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North Pender Island - Islands Trust

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Further to the Islands Trust request of March 17, 1976, please find attached a review of all available hydrogeological and hydrochemical information for North Pender Island completed by G. Harris under my supervision. Specific information has been provided where possible for the northern areas of the island where further development is anticipated. The information was compiled to ascertain how much further groundwater development could be sustained in the northern parts of the island without degrading the resource.

Estimates of groundwater potential depend primarily upon the quantity of rainfall that can infiltrate to the aquifer zones on an annual basis and the ability of the aquifer materials to store and transmit this water. Groundwater, however, may be removed from an aquifer at a rate in excess of the annual replenishment or recharge rate, thereby with subsequent mining of the aquifer taking place. Ideally, annual groundwater withdrawals should be limited to the annual recharge to avoid mining. Mining can proceed only for a limited amount of time as water levels will eventually drop below the point of pumping, sea water will migrate into the aquifer zones and/or natural saline groundwaters at depth may be encountered. In some cases groundwater withdrawals may induce additional recharge which normally may not have taken place, thereby increasing available water supplies.

The available recharge to groundwater from precipitation on North Pender Island has been estimated at one inch per year on the basis of other studies in the Gulf Islands (Foweraker, 1974). This figure is believed to be a conservative estimate, but in view of the fact that storage within the fractured bedrock is a limiting factor, the one-inch figure is probably not unreasonable.

A contributing watershed area was determined for the specific site areas (Table 1) where future development is anticipated and the annual recharge quantity calculated using the one-inch recharge figure. Existing groundwater use utilizing data as of 1974 was estimated on the basis of an average of 350 gpd per well for 100 days pumping. This use figure only considers normal residential requirements, although many wells may also be used for agricultural purposes, resorts, schools, etc. The difference between the annual recharge quantity and the annual groundwater withdrawal indicates whether additional groundwater may be available for development (positive difference) or whether groundwater mining is probably taking place (negative difference). Where additional groundwater development is indicated, a cal-

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June 30, 1976

culuation is made of the additional 350 gpd units warranted. Where individual wells are located on individual lots, this indicates the number of additional wells warranted. Multi-lot developments may, however, be serviced by single wells rated at 350 gpd per lot. Requirements of 350 gpd per lot, however, are subject to revision.

It would appear from the above estimates that present annual groundwater use in the northwestern peninsula on North Pender Island exceeds the natural annual recharge. It would be advisable to monitor an observation well in this region to substantiate that groundwater mining is taking place before any future development is planned. The remaining site areas show some room for more groundwater development on a limited basis for an additional total of 80 units at 350 gpd each.

In summary, a preliminary estimate has been made of present groundwater use and potential for further groundwater development in specific areas in the northern part of North Pender Island. Observation wells and long-term water level records are needed to document whether groundwater mining is presently taking place in the northwestern peninsula of the island. Groundwater for an additional 80 residential units based on 350 gpd for each unit over 100 days may be available for development southeast of Hope Bay, north of Port Browning and north of Shingle Bay. The above figures should be used with reservation as the analysis is based on available data to 1974. A field investigation, including well inventory, would be desirable this summer to update the existing information. It is generally recommended that future wells should be located preferably away from the coastal areas to avoid sea water intrusion and water quality samples should be obtained on a periodic basis to monitor any changes in water chemistry which may occur.

#### Reference

Foweraker, J.C. 1974. Groundwater Investigations on Mayne Island, Report No. 1, Evaluation, Development and Management of the Groundwater Resource on Mayne Island, B.C. Water Resources Service.



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Attach.

TABLE 1  
NORTH PENDER ISLAND  
Estimates of Groundwater Recharge, Groundwater Use  
and Additional Development Units

Sites	Contributing Watershed Area in Ft <sup>2</sup>	Acres	Acre Feet of H <sub>2</sub> O Assuming 1" Recharge	Equivalent Recharge In U.S. Gal.	No. of Wells In Water- shed Area As of 1974	Estimated Groundwater Use Based On 350 gpd for 100 Days of Pumping	Difference Between Use and Available Recharge In U.S. Gal.	Estimated Additional Development Units at 350 gpd.
1	2,833,333	65.04	5.42	$1.76 \times 10^6$	17	595,000	$+ 1.17 \times 10^6$	33
2	2,842,592	65.25	5.44	$1.77 \times 10^6$	22	770,000	$+ 1.00 \times 10^6$	28
3	1,072,222	24.61	2.05	$6.68 \times 10^5$	36	1,260,000	$- 5.91 \times 10^5$	0
4	4,353,703	99.94	8.32	$2.7 \times 10^6$	86	3,010,000	$- 2.98 \times 10^5$	0
5	1,353,703	31.08	2.59	$8.4 \times 10^5$	5	175,000	$+ 6.69 \times 10^5$	19