

926-12-9

BRYNELSEN BENZON REALTY CORP.

PROOF OF WATER  
FOR  
SUBDIVISION OF D.L. 2990, GROUP 1, N.W.D.  
(Except Portion in Plan 13631)  
AT FRENCHMANS COVE ON THE SECHELT PENINSULA

PACIFIC HYDROLOGY CONSULTANTS LTD.

January 6, 1984

**PACIFIC HYDROLOGY CONSULTANTS LTD.**  
CONSULTING GROUNDWATER GEOLOGISTS

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January 6, 1984

Brynelsen Benzon Realty Corp.  
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566 Cardero Street  
Vancouver, B.C. V6G 2W6

Attention: Mr. Dal S. Brynelsen, R.I.(B.C.)

Subject: Proof of Water for Subdivision of D.L. 2990,  
Group 1, N.W.D. (Except Portion in Plan 13631)  
At Frenchmans Cove on the Sechelt Peninsula

Dear Sir:

This is further to a discussion at our office on January 4 about proof of water for a subdivision of part of D.L. 2990 at Frenchmans Cove on the Sechelt Peninsula. This letter-report is based on notes in our file prepared following a visit to the property in January 1981, at which time we met with Mr. P.M. Gordon, B.C.L.S., to discuss proof of water for the proposed development. In preparation of this letter-report we have also had a discussion with Mr. S. McCourt, an employee of Frank Jorgensen Contracting Ltd. of Sechelt, who recently did some excavating with a backhoe on the property. The subject property is shown on Figure 1 attached.

We understand that the situation is approximately as follows:

1. The land is to be subdivided into parcels with a minimum size of 1.2 to 1.6 hectares (3 to 4 acres). The total number of parcels will be 13.

2. There is no road access at present and because the property is bounded by a Provincial Park, road access is not likely in future.
3. Because of the nature of the property and the water access, the lots will be used only for recreational purposes. Under the circumstances, the size of dwellings is likely to be small with little or no lawns or gardens.
4. Water demand is likely to be uneven with maximum demand on summer weekends and minimum demand in winter months.

The purpose of this letter-report is to discuss the feasibility of developing adequate individual domestic supplies of potable groundwater as defined by Sunshine Coast Regional District Bylaw #103, Section 5.5.1:

"5.5 Water Supply

5.5.1. Independent Supply

1. Where a parcel to be created is not to be served by a common water system the approving officer shall require proof by a qualified person of a water supply of 2000 litres (440.0 gallons) per day available on that parcel.
2. Each independent water source shall be at least 30 metres (98.44 feet) from a sewage disposal field or property boundary."

Setting and Geology

The subject property is located on a peninsula formed by a long, narrow, northwesterly-trending bay called Frenchmans Cove. The southeast part of the property is an island.

The topography is very irregular, typical of a coastal area underlain by hard brittle rocks that has been subjected to intense glaciation. The maximum elevation

is in the northwest part of the property where rocky hills rise to about  $42\frac{1}{2}$  m (140 ft) above sea level.

Bedrock is exposed on more than 50% of the property. Except for a marsh in the central part of the property, most patches of overburden are small and isolated. The overburden, except in the marshy area mentioned above, is probably mostly permeable sand and gravel. At the time of my visit to the property in 1981, the overburden in the marsh could be seen in several "perc test" holes. It consists of glaciomarine silt containing a few stones. This material was deposited at the end of the last glacial episode in the area when sea level was tens of metres (several hundred feet) higher than it is at present. The silt, along with a minor amount of sand, came from meltwater streams off retreating glaciers that were melting. The stones were dropped from floating ice. This blanket of sediment did not remain on the steep-sided bedrock hills but collected in depressions.

The bedrock in the area of the subject property consists of rocks of the Coast Range Batholith. The Batholith rocks are mostly light-coloured diorite along with related rocks that contain variable amounts of included darker rock. The rock is all brittle and strong with numerous joints and other fractures.

#### Hydrology

The only source of fresh water in the subject area is precipitation falling directly on the land surface: the average annual precipitation at Sechelt is 1099 mm (43.27 in). Part of the precipitation runs off as

intermittent surface streams, part moves down to become ground-water and part is returned to the atmosphere by the processes of evaporation and transpiration. During the growing season from early April to the middle of October, there is very little surface run-off or groundwater recharge. Most recharge occurs between mid-winter and the start of the growing season in early April. Between April and November, most water (whether groundwater or surface water) comes from storage below the ground surface.

