A Preliminary Assessment of the Groundwater Resources of Savary Island, British Columbia

By

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For

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And

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EXECUTIVE SUMMARY

Groundwater is the principal source of water on Savary Island. The groundwater resources are recognized by the community as a whole and the various levels of government to be a highly valuable resource that requires active and ongoing procedures for its protection, maintenance and assessment. This study was intended as a preliminary study of the hydrogeology of the whole of the island upon which future studies and planning can be based. It included the compilation of all available data, initiation of an inventory of wells, septic disposal systems, and land use, mapping of the geology of the island, and estimating the present consumption of groundwater. This was completed in part by a survey of property owners in July and August, and a water quality study of selected wells in September. The study was conducted from June to September of 1995 with the generous funding assistance of the following:

Real Estate Foundation of British Columbia;
Savary Island Property Owners;
Powell River Regional District;
British Columbia Ministry of Environment, Lands and Parks;
Savary Island Property Owners Association, and;
British Columbia Ministry of Health.

Savary Island is a narrow remnant of Quadra Sands glacial outwash sediments comprising a total of only 449.6 hectares (1,111 acres) in area. The island is divided into five District Lots that include from east to west: DL 1372, DL 1373, DL 1375, DL 1376 and DL 1377. The area of DL 1375 has been the subject of a now failed development proposal. Savary is located in southwestern British Columbia at the northern end of the Strait of Georgia in the rainshadow of the Vancouver Island mountains. There is a significant seasonal increase in groundwater demand during the summer months with an over 1,500% increase from 70 to over 1,000 people staying on island. The island has one of the highest lot densities of any in the Strait, but as yet has only approximately 14.4% of the area and 27.7% (471 out of approximately 1701) of the lots developed.

There is a lack of data upon which to come to any definitive conclusions about the quantity groundwater present on Savary. There are no continuously monitored observation wells or long-term data upon which to base an accurate hydrological model. Hydrological conclusions reached in this study are based on previous well pump test studies, geological mapping, wells logs and limited water level monitoring data.

There is a single Main Aquifer that extends the entire length of the island. This is divided into six groundwater domains that are subdivided again along the north-south divide of the island. There are also three perched or shallow aquifers identified: the Keefer Bay Aquifer, the West Perched Aquifers (comprising three small perched aquifers), and the Indian Point Shallow Aquifer. There are four known springs related to perched aquifers, three of which (Indian Springs, the Neilsen Spring and the Meadows, or Julian Road South, Spring) are used for household water supply.

There are an estimated 82 drilled wells, 35 shallow dug wells and 140 sand point wells in use on Savary, totaling 257. The Savary Shares Improvement District (SSID), comprising 211 lots, has the only community well service on the island. Installed in 1970, the SSID well produces 3.75 million litres (0.82 million Imp. gallons) of water a year. In preparation for the development of the DL 1375 property, two high production wells were installed in 1994.

Groundwater consumption on the whole island is estimated to be 1.26×10^7 litres/year (2.77×10^6 Imp. gal/yr.) Based on preliminary estimates, this is considered safely below the crudely calculated net groundwater recharge of between 1.0×10^9 and 2.2×10^9 litres/year (2.2×10^8 and 4.9×10^8 Imp. gal/yr.). The ratio of consumption to recharge is calculated as between only 0.5% and 1%. Provided development on the island remains for the most part seasonal recreational and per property consumption averages remain similar to what they are now, there is likely more than enough groundwater to maintain a sustainable yield for many years to come. This however does not account for local hydrogeological conditions or cumulative rates of consumption. Employing alternative sources of water such as catchment systems, and changes in consumption habits, including elimination of the use of conventional flush toilet systems, are the best ways to maintain the availability of the groundwater resource.

This study included the collection and analysis of 27 well and spring water samples. Only one sample had salinity levels over the 1987 Canadian Council of Resource and Environment Ministers (CCREM) drinking water quality guidelines, the cause of which is not directly known. The perched and shallow aquifers were demonstrated to be a risk from contamination with fecal coliform contamination in four of the 11 wells tested. Total coliform counts were high for both the shallow and the deep wells. The quality of the groundwater, specifically for the perched and shallow aquifers, is considered more at risk than the quantity of supply.

Given the established high subdivision density of a significant proportion of the island combined with its unique hydrogeology, population growth (both seasonal and permanent) poses a greater threat to the groundwater than restricted development of some of the remaining large parcels of bare land.

At the present time there is no active groundwater management plan in place, nor the regulatory ability to do so, that is designed to provide a sustainable groundwater resource for all present and future consumers through protection of quality and supply. There is also no established means for the collection of well and groundwater data, voluntary or required, in a centralized facility such as the Regional District offices. The development of a strategy for the management of the groundwater on Savary Island is recommended. A strategy of this kind could be formulated as part of an Official Community Plan, the broader context of which would better enable the land use controls and protected watersheds needed to protect the sustainability of this resource long into the future.

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1.0 INTRODUCTION

Referred to in the past as British Columbia's "South Sea Paradise," Savary Island is situated in the northwestern reaches of the Strait of Georgia, and extends in an east-west direction between Powell River on the mainland to the east and Campbell River on Vancouver Island to the west. The island is located approximately 150 kilometres northwest of Vancouver, 1.8 kilometres southwest of the village of Lund, the northern terminus of Highway 101. Access is by boat from Lund, or by small fixed wing plane to a private gravel airstrip.

Savary Island is 449.6 hectares (1,111 acres) in area. In the 1870's the Colonial government subdivided the island for homesteading purposes into five District Lots (Kennedy, 1992) (**Map 1a**) that from east to west included:

- D.L. 1372 (64.7 hectares; 160 acres);
- D.L. 1373 (61.1 hectares; 151 acres);
- D.L. 1375 (128.3 hectares; 317 acres);
- D.L. 1376 (67.6 hectares; 167 acres), and;
- D.L. 1377 (127.9 hectares; 316 acres).

In 1910, most of DL 1372, 1376 and 1377, and the north shore of 1373, were subdivided into 1311 small lots averaging approximately 0.1 hectare (0.2 acre). The south portion of DL 1373 and part of 1372, now known as the Savary Shores Improvement District (SSID) was sub-divided into an additional 211 lots averaging approximately 0.12 hectares (0.3 acres) in 1969. In 1970, seven 4.0 hectare (10 acres) lots and a 14.2 hectare (35 acre) common property area were created on the 32 hectare (80 acre) property referred to as Parcel B on DL 1377. Today, DL 1375 is the only District Lot on the island that has not been sub-divided. There are only 17 sub-divided larger lots on the island ranging between 0.7 and 9.3 hectares (1.8 and 23 acres).

Recent events on Savary Island have made protection of the community groundwater resource a key issue. These include the release of the Indian Point water quality survey by the Coast-Garibaldi Health Unit in 1995 that identified numerous wells in that area contaminated by septic effluent from onsite sewage treatment systems, and the recently failed proposal for the development of DL 1375 by RRR Construction (draft by-law rescinded September 28, 1995). Although these events and the issues relating to them are important, they only help to emphasize the more basic significance of the following factors:

- the existence of more than 1650 private lots on the island, over 1500 of which are less than 0.2 hectares (0.5 acres);
- lands available for protected groundwater recharge watersheds include only 32 Crown public owned lots totaling approximately 6 hectares (15 acres) and the 14.1 hectare (35 acre) Common Area of VR1143 (the Parcel B subdivision) on DL 1377;
- the previous lack of enforcement of health regulations, specifically with regard to sewage treatment, and building codes;
- the recent surge in property development, and;
- the fragility of the environment and the geology of the island.

Water on Savary Island is a limited resource entirely dependent on the amount of annual precipitation that falls on the island. There is no natural surface water storage (no lakes, rivers or winter snow pack) and the community is largely dependent on the below surface storage of groundwater as its principal source of potable water. As a result, there are two very important factors to be considered with regard to the protection of this valuable resource:

- the total quantity of annual groundwater consumption possible;
- the protection of the quality of the groundwater from contamination.

Winter rains replenish groundwater levels, which limits the total amount of groundwater that can be withdrawn every year before demand exceeds supply and this valuable resource is diminished below adequate levels. Fortunately, the island is blessed with a good aquifer, known as the Quadra Sands.

As yet no comprehensive hydrogeological study has incorporated the data required to properly estimate the extent of the aquifer and the groundwater resource on the island and what future limitations on annual use (draw down) need to be considered. This study is a preliminary attempt to help in the development of an empirical groundwater level monitoring data base, proper enforceable wellhead protection, proper sewage treatment and, most importantly, education. To begin to be able to properly plan for the protection of both the quantity and quality of the groundwater supply on Savary Island, this preliminary hydrogeological study of the entire island was undertaken.

