and possible freezing or snow. Steep gravel roads are subject to rutting and wash boarding, another reason why paving would be recommended. This access would also add additional costs for material delivery, namely concrete, due to potential reduced truck delivery volumes.

4. Sewage Pumping

The proposed site would require pumping sewage approximately 120 m up the slope (elevation-wise). Due to the solids handling capability of sewage pumps they are not the most efficient. It is likely that 2 pump stations in series will be required to lift the sewage to the site. Each pump station would include a duty/stand-by pump system operating at approximately 60 to 80 hp. The annual estimated power consumption would likely cost between \$15,000 and \$20,000 per year for the two lift stations.

5. Power

Three-phase power and a high voltage line would be required for the STP and lift stations. Three-phase power is available along Oceanview Drive, and the primary line has enough capacity, based on preliminary discussions with BC Hydro. New power infrastructure would be required up Eagle Hill Drive. All new high voltage lines would belong to BC Hydro once built, although they could be built by the contractor doing the other STP works. At each site which needs the three-phase power (lift stations and STP) a transformer would be needed, and would also belong to BC Hydro. Each lift station and the STP would need a back-up generator to make sure the system could operate during a power outage. The option of a private, underground hydro service, would have to be considered during design in lieu of localized back-up generators at each pump station.

6. Linear Infrastructure

At a minimum, linear infrastructure to the plant would include: an access road, a forcemain, drainage piping, outfall piping, power poles or conduits, and control conduits. Typically, linear infrastructure is built within the roadway to reduce the amount of clearing required within the right-of-way (ROW); the feasibility of locating infrastructure under the road would be determined during design once a geotechnical investigation has been done.

7. Closure

Based on the information provided, there are no technical issues which would prevent the use of the proposed site; however, it would not typically be a preferred site should other options exist due to the added operational costs and complexities directly resulting from the site elevation, grades and distance from the collection system. During detailed design, the above technical issues will require consideration by the design and operation teams.

The above discussion provides a high-level overview for considerations of the proposed site for a STP. We trust that the information provided meets the needs of the Village. Please do not hesitate to contact the undersigned if you have any questions.

Regards,



Walt Bayless, P.Eng.
Project Manager