#### Water Supply

Water sources for domestic supply which may be considered for the subject property are:

1. A pipeline across Frenchmans Cove from the nearest system operated by the Regional District.
2. A community water supply system obtaining water from one or more sources.
3. Individual wells drilled in rock, with one well on each lot.
4. A central source from which individual property owners can transport water.

Any type of community water supply scheme on the subject property would be difficult and expensive to construct because of the large lot sizes and the amount of exposed rock over which pipes would have to be run. A source of about  $\frac{1}{2}$  l/sec ( $6\frac{1}{2}$  igpm) along with a small storage reservoir would be required for 13 lots. Possible sources are a rock well and water stored below surface in the marsh area.

In consideration of access, economy and the primarily recreational use of the subject property, the most logical source to concentrate development on is the water stored below surface in the marsh. It is difficult to estimate the amount of groundwater stored in this source because the thickness of sediment under the marsh is unknown, as is the porosity and permeability of the sediments between ground surface and the surface of the rock. The overburden material above the rock is likely to consist largely of glaciomarine silt that has a low permeability, making it difficult to recover any stored water. By making certain assumptions about the various unknown parameters mentioned above, it is possible to obtain a conservative estimate of the potential quantity of water in storage in the ground beneath the marshy area.

For example, if the marsh has an area of 2 hectares (5 acres) and the underlying sediments have an average thickness of 2.4 metres (8 ft) with a useful porosity of 15%, there is about  $7.4 \times 10^3 \text{ m}^3$  (6 acre ft or 1.6 million gallons) of water in storage. Over a 200 day period of use, this represents about 30,000 litres (8000 gallons) per day. The estimate of average thickness of sediment used in this calculation is quite conservative as shown by the experience of Frank Jorgensen Contracting Ltd. when excavating with a backhoe at the edge of the marshy area, where it was possible to dig to 4.6 m (15 ft) without reaching bedrock. The backhoe operator reports that digging was entirely in clay and that it was not possible to dig deeper than 4.6 m at the edge of the marsh because of caving.

Another approach to the question of how much water is stored below ground surface in the marshy area

is to speculate on the possible percentage of total precipitation that goes to recharge the area. The marshy area is recharged directly from precipitation and also from local flow off the surrounding slopes of the catchment area. An approximation of the amount of water in storage can be made from the following assumptions:

1. the average annual precipitation is about 1 m (based on average statistics for Sechelt);
2. approximately  $2/3$  (or 660 mm) of the total annual precipitation falls during the period of low evaporation and transpiration losses from October to April;
3. approximately  $1/3$  (or 220 mm) of this infiltrates to directly recharge the subsurface materials;
4. the catchment area is approximately  $3.6 \times 10^4 \text{ m}^2$  ( $3.9 \times 10^5 \text{ ft}^2$ ).

On this basis,  $8 \times 10^3 \text{ m}^3$  of groundwater are available in the marshy area. This shows close agreement with the previous calculation.

Both of these calculations, which are based on rather conservative assumptions, indicate that the required amount of water for the proposed development is available in the marshy area. The cattails and reeds in the marsh show that the groundwater in the sediments underlying the marsh is generally of good quality. There are no signs of iron precipitation in the marshy area.

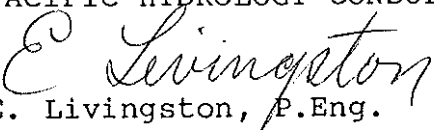
Obviously the estimates of groundwater in storage are meaningful only if the sediments underlying the swamp are sufficiently permeable to permit recovery of water by means of a central well (or wells) or a buried drain. As noted, all of the assumptions used in the calculations are quite conservative. In our opinion the required amount

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of good quality groundwater for the proposed development can be developed in the marshy area. Some experimentation may be required to establish the most satisfactory method of exploiting the resource.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