This study has the endorsement of the Powell River Regional District Board, the Savary Island Planning Committee, and the provincial Ministry of the Environment, Lands and Parks (BCE). Support came from the Real Estate Foundation of British Columbia, Savary Island Property Owners, the Powell River Regional District, the British Columbia Ministry of Environment, Lands and Parks, the Savary Island Property Owners Association, the British Columbia Ministry of Health and Capilano College.

1.1 Purpose and Scope

This preliminary analysis of the groundwater resources of Savary Island will allow the Regional District and the Island Planning Committee to begin addressing land use issues on the island and planning for the growth of the community. It also provides the important basis for further studies.

Due to the near complete lack of long term empirical data regarding the hydrogeology and groundwater resources of whole of Savary Island, the scope of this report is limited. There is no established monitoring well or continuously recorded water level data from Savary Island with which to infer a more conclusive understanding of the quantity of groundwater available.

Given the level of data and funding available, this study was designed to provide the greatest possible level of understanding of the hydrogeology of the island at this time, and initiate a well water level monitoring program that will provide the data to enable a more conclusive study in the future.

The intention of this project was to compile and inventory:

a) all existing groundwater data and reports;
b) well logs of existing wells;
c) the distribution and locations of wells;
d) geological data;
e) the level of property development and use;
f) the sources and consumption levels of water;
g) the distribution of septic treatment system types.

The initiation of well water level and water quality base-line monitoring was also begun. Unfortunately, due to funding difficulties, it was not possible to collect meaningful water level data before the end of the field season.

This report focuses on geological aspects of the hydrogeology of Savary Island, and extrapolates that information to establishing a hydrogeological model for the Island. It also attempts to summarize in a map format -- land use, water consumption and hydrogeological data for application to community planning.

Repeated proposals to drill a deep well for long term monitoring of the freshwater/saltwater interface beneath the island was rejected. The anticipated high cost of such a well, scheduling difficulties and the numerous technical and geological problems that would likely be encountered, made this option a poor use of the limited resources available.

1.2 Methodology

The methodology incorporated into this study involved a variety of tasks and efforts. Initial compilation work required interviewing a broad spectrum of people to get all the technical data and reports on the groundwater of Savary as available. A large part of the work effort included interviewing property owners on a door-to-door basis to get basic well (location, depth, type, stratigraphic log), water consumption, and septic wasted treatment data. A total of 142 property owners were interviewed, representing approximately 30% of the total that actively come to Savary. The data from the survey is presented in **Appendix II**. The data does not report property lot numbers or owner's names to protect individual privacy.

Geological mapping was undertaken of all cliffs and exposures on the island. A total of 33 well logs were collected and proved invaluable in understanding the geology of the island. In addition, all cliff exposures were photographed to establish a photo record for monitoring of erosion.

Results of the geological survey, land use and development data and water consumption estimates are presented on maps drafted from 1:5,000 topographic and 1:10,000 cadastral base maps provided by the Powell River Regional District planning office.

The combined data collected from the property owners interviewed, the provincial Property Assessment Records and personal observations, provides a good

statistical data base upon which to draw conclusions and estimates about island land use, water consumption and septic waste treatment

The initial work proposal for this study outlined the collection of well water level readings while conducting the above consumption survey. This was abandoned firstly due to the lack of time, and secondly due to the lack of equipment and funds available to collect continuous water level data relative to the tidal variations. Limited water level data was collected with a home-made level recorder using a 40 metre (130 foot) spool of speaker wire and a VOM Multitester resistance meter.

Water quality analysis was conducted with the aid of the Coast Garibaldi Health Unit, which provided sterile sample bottles and laboratory analysis for a total of 27 samples. Bacteriological analysis was conducted by The Provincial Laboratory at the B.C. Centre for Disease Control in Vancouver. Chemical analysis for pH, dissolved chlorine, sodium, nitrates and conductivity was done by Zenon Environmental Laboratories. Samples were collected from a variety of widely distributed deeper drilled wells, shallow dug wells, sand point wells and springs, and submitted for analysis for fecal and total coliform, and nitrates, nitrites, phosphates and conductance. Samples were collected on September 20, 1995 and sent by courier to Vancouver the same day.

A topographic level survey was done of 18 well heads on the island in preparation for establishing a hydraulic gradient map of the aquifers present. Sea level elevations reported by the Canadian Hydrographic Service were used to provide control for the survey. A Nikkon surveyor's level was used. Unfortunately, due to time constraints, survey loop closure was not possible.

Weather records and precipitation monitoring was initiated in July of 1995 on the island. A rain gage was installed in the open meadow near the south end of Julian Road. Rain measurements were recorded from a Taylor 5 inch Clear-Vu Rain Gage. Weather records were also collected independently of this study beginning in January of 1995 by local resident, Martin Hill.

1.3 Previous Studies

A variety of groundwater studies have been conducted on Savary Island. All of these have been conducted in direct association with development projects on the island. The first work was done in response to proposed development of the Savary Shores Improvement District (SSID) by Marineland Developments in 1969. A more recent study was done for RRR Construction in regard to DL 1375, commonly known as the Trillion property. A number of important geological papers have been written by various authors from the Geological Survey of Canada and the B.C. Ministry of the Environment. The following is a list of the reports conducted that relate directly to the geology and hydrogeology of Savary Island:

1) **Preliminary Groundwater Evaluation of D.L 1373 and D.L. 1373, Savary Island, British Columbia**, by W.L Brown, in April 1970;

2) **Effect of Development of Southwest Portion of District Lot 1372 and southerly part of District Lot 1373 on Existing Property Along Northern Side of Savary Island**, by R.A. Spence, April, 1970;

3) **Report on Pump Test of a Well Owned by Marineland Investments Lt. at Savary Island, B.C.**, By E Livingston in Nov. 1970;

4) **Report to Marineland Investments Lt. on Evaluation of Erosion, South Side of Savary Island**, by C.O. Brawner, January 1971;

5) **Evaluation of Groundwater Potential of Savary Island, British Columbia**, By W.L. Brown on February, 1971;

6) **Quadra Sand: A Study of the late Pleistocene Geology and Geomorphic Evolution of Coastal Southwest British Columbia, GSC Paper 77-17**, by J.J. Clague in 1977;

7) **A Review of the Groundwater Situation on Savary Island** by E. Livingston, February, 1988;

8) **Investigation of Erosion, Indian Point, Savary Island**, Brendan Holden in March, 1993;

9) **Completion Report, Evaluation of Groundwater Resources on D.L. 1375 of Savary Island** by Ann Badry in may of 1995.

Most of the above hydrological reports are based largely on pump test related evaluations of specific areas and properties on the island. Some attempts have been made to estimate the groundwater resources and hydrogeology of the island (Brown, 1971; Livingston, 1988), but have to date been incomplete in data, assumptions made and only been calculated for the area of DL 1372 and 1373. The numerous written discussions of the groundwater in the Mace Point area by Mr. Hugh Rickard, a long time visitor and resident of Savary Island, also requires mention here.

1.4 Regulatory Framework

Savary Island is within the jurisdiction of the Powell River Regional District. In 1994, the community elected a local Planning Committee that operates in an advisory capacity to address the concerns of the island to Board. The Planning Committee and the District have little control over the development of the Island at present. Regulation 274/69 of the Local Services Act only stipulates a minimum lot size of 4 hectares (10 acres) for subdivision. Any variation form this would require the Local Services Act to be repealed through the adoption of a regulatory by-law by the Regional Board, a process requiring a public hearing.

Unfortunately, the processes of regional government on Savary are particularly inefficient due the fragmented nature of the community resulting from the fact that

over 90 percent of the property owners are seasonal or absent, and ineligible to vote in local elections.

Ministry of Health inspectors have some power to limit development on existing properties through the septic system approval process, although they have made efforts ease regulations to allow alternate treatment systems. The Ministry of Highways has the power to limit encroachment to provincial highways right of ways, but to date has not enforced its own regulations in this area. With regard to groundwater and the installation of wells, there is no groundwater legislation in the province of British Columbia. Surface water rights have been granted to a number of individual property owners for three of the springs that occur on the island.

In 1993, a proposal for development of DL 1375 was presented. A groundwater study involving a 24 hour pump test of DL 1375 was undertaken in 1994. At an official Public Hearing in August of 1995, Regional Board presented a revised zoning by-law to enable the strata development proposal from RRR Construction to create up to 90 smaller, single dwelling waterfront lots averaging 1.6 hectares (4 acres) when in combination with a central 100 hectare (250 acre) common area (see Map 2a). Community support was low with requests for the opportunity to establish an Official Community Plan (OCP) based in part on a community groundwater supply study prior to the adoption of a zoning by-law. Finally, after more than two years in the planning, the draft by-law was rescinded by the Regional Board. Request for the funding of an OCP was also denied.

2.0 BIOGEOGRAPHICAL SETTING

Savary Island is unique in many ways compared to its general surroundings in the Strait of Georgia, not the least of which are its abundant sandy beaches that have earned it the title "Sunny Sandy Savary".

2.1 Physiography

Savary Island is an obvious physiographic anomaly by comparison to the general northwest trend of topography in the Strait of Georgia. This narrow 0.4 to 1.0 kilometre wide island extends approximately 8 kilometres in a pronounced east-west direction (**Map 1a**).

The topography is generally tabular or gently sloping, except the east end which has a wedge shaped profile that slopes to the north, and a section west of the airstrip of linear, northwest trending sand dune ridges 5 to 15 metres in height.

Steep sand cliffs form most of the shoreline. The north shoreline varies from low gentle slopes near the east end to well-vegetated cliff banks between 15 and 40 metres in height. The south shore has a low profile at the west end and along a 1.3 kilometre section in the middle of the island. Steep, 40 to 55 metre high exposed sand cliffs form the rest of the south shore. The cliffs are buffered from

undercutting by a broad raised sand beach and a 100 to 800 metre shallow reef of sand and boulders extending to the south.

There are no obvious topographical features that can be related to surface water runoff. A small seasonal flow runs down a ditch along Rogers Road on DL 1377 in the winter months. Failure of the cliffs resulting from the failure of local zones of water saturated less permeable horizons in the stratigraphy are evident in the south shore cliffs from halfway between Henderson and Cunningham Roads to just west of MacLean Road. Similar failures are seen adjacent to Indian Springs and the springs at the north end of Sutherland Road.

2.2 Climate

The climate on Savary is mild, even by west coast standards. General observation would suggest the island has a higher number of sun hours per year and less precipitation than many areas in the Strait of Georgia, a result of it being protected from prevailing weather systems in the shadow of Vancouver Island, and its low profile.

Precipitation records were recorded in the wharf area by Emma Roberts from June 1919 to November 1951. The weather records from Van Anda on Texada Island to the south show that it receives very similar rain fall and could be used to estimate averages for Savary in more recent years. The period of effective groundwater recharge has been suggested to occur from December to March as a result of the high losses caused by evapotranspiration (Livingston, 1988). Work by Klinka (1979) however suggests that effective recharge occurs from November through to the end of February These averages for both Savary (Rickard, 1991) and Van Anda (Environment Canada, 1993) are as follows:

TABLE 1
Savary Island and Texada Island Precipitation Record

	Savary Island (1919-57)			Van Anda, Texada Is. (1961-90)		
	Annual	March to October	November to February	Annual	March to October	November to February
Average mm. (in.)	**929.6** (36.6)	**446.0** (17.6)	**483.6** (19.0)	**948.7** (37.4)	**455.8** (17.9)	**492.9** (19.5)

Additional precipitation records for the Savary Island area are presented in **Table 2** and **Figure 1**.

Temperatures on Savary are comparatively mild in winter and warm to hot in summer. Form the weather records of the surrounding area, it can be estimated that there are 5 to 20 days of the year when the temperature falls below 0°C and groundwater flow is be reduced. Similarly, there are over 30 days of the year on average when the temperature is over 25°C and the rate of evaporation of near surface water is high.

TABLE 2
Weather Record - Savary Island and Area

Month	Precipitation (mm)					
	Lund (1951-80)	Powell River (1961-90)	Van Anda Texada Is. (1961-90)	Keefer Bay Savary Is. (1920-50)	S. Julian Rd. Savary Is. 1995	N. Cunningham Rd. Savary Is. 1995
January	143.9	137.4	127.1	114.3	-	203.2
February	110.5	105.0	83.4	82.6	-	64.8
March	101.7	97.3	79.4	64.0	-	61.0
April	59.1	61.4	52.6	54.4	-	144.8
May	50.1	63.0	48.0	43.2	-	74.9
June	55.8	53.2	47.6	46.2	-	85.1
July	43.8	44.6	33.6	32.5	20.1	43.2
August	71.8	48.5	38.8	40.9	61.0	66.0
September	64.8	60.1	46.6	54.6	-	21.6
October	138.9	127.7	108.9	112.0	-	125.7
November	176.6	159.8	147.4	131.1	-	235.0
December	177.4	155.1	135.0	154.4	-	189.2
Total	1194.4	1113.1	948.4	930.2	-	1314.5

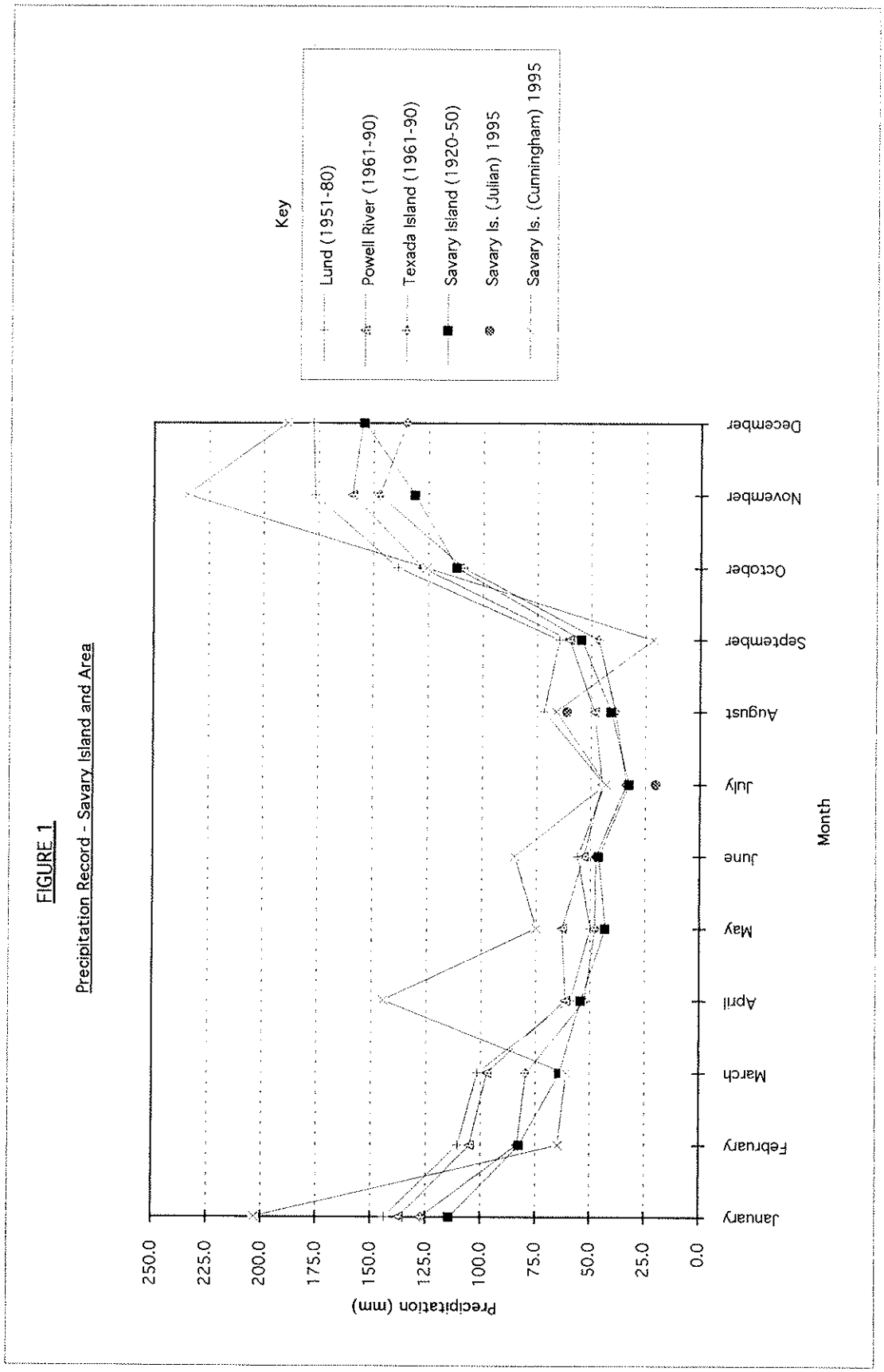


FIGURE 1

Precipitation Record - Savary Island and Area

Weather records were begun independent of this study by local resident Martin Hill on his property near to the intersection of Cunningham Road and Vancouver Boulevard on January 1 of 1995. The results of this survey showed an abnormally high annual precipitation total of 1314.5 mm (51.75 inches). Records were also collected near the south end of Julian Road beginning July 12, 1995 and ending September 19, 1995. The weather this past summer was unseasonably wet. On August 11, 27.9 mm. (1.1 inches) of rain fell in an hour causing considerable rutting of the roads resulting from the high volumes of runoff. From August 24 to September 18, the weather was warm and dry. Both July and August were uncommonly windy.

2.3 Vegetation

Savary Island marks the northern limits of the Coastal Douglas Fir Biogeoclimatic Zone, the driest mesothermal zone in British Columbia (Klinka et al, 1979). Tree growth is commonly second growth due to sporadic selective logging that has been ongoing since the 1920's.

Typical tree cover includes Douglas-fir, western red cedar, grand fir, western hemlock, and arbutus. Under story plants include Oregon grape, salal and ocean spray. The vegetation cover is locally characteristic of the underlying geology. Wetter areas on the island indicative of shallow clay layers and perched groundwater include red alder and western maple, with abundant sword ferns and deer ferns. Lodgepole pine and arbutus are typical of the much drier sand dune terrain in the central section of the island where salal is the predominant under-story plant.

Western yew trees are common along the tops of the high cliffs near to the south margin of the island indicating climax forest conditions. A single Garry oak has been identified at Mace Point.

Broom covers much of the sand cliffs along the southeast shore of the island. It was introduced in 1914 (Kennedy, 1992) to help prevent erosion, but has now replaced native plants in many areas on the island.

2.4 Geological Setting

Savary Island is situated at the northern end of the Georgia Basin, a large scale depressional feature resulting from Tertiary intercontinental strike-slip movement between the Coast morphogeological belt to the east and the Insular morphogeological belt to the west (Monger, 1994). Late Cretaceous and younger rocks and sediments are preserved in the Georgia Basin, including the Pleistocene glaciofluvial sediments of the Quadra Sands that make up most of Savary Island. Hernando Island and southern Quadra Island to the northwest, Harwood Island to the southeast, and the Comox headland to the southwest are also comprised mostly of Quadra Sands.

The Quadra Sands consists of a layered succession of well sorted, unconsolidated, Oligocene glaciofluvial sands, minor silts and clays that locally exceeds 75 metres in thickness. Silt and clay horizons are more common in the lower sequences. The Quadra Sands are thought to have been deposited as outwash preceding the advance of the Wisconsian Fraser Glaciation (Clague, 1994). Occurrences of the Quadra Sands dotting the coast today are considered to be topographic remnants that the glaciers overrode. The deposits of Quadra Sands have been shown to decrease in age from 29,000 years BP near Savary to 14,000 BP in the Puget Sound area in Washington State to the south.

Earlier mapping described the Quadra Sands as "...horizontal, uniform in character, and continuous over distances as great as 6 kilometres (3.7 miles)" (Clague, 1975). However, more recent work, including this study, demonstrate a complexity both horizontally and vertically at all scales of mapping that limits projection of the lithostratigraphic sequence below the subsurface. Ricketts and Liebscher (1994) describe this complexity as a result of "...the interactions between sedimentation and erosion during advance and retreat of the ice sheets, the concomitant retreat and advance of the seas, and the isostatic effects of ice loading and unloading that resulted in subsidence and uplift respectively." As a result, an earlier correlation of the Quadra Sands stratigraphy on Savary to that of Harwood Island 18 kilometres (11 miles) to the south by Clague (1975) is not as easily supportable.

Regionally, the Quadra Sands overlie semi-consolidated fluvial and marine deposits of fine sand and silt of the Eocene Cowichan Head Formation and Semiahmoo glacial-marine drift. These deposits are not exposed above sea level in the vicinity of Savary Island, however. A thick bed of clay is reported from the log of a well drilled on Hernando Island 4 kilometres (2.5 miles) to the north at an estimated depth of 25 to 33 metres (83 to 108 feet) below the low tide mark (Brown, 1970). This clay bed may represent this underlying stratigraphy.

A resistant 0.5 to 4 metre (1.6 to 13 foot) cap of Vashon drift helps to preserve Quadra Sands from more rapid erosion. Vegetated and now inactive sand dunes of varying thickness overly the drift.

2.4.1 Island Geology

Unlike most of the surrounding land forms in the area, Savary Island consists largely of unconsolidated layers of glacially derived sediments (**Maps 1b, 1c & 1d**). Only at Mace Point at the east end of the island can bedrock be found where a small topographic remnant of Cretaceous granodiorite approximately 4 hectares in area is exposed. The granodiorite is competent with only minor tight fractures and a variety of late basaltic dykes.

The majority of exposures on the island are comprised of cross-bedded, pale brown to gray sand with up to 2% magnetite derived from the granitoid intrusives of the Coast Mountains. The general direction of deposition is to the southwest. Many of the cross-bedded sections in the central section of the island have 5% gravel content. The sand horizons vary in compaction from very loose to very

tight based on drilling reports. They are distributed throughout the stratigraphy, but are more common to the west half of the island.

Horizons of brown-grey sandy silt to silty clay 0.05 to 4.0 metres (0.2 to 13 feet) thick are found throughout the package. The continuity of these horizons is difficult to determine, but generally is considered limited. Two distinct, horizontal, 1 metre (3 feet) thick horizons extend west from Mace Point for a kilometre (0.6 miles), eventually being cut off by the Vashon Drift and topography. At one point just east of Garnet Point, the lower contact of the horizon becomes very irregular, possible representing channel cuts. A similar horizon emerges west of Beacon Point and continues for a kilometre, and is considered to be the relatively impermeable layer that forms the Neilsen Spring at the south end of MacLean Road. The possibility of these horizons having once been connected and having the same depositional origins is possible, but not absolutely discernible. Instead, the depositional environment is considered to have been quite variable with rapid changes in depositional energies and the constant reworking of sediments. Surface mapping and interpretation of well hole stratigraphic data suggest that these horizons can change laterally in the matter of a few hundred metres from a sandy silt to a blue-grey clay, such as is exposed at Indian Springs near the north end of Henderson Road and the spring near the north end of Sutherland Road.

Well-layered sandy silt up to 30 metres (98 feet) thick is common in most of the exposures on the south cliff extending from Mace Point to Garnet Point, on the north shore between First and Second Points, and just east of Julian Road on the south shore. Horizontal facies changes between the silt horizons and the cross-bedded sands can occur over a distance of 200 metres. In the area from Burnett Road to MacLean road, well hole stratigraphic data suggests lateral continuity between the layered silt units and the identifiable clay to silty clay horizons. Well data suggest this also may be true at the SSID well and the surrounding area where a clay horizon near to sea level has been reported (Livingston, 1970; Rickard 1993). This clay layer is not reported in all well reports suggesting some lateral variability here also.

The capping Vashon Drift unit is comprised of blue-grey to grey-brown silty clay with a variable percentage of gravel, cobble and boulders, and varies considerably in thickness. On the north shore it is 1.0 to 1.4 metres (3 to 3.2 feet) thick, while on the south shore it varies from 1.0 to more than 4 metres (3 to 13 feet) thick. The unit is distinctly layered in exposures on the south shore and it often compares in appearance to the blue-grey clay horizons, suggesting a similar origin. Layers in the drift unit locally display irregular fluctuations in dip up to 30°, possibly the result deformation related to ice loading from the glaciers. The drift forms a relatively impermeable layer that locally forms the perched aquifer, notably west of Henderson Road to south of Indian Point. The drift unit fluctuates in elevation along the length of the island that it is possible it is not continuous but in fact repeated in the stratigraphy, as might be formed by repeated minor advances of the glaciers. This assumption is supported by the presence of multiple drift-like horizons described in well logs. A massive body of the drift unit 5 to 8 metres (16 to 26 feet) thick can be observed in the cliff at the south end of Henderson Road. To the west in the area of Rogers Road, the clay becomes intercalated with multiple seams of gravel.

The drift appears absent from the record across roughly 300 metres (1000 feet) at the boundary between DL1375 and DL 1376. In consideration of topography, the drift also may be absent from most DL 1372, except possibly the high points along the south shore. Little or no drift was observed along the south shoreline cliffs in this area, possibly though the result of fairly heavy vegetation cover.

A 1.2 kilometre (0.8 mile) stretch of the island on the west half of DL 1375 has a thick cover of sand dunes, now well stabilized by vegetation. The sequence of repeated dune activity can be seen from the south shore near the west boundary of DL 1375 where the old stabilized surfaces are visible. Dune activity seems to have been reactivated by fires as evidenced by the presence of charcoal in the old stabilized horizons. The dunes are estimated to be up to 15 metres (50 feet) thick and trending in a markedly northwest-southeast direction. Limited areas of active sand dunes are present along the south shore. This includes the deposition of fine silt blown up from the cliff exposures and deposited in dunes now up to 5 metres (16 feet) high at the top edge.

Indian Point is a flat lowland area approximately 15 hectares in size at the western end of the island. It is a natural accreted spit of reworked Quadra Sands formed as a result of the long shore current (Holden, 1993). It has no detectable, more consolidated material to at least 5 metres (16 feet) below sea level based on well log data.

Stratigraphic data from below the sea level exposures are limited to a few deeper well holes, the majority of which are still too shallow to reach the bottom of the Quadra Sands stratigraphy. Well hole RRR94-1 located on DL 1375 is the deepest hole on the island, reaching to an estimated depth of 28.2 metres (92.5 feet) below sea level (Map 1c & 1d). At an estimated depth of 23.3 metres (75 feet) below sea level, a blue-grey compact silt and sand was encountered (Badry, 1994). This correlates well to the clay bed intersected at 25 metres below sea level on Hernando Island to the north (Brown, 1970). This supports the possibility of these units being the stratigraphic base of the Quadra Sands.

2.4.2 Structural Geology

The geological structure of Savary is not complicated. However, the near to horizontal stratigraphy does cause confusion, making hydrogeological modeling difficult. The dip directions of the more impermeable horizons is important to understanding the groundwater flow directions of the perched aquifer systems.

Observations made (Livingston, 1971; Rickard, 1984) describe the clay horizon intersected at depth in the SSID well and shallow wells along the north shore, as shallow dipping to the north. This would suggest that most of the stratigraphy, in this area at least, dips northward (see **Map 1d, Sections AA' and BB'**). In spite of a lack of consistent evidence to support this conclusion and in consideration of the complexity of the lithostratigraphic sequence generally, this possibility does help to explain the observed greater hydraulic connectiveness to the sea along the south shore in this area.

Rickard suggests that this clay horizon is continuous through the width of the island on DL 1372 and 1373; but well logs show that the clay horizon grades laterally to the south into thin bedded fine sand and silt. Rickard also suggests that in comparison to the exposed south bank, the heavily over grown north bank is evidence of these less permeable horizons shedding groundwater to the north. The well-rooted vegetation along the north shore is likely more a result of this area not being exposed to the erosive forces of the southeasterly winter storms. Similar clay horizons exist in the area of DL 1376 and 1377. Groundwater from perched aquifers is locally shed off these horizons along both the north and south shorelines, indicating a fair amount of variability in their dip directions. The most notable examples are;

- Indian Springs, located at the north end of Henderson Road;
- the small seep near the north end of Sutherland Road;
- Neilsen Spring located at the south end of MacLean Road, and;
- the Meadows Spring, located at the south end of Julian Road.

A clay horizon, possibly the Vashon Till, covers much of the area between Julian Road and Rogers Road. The clay dips to the south, shedding low volumes of groundwater at its exposed edge along the break in slope at the south ends of Salisbury and Herchmer Roads.

There are no identifiable low angle fault displacements of the stratigraphy as a result of glacial loading, as observed by Kohut (personal communication, 1995) on James Island to the south near Cowichan Point.

Some evidence of local earthquake activity was noted on the north bank east of Senkler Road where a near vertical sand dyke up to 15 centimetres (6 inches) wide is exposed for 1.5 metres (5 feet). The dyke occurs high on the exposed cliff face suggesting it was emplaced before the isostatic drop in sea level more than 7,000 years B.P.

The broad shallow reef areas that surround Savary and the neighbouring islands may in part be an erosional remnant formed in the post glacial period estimated by Clague (1981) from approximately 12,000 to 8,000 years B.P. when sea level was several metres below its present levels.

3.0 HYDROGEOLOGY

The hydrogeology of Savary Island is deceivingly complex, and can not be fully explained based on the level of work completed to date. Although the geology is reasonably understood and the principal aquifers identified, much is still left to interpretation and extrapolation. And most importantly, there are no long term water level monitoring data upon which to draw conclusions about the nature of the aquifers, the connectiveness of all portions of the groundwater system, and upon which to attempt to estimate the vertical hydraulic conductivities of various geological units and the rates of draw down and recharge of the aquifers.

3.1 Well Inventory and Well Logs

The inventory of wells conducted this past summer helps to map out the extent of the aquifers present, notably the perched and shallow aquifers (**Maps 1b, 1c and 1d**). The well logs provide valuable stratigraphic and yield data, in spite of obvious errors and omissions.

A total of 171 wells have been inventoried on the island. However, the inventory missed at least 140 additional wells, and many of those included are unused or abandoned. An estimate of the number of wells presented in **Table 3**. Two observation wells exist on the island; one adjacent to the Savary Shores Water District (SSWD) well, and the other near the RRR Construction secondary production well, RRR94-2.

Groundwater production on SSWD community well service, which services a total of 93 properties from a single eight inch production well. The service operates with a well and pump house located on Lot 129 and a 190,000 litre (40,000 gallon) tank farm on Lot 12 of the sub-division. First installed in 1971, the system has been upgraded in the past two years with the repair of leakage and installation of meters for each user.

The RRR Construction development proposal would also be serviced by a single eight inch production well (RRR94-1).

With the exception of the SSWD and RRR production wells, drilled wells on the island are six inches in diameter.

Informal sharing of wells occurs amongst approximately 10% of property owners based on the results of the survey.

Well logs were collected for a total of 43 wells on the island (**Map 1b, Appendix III**). Of these, 34 are from drilled wells (approximately 33% of total) and 9 are from dug wells. No logs were provided for most of the wells drilled by Nelson Well Drilling. Wells drilled by Fyfe's Well Drilling had logs provided to the owners, but not to the Groundwater Section of the Provincial Ministry of the Environment. Many owners now are unable to find these logs. A total of 9 well logs were provided from various offices of the Ministry of Environment.

Most known drilled wells were developed with a cable and tool drill method with 1.5 metre (5 foot) stainless steel screens. At least one well has no screens and is developed into a gravel bed at the bottom of the hole. Shallow wells have generally been dug by back hoe to a depth of 5.5 metres (18 feet). In recent years shallow wells have been lined with large diameter concrete rings. Older wells are wood lined or poured concrete. Some wells are dug by hand. Sand points are constructed of driven PVC or steel with PVC or stainless steel number 10 slotted screens.
Well logs are vital to understanding both the geology and much of the characteristics of the aquifer present. However, many different drillers operating on the island over many years makes the correlation of stratigraphy sometimes

TABLE 3
Well Inventory Summary

D.L.	Classification	Drilled Well	Dug Well	Sand Point	Totals
	Aquifer	Main	Perched	Perched	All Aquifers
1372	Total Known	16	2	18	36
	No. Not In Use	6	0	0	6
	No. Abandoned	0	0	2	2
	Estimated No. Not Inventoried	7	1	31	39
	Total No. Wells	23	3	49	**75**
	Total In Use	17	3	47	**67**
1373	Total Known	11	10	0	21
	No. Not In Use	0	0	0	0
	No. Abandoned	1	15	0	16
	Estimated No. Not Inventoried	6	7	0	13
	Total No. Wells	17	17	0	**34**
	Total In Use	16	2	0	**18**
1375	Total Known	2	0	0	2
	No. Not In Use	2	0	0	0
	No. Abandoned	0	0	0	0
	Estimated No. Not Inventoried	0	0	0	0
	Total No. Wells	2	0	0	**2**
	Total In Use	0	0	0	**0**
1376	Total Known	18	4	0	21
	No. Not In Use	6	1	0	7
	No. Abandoned	0	1	0	1
	Estimated No. Not Inventoried	2	0	0	3
	Total No. Wells	20	4	0	**24**
	Total In Use	14	2	0	**16**
1377	Total Known	38	28	24	90
	No. Not In Use	4	0	0	4
	No. Abandoned	1	3	0	4
	Estimated No. Not Inventoried	2	3	69	74
	Total No. Wells	40	31	93	**164**
	Total In Use	35	28	93	**156**
All Lots	**Total Known**	**84**	**44**	**42**	**170**
	Total No. Wells	**102**	**55**	**142**	**299**
	Total In Use	**82**	**35**	**140**	**257**

very difficult. The more well logs in an area the better the reliability of the interpretation.

3.2 Springs and Seeps

Four springs are known on Savary Island that flow all year round: Indian Springs, Neilsen Springs, Meadow Springs and Sutherland Road North.

Indian Springs is the only public and reliable source of potable water on the island. It is located approximately 10 metres (33 feet) up the north shore cliff below Block 25 on DL 1376. At least two water permits have been issued for the spring, but it services a great number more households.

Measured flow rates for the spring showed both an increase, resulting from the more than two weeks of unseasonably wet weather beginning July 24 (including the heavy rainfall on August 11), and a decrease as the weather dried up towards the end of August (**Table 4**). This observation suggests a direct hydraulic connection between the Indian Springs perched aquifer and surface water infiltration.