  
E. Livingston, P.Eng.

attachment

EL/ec



APPENDIX


LOCATION MAP

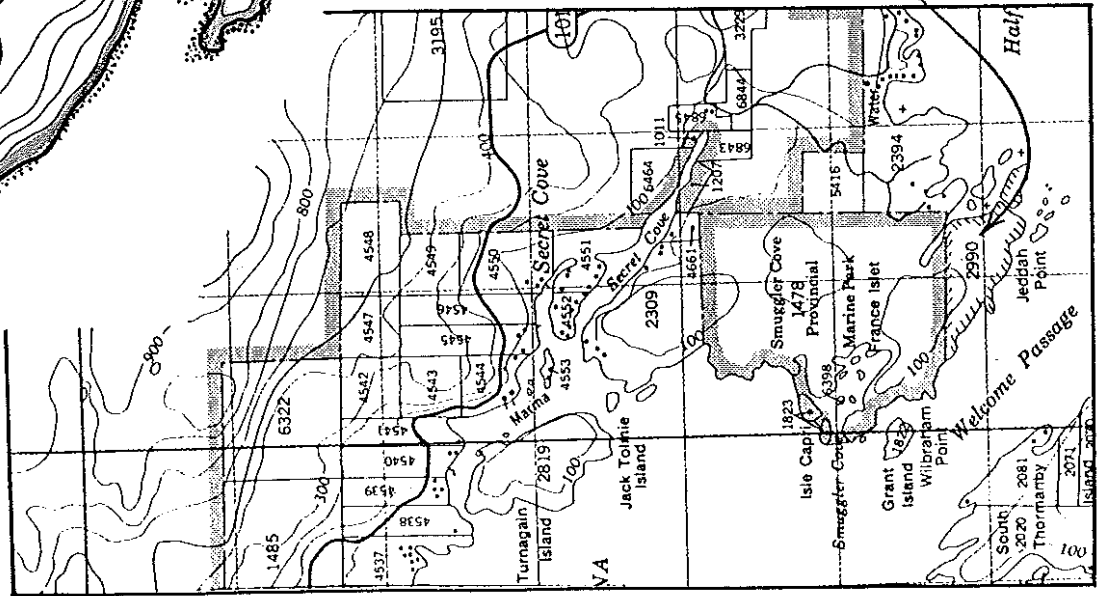
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AT FRENCHMANS COVE ON THE SECHELT PENINSULA



[Scale 1" = 500 ft.]

 Catchment area for marshy area



[Portion of 1:50 000 Scale  
 NTS 92G/12, SECHELT INLET]

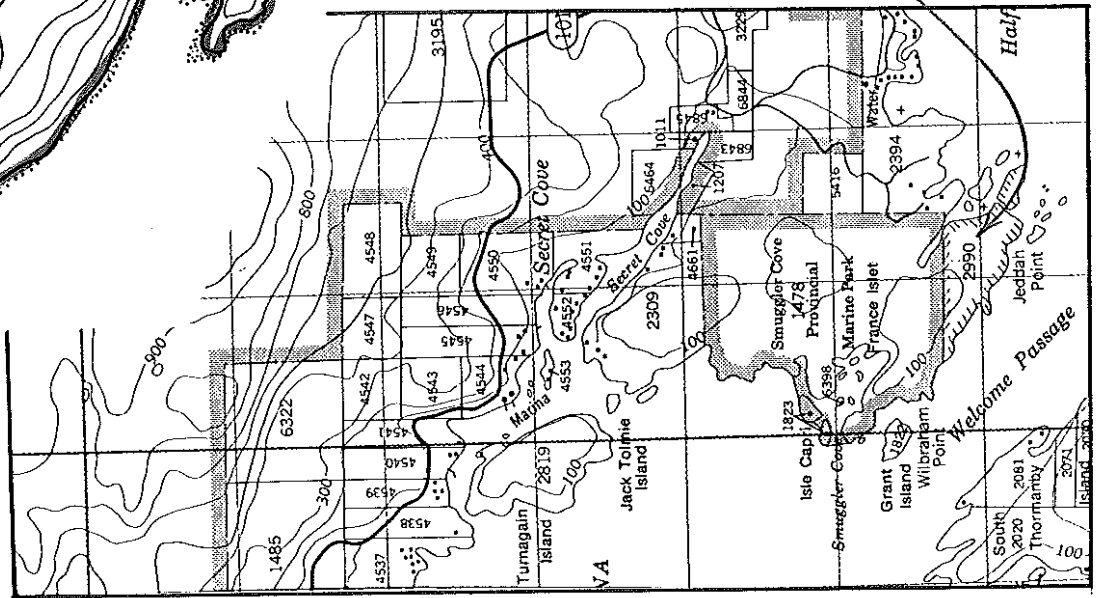
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