TABLE 4
Indian Springs Flow Rates

Date	Flow Rate (Imp. gpm)	Flow Rate (US gpm)	Flow Rate (l/sec)
July 19/95	1.03	1.28	0.081
August 12/95	1.16	1.45	0.091
August 13/95	1.13	1.41	0.089
August 20/95	1.03	1.29	0.081
August 21/95	1.05	1.31	0.082
August 28/95	0.83	1.04	0.066
Average	**1.04**	**1.30**	**0.082**
Estimated Total Annual Flow			**260,000 litres**

However, the rate of flow measured at the spring is potentially subjective. The flow measured is from a plastic spout pushed into the clay where the seepage appears to be greatest. The constant rate of flow out would be a direct function of the constant and undisturbed position of the spout. The spout did not appear to have been tampered with or altered during that period. Also, only a small portion of the total volume of seepage is caught. Total annual flow for the entire Indian Springs perched aquifer would be at least three times greater than estimated above.

According to Mr. Ray Flawith, a local property owner, the longest water license holder on the Springs and for many years past, the its unofficial warden, it has flowed at close to a gallon per minute for some 20 years.

Indian Springs flows off a very homogenous fine silty blue-grey clay measured to be 5.5 metres (18 feet) thick in a nearby well hole (Block 25, Lot 22). The unit is

exposed for 75 metres (250 feet) along the cliff only, the upper contact roughly 12 metres (40 feet) above the low tide level. Good exposures of the cliff 50 metres (165 feet) to the west and 200 metres (650 feet) to the east show no signs of the unit.

The next observed exposure of the clay is below the middle of Block 19, 650 metres (2100 feet) to the west. This is the site of the Sutherland Road North Spring. The spring is a low volume seep not presently being used for water supply. The clay unit occurs at 20 metres (65 feet) above the beach, 10 metres (33 feet) higher in elevation than the clay at Indian Springs.

Neilsen Spring occurs at the south end of MacLean road at an elevation of 30 metres (100 feet) and runs off a silt horizon that can be traced on the cliff extending from a kilometre (0.6 miles) to the east. The volume of flow is low, running at an estimated one Imperial gallon every 5 minutes. Three households are supplied by the spring, which is held under license.

The Meadows Spring is located at the south end of Julian Road. The spring is very low volume producing 4 litres (1 Imp. gallon) every 5 to 10 minutes. Two nearby property owners hold the water rights and use very shallow wells to tap into the supply. The groundwater flow feeding the spring is very local, due to the number of dry wells dug within a 50 metre (165 feet) radius around to the east and west.

An old map of the island indicates a spring site east of Beacon Point. Examination of the site reveals abundant reed grass that might be indicative of near surface water. A seepage is also know at beach level near to the high tide mark south of Sutherland Road. Groundwater is commonly seen on the sandy beaches during low tide seeping out along the beach.

Some wicking of groundwater by less permeable layers is noticeable on the cliff faces around the island. Layered silt, silty clay and some sand horizons appear moist, possibly a result of their anisotropic hydraulic conductivity that is more conducive to lateral movement of a small proportion of groundwater. Flow volumes are very low to the exposed edges of these horizons, so visible runoff is not observed with the exception of the four known spring sources, the biggest of which is Indian Springs. Groundwater evaporates at the exposed face of the cliff, especially on hot or windy days.

3.3 Groundwater Aquifers

Three aquifers have been identified on Savary Island (**Map 1b**). The Main Aquifer is the most important and extends the entire length of the island. The Keefer Bay Shallow Aquifer is located along the north shore of DL 1372 and DL 1373. The West Perched Aquifer consists of a group of three perched shallow aquifers located on the west end of DL 1376 and on DL 1377. The Indian Point Shallow Aquifer at Indian Point is also described.

3.3.1 Main Aquifer

The Main Aquifer system is considered to comprise lower elevation, less compacted sand and lesser silty sand of the Quadra Sands stratigraphy extending the entire length and breadth of the Savary Island. In spite of local facies changes in the stratigraphy, data collected to date suggests a single hydrostratigraphic unit.

In many well holes, the aquifer appears confined below less permeable clay, silty clay or compacted sand layers, as evidenced in the SSID well where a 2.1 metre (7 foot) clay horizon was intersected below a down hole depth of 27.7 metres (91 feet). Water level of the nearby observation hole remained constant during a 21 day pump test of the SSID well which was drawn down 20 feet, demonstrating that groundwater does not penetrate easily through the clay horizon (Livingston, 1970). However the Main Aquifer is hydraulically connected to the sea as evidenced by tidal fluctuations of the well water levels of up to 0.6 metres (2 feet).

Correlation problems exist in the vicinity of the SSID well where the continuity of the clay horizon is difficult to demonstrate using the well logs. The three wells drilled immediately to the north do not report any clay horizons, although this could just be an oversight by the driller. In fact the nearest drilled well to record a clay horizon is 600 metres (2000 feet) to the northeast on Lot 5 of Block 11, DL 1372. The next well 800 metres (2650 feet) to the northeast from the SSID well does not report any clay horizons, nor do any of the wells 550 metres (1800 feet) to the east or 1.4 kilometres (0.9 miles) the west. Numerous shallow dug wells now abandoned to the north of the SSID well are reported to have been dug to a clay horizon up to 2.5 meters (8 feet) thick.

Well logs from most of the wells located west of the DL 1375 and DL 1376 boundary report a static water level higher than the bottom of a relatively less permeable layer of clay, silt or compact sand suggesting some artesian effect. This would indicate that the aquifer in this area is confined and under some pressure from the head created from groundwaters possibly recharging it laterally and from the basin shaped West Perched Aquifers above.

The recently drilled DL 1375 production well RRR94-1 is the deepest well on the island, extending 52.4 metres (172 feet) to an approximate elevation of 28.2 metres (92.5 feet) below sea level. While answering some important stratigraphic questions, it leaves the most important one. A relatively less permeable compact grey-blue silt and sand unit was intersected at a down hole depth of 45.7 metres to the end of the hole. It is not possible to know if this is the base of the Main Aquifer on Savary Island or if the groundwater lens extends below to some further depth. Without knowing the total thickness of this unit and what lies below it, the question of the thickness of the Main Aquifer is still unanswered, hampering the accurate calculation of hydraulic conductivity and transmissivity. The aquifer in the area of the RRR wells is not confined.

The only specific calculations of the physical hydrological character of the main aquifer on Savary Island come from pump tests conducted on the SSID well

(Brown, 1969; Livingston, 1970) and the RRR wells (Badry, 1994). These wells differ considerably in their depth of intersection of the aquifer, into which the RRR wells are developed much deeper. The results of these tests are provided in **Table 5** below for comparison (although it should be noted that the estimates stated by Brown are based on incomplete data).

It is shown from these tests that the Main Aquifer has excellent yield capacity in general. However these tests do nothing to indicate the total annual quantity of groundwater available.

TABLE 5
Reported Calculated Main Aquifer Characteristics

	SSID 1970	SSID 1969	RRR94-1	RRR94-2
Diameter	200 mm (8 in.)	200 mm (8 in.)	200 mm (8 in.)	150 mm (6 in.)
Width of Intersection	4.0 m (13 ft)	4.0 m (13 ft)	30.1 m (98.6 ft)	18.8 m (61.8 ft)
Screens Length	3.0 m (10 ft)	3.0 m (10 ft)	7.5 m (25 ft)	3.4 m (11.1 ft)
Pump Test Duration	21 days	72 hrs.	24 hrs.	3 hrs.
Pumping Rate	2.9 l/s (46.7 USgpm)	3.5 l/s (55.0 USgpm)	6.8 l/s (107 USgpm)	7.19 l/s (114 US gpm)
Specific Capacity	0.47 l/sec/m (2.3 USgpm/ft)	0.64 l/sec/m (3.1 USgpm/ft)	1.55 l/sec/m (7.5 USgpm/ft)	1.02 l/sec/m (4.9 USgpm/ft)
Time Return to Static Water Level	-	6 min.	4 min.	7 min. (approx.)
Available Drawdown (Total)	-	-	11.9 m. (39 ft)	13.7 m. (45 ft)
Available Drawdown (60%)	-	-	7.1 m. (23.4 ft)	8.2 m. (27 ft)
Theoretical Well Capacity (60%)	-	-	9.5+ l/sec (150+ USgpm)	7.6+ l/sec (120+ USgpm)
Transmissivity	-	7400 USgpd/ft	1370 m^2/day $1.1x10^5$ USgpd/ft	1240 m^2/day $1.0x10^5$ USgpd/ft

3.3.2 Keefer Bay Shallow Aquifer

The Keefer Bay Shallow Aquifer is located in the area of low ground along the north shore of DL 1372 and DL 1373 and covers an area of approximately 20 hectares (50 acres). It occurs at a depth of 10 to 15 feet perched on the clay horizon described in the SSID well. Little has been done to examine the yield potential of this groundwater source, however rates of consumption indicate it to be high.

The Keefer Bay Aquifer is defined by a concentration of shallow dug and sand point wells. It provides groundwater to an estimated 52 users. The underlying

clay unit on which the source waters of this aquifer are perched can not be easily correlated between drill holes in the area. This suggests possible hydraulic connectiveness to the underlying Main Aquifer in some locations.

3.3.3 West Perched Aquifers

The West Perched Aquifers rest on the relatively impermeable Vashon Drift cap in the area between Henderson Road to past Rogers Road. It has been interpreted as three separate aquifer areas based on the distribution of shallow dug wells and springs in the area, and some knowledge of the locations of dry wells dug in the past. The two sections where the groundwater is absent between the three outlined segments of the West Aquifer have a northwest orientation that could be reflective of their geomorphology.

The east segment of the aquifers is related to Indian Springs. There are only two shallow wells known in this area of only 9 hectares (22 acres). The groundwater flow direction can be easily assumed to flow towards the north and the springs based on the topography of the area.

The central portion of the West Perched Aquifers rests atop the highest point of the island covering and area of approximately 30 hectares (75 acres). It is fairly shallow below the surface averaging about 1.5 metres (5 feet) in the middle sections of the island, requiring that wells be dug into the clay to create a reservoir for the water. The roads are commonly muddy after a rain and the forest cover is predominated by broad leaf maples and red alder. The area supplies 15 known shallow wells. Wells towards the south shore tend to begin to dry up in September.

The groundwater is at a depth of only 0.6 metres (2 feet) in the area of Sutherland and Tennyson Roads. Two wells in this area only 22 metres (75 feet) apart have considerably different yields. One only 3 metres (10 feet) deep is completely in clay and is entirely dependent for surface water to fill it. During summer it is often dry. The other is 4.6 metres (15 feet) deep and cuts through a 0.3 metre (1 foot) seam of gravel near the bottom that supplies water to the well year round at a rate of approximately 3.0 litres/hour (15 Imp. gpd).

The Sutherland Road North and the Neilsen Springs appear related to this segment of the aquifer, although both occur at elevations well below the depth of groundwater and the capping drift layer.

The western portion of the aquifers is 36 hectares (90 acres) in area and occupies a broad flat bowl that slopes gently down to sea level in the south. Capped by a 3 metre (10 foot) thick horizon of relatively impermeable drift material, and being a lowland, this area is known to be damp in the rainy season. It can be assumed that a significant volume of groundwater collects in this area.

The area supplies 12 wells known from a depth of between of 4 and 5.5 metres (14 to 18 feet) in depth. One dug well now abandoned on Lot 26 of Block 10, DL 1377, was 7.6 metres (25 feet) deep. The well produced water for some years until the adjoining large parcel (Parcel B) was subdivided in the early 1970's. In

compliance with highway regulations, the roads in the area were ditched. This diverted surface waters from the areas north of the well, channeling it west along Vancouver Boulevard instead. The well subsequently dried up and the owner had a deeper well drilled to the Main Aquifer. Some 4 or 5 years later, the ditches along Vancouver Boulevard washed out, and the owner reports that the well again refilled with water. In consideration of this information, it is likely that the greater proportion of recharge in the area is from near surface, perched groundwater flow.

3.3.4 Indian Point Shallow Aquifer

Indian Point has been mapped as a Holocene accreted sand spit comprised of transported and reworked sands from the Quadra Sands stratigraphy (Holden, 1993). The area is 20 hectares (50 acres) and supports at least 72 shallow wells of which one is a deeper drilled well, one is a dug well, and 69 are sand points (as described for the Keefer Bay Shallow Aquifer). The sand points and dug wells vary from 2.0 to 4.6 metres (7 to 15 feet). The drilled well extends 13 metres (43 feet) to approximately 3 metres (10 feet) below sea level. The well log reports the same sand to this depth, with no underlying Pleistocene basement. The hydraulic conductivity of the sands at Indian Point would likely be very high and groundwater flows are expected move quickly from the adjacent highland the area through in a westerly direction.

In spite of the very high demand for groundwater in this area, there has never been a shortage, even in the furthest properties to the northwest. This suggests that there is a considerable flow of groundwater from the east. This further supports the contention that the Main Aquifer in the area from Burnett Road west is under some hydrostatic pressure and is moving northwest towards Indian Point indicating hydraulic connection between the two systems.

3.3.5 Unsaturated Zones

The thickness of the unsaturated zone of the Main Aquifer varies considerably from area to area on the island. Over much of the island, the unsaturated zone ranges between 25 and 45 metres (80 and 150 feet) in thickness above the Main Aquifer, not accounting for perched aquifers higher in the stratigraphy. In the area of the airstrip on DL 1375, the unsaturated zone is approximately 15 metres (50 feet) thick, and only 8 to 10 metres (25 to 33 feet) thick in the area of Tennyson Road between Salisbury and Rogers Roads.

The unsaturated zone is generally much thinner above the perched aquifers, ranging between 0.3 and 12 metres (1 to 40 feet). The Indian Point Aquifer is very shallow with only 1 to 4 metres (3 to 13 feet) of unsaturated sand above. The saturated zone of the Keefer Bay Aquifer is at approximately 3 to 4 metres (10 to 13 feet) depth. The West Perched Aquifers vary considerably from as shallow as 0.3 metres on the south side between MacLean and Sutherland Roads to over 10 metres (30 feet) in the vicinity of Indian Springs.

3.4 Hydraulic Gradients

To best determine groundwater domains, some understanding of the groundwater flow directions on Savary Island is necessary. To do this requires a water level survey of 20 to 30 main aquifer wells for which the well head elevations are accurately known. This would also require a continuously monitored record of the tidal influence in each domain from which to estimate elevation corrections.

Due to a lack of water monitoring equipment this work has not been completed to date. With the purchase of the appropriate equipment and completion of the well head level survey, this work can be initiated in 1996.

3.4.1 Well Head Topographic Level Survey

The topographic level survey was initiated to facilitate development of a groundwater contour map to help determine groundwater domains. The survey provided elevations for 14 drilled wells that access the Main Aquifer and 4 wells in the West Perched Aquifer. Time did not allow for completion of the survey work, which requires another 15 to 20 well head elevations to allow for proper hydraulic gradient map. This work will be completed as time permits on a volunteer basis in 1996.

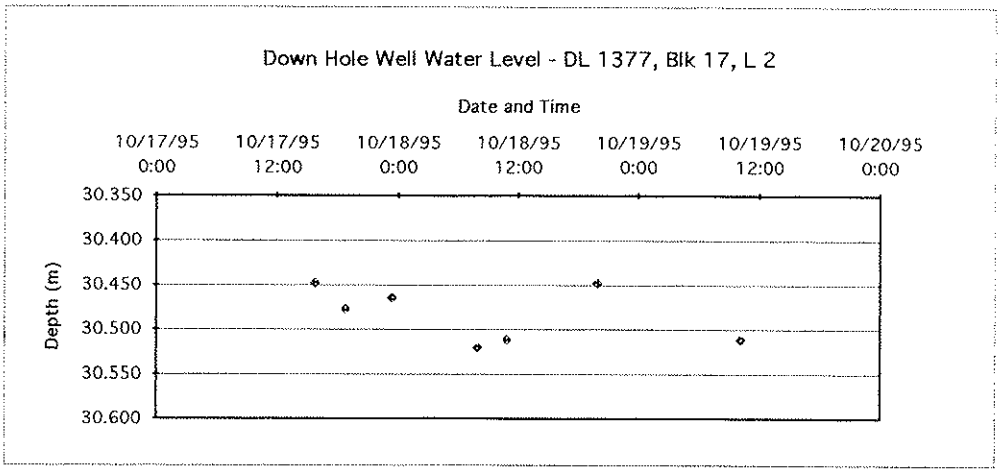
Results of the survey work to date are tabulated in **Appendix IV**.

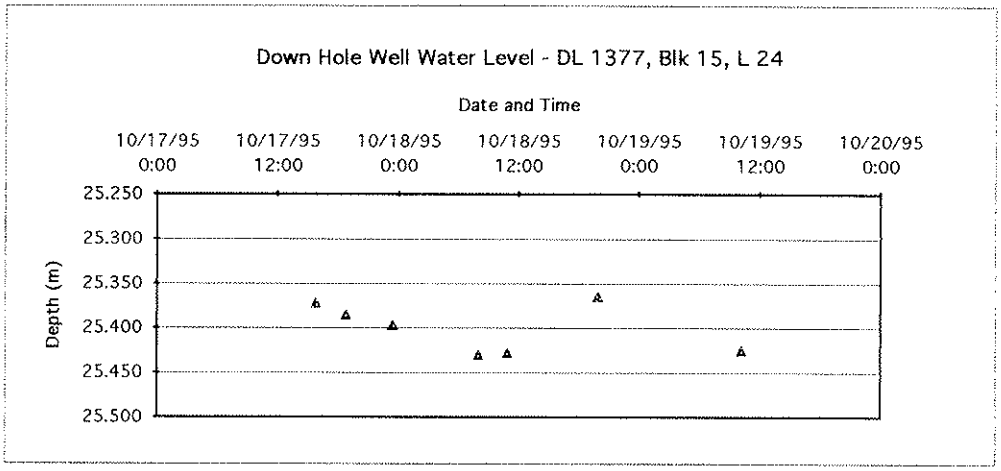
3.4.2 Well Water Level Monitoring

Monitoring of the well water levels was only carried out on four wells. More work in this important area was not completed because of time constraints, the lack of access to some wells, and limitation in equipment.

Most of the wells that were identified as prospective spot monitoring wells are in use. Unfortunately, many of these have a well cap (supplied by Nelson Well Drilling) that does not allow easy access for down hole monitoring. And of the wells not in use, many have welded caps. A more active monitoring survey of accessible wells was not initiated due to the lack of a full-time water level recorder that would provide a record of tidal fluctuations, to be subsequently compensated for in the more randomly collected, seasonal spot water level checks. Manually collected data detailing tidal influence was not possible due to a busy work load with regard to the other aspects of this study.

In the area of Julian and Tennyson Roads, two wells were monitored over a period of three days (**Figure 2**). Tidal influence was marginal, varying at most 0.072 metres (2.8 inches) with a 2.4 metre (7.9 foot) tide change. Well water level monitoring done in 1970 (Livingston) on the SSID well showed a tidal influence of 0.64 metres (2.1 feet) with a 3.3 metre (10.8 foot) tide change. This difference in the tidal influence demonstrates a definite hydrogeologic difference between these two areas. Based on this limited information, it can be assumed that the area of DL 1373 is more hydraulically connected to the ocean than that


Down Hole Well Water Level - DL 1377, Blk 17, L 2
Date and Time
10/17/95 0:00
10/17/95 12:00
10/18/95 0:00
10/18/95 12:00
10/19/95 0:00
10/19/95 12:00
10/20/95 0:00
Depth (m)
30.350
30.400
30.450
30.500
30.550
30.600


Down Hole Well Water Level - DL 1377, Blk 15, L 24
Date and Time
10/17/95 0:00
10/17/95 12:00
10/18/95 0:00
10/18/95 12:00
10/19/95 0:00
10/19/95 12:00
10/20/95 0:00
Depth (m)
25.250
25.300
25.350
25.400
25.450
25.500

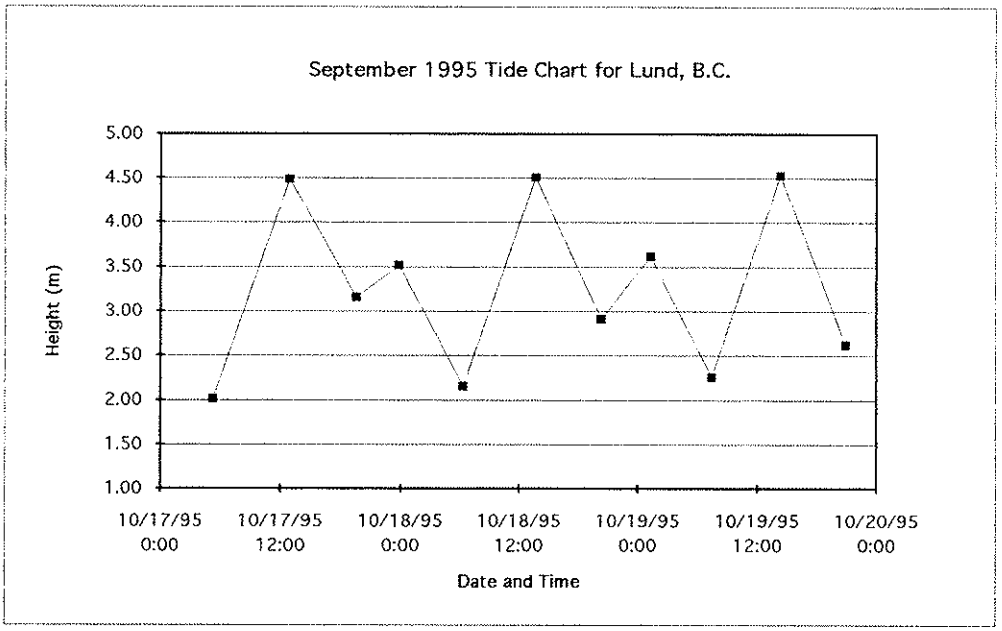

September 1995 Tide Chart for Lund, B.C.
Height (m)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
10/17/95 0:00
10/17/95 12:00
10/18/95 0:00
10/18/95 12:00
10/19/95 0:00
10/19/95 12:00
10/20/95 0:00
Date and Time

FIGURE 2

of the north Julian Road area. This would suggest a greater risk of sea water intrusion in the area of DL 1373.

3.5 Groundwater Domains

Six groundwater domains are outlined for the Main Aquifer on Savary Island (**Map 1b**) based primarily on topography and geology, with consideration to recharge, storage and consumption. The domains described are projections only. Two important considerations for defining domain boundaries not shown on the map nor outlined in the descriptions below include:

- further sub-division along the centre line of the island into North and South areas to account for expected groundwater flow patterns to the ocean, and;
- closure somewhere within the low tide mark.

Domain I

Domain I outlines most of DL 1372. The area excludes the bedrock area of Mace Point, which can be considered a distinct domain, but is not isolated due to its lack of importance as an groundwater aquifer on the island. Domain I covers an area of relatively uniform topography and geology. The area is approximately 1.2 kilometres (0.75 miles) long by a uniform 0.45 kilometres (0.28 miles) wide, has a wedge-shaped profile that slopes to the north, and is largely comprised of layered silty sands. Along the north shoreline, a compact silty clay averaging approximately a metre (three feet) in thickness forms the Keefer Bay Perched Aquifer. This area is heavily developed along the north shore, however the greater percentage of groundwater consumed is drawn from the Keefer Bay Perched Aquifer. Subsequently, the main aquifer is potentially under utilized. The south half of Domain I has very few wells, with most property owners using rainwater catchment systems.

Domain II

Domain II is an area similar to Domain I, but topographically more tabular with high sand banks along both the north and south shores. The stratigraphy is comprised of more fine to coarse sand, capped by a 0.5 to 2 metre (1.6 to 6.5 foot) veneer of glacial till and drift. Domain II is the area of the greatest Main Aquifer groundwater production on Savary Island. Perched aquifer groundwater production is very limited, with reports of sea water and septic contamination of shallow wells along the north shoreline area in the early 1980's.

Domain III

Domain III is the widest part of the island and for a variety of reasons, considered to be the area of greatest groundwater recharge on Savary. The area rises gradually in elevation towards the west, where sand dunes cover the variable stratigraphy of layered fine silty sand to cross bedded coarse sand. There is no identified perched groundwater source in Domain III, and the area has the least

production of any area on the island. It is the area of the proposed RRR Construction subdivision.

Domains IV and V

Topography distinguishes Domains IV and V from each other, and the rest of the island. Both are underlain by a variable mix of loose to compact, coarse to fine sand and layered silt and sand, with lenses of silty clay/drift, all capped by a thick cap of Vashon Drift up to 4 metres (13 feet). Averaging approximately 0.38 kilometres (0.23 miles) wide, Domain IV is the narrowest part of Savary. It is also the highest, with steep sand cliffs up to 55 metres (180 feet) along both shorelines. Domain V averages 0.6 kilometres (0.37 miles) in width and forms a broad shallow bowl that slopes to the south that forms the perched aquifer in this area. Domain V is considered to be the recharge are for Domain VI. The West Perched Aquifers straddle Domains IV and V.

Domain VI

The sand spit that forms Indian Point has been outlined as Domain VI. The low profile and underlying stratigraphy of unconsolidated accreted sands and gravels make this a hydrologically unique area on the island.

3.6 Evapotranspiration

Groundwater losses to transpiration of the forest cover and evaporation are best estimated using the analysis of the biogeoclimatic zones of southwestern B.C. as prepared by Klinka et al (1979). The authors calculate actual evapotranspiration using Thornwaites method (1948; cited in Klinka et al, 1979) that balances precipitation, soil storage, and potential evapotranspiration (calculated according to Wilson and Rouse, 1972).

Klinka et al have determined estimated evapotranspiration as part of their classification of biogeoclimatic zones, of which Savary Island is classified as Drier Maritime Coastal Douglas Fir (dmCDF). Their analysis is based on data sets from 15 sites within the zone. Savary Island very closely fits the zonal classification based on plant species, but varies from the norm in soil classification. Although not stated, it also likely varies considerably from the norm due to the lack of bedrock underlying the soil cover and a lack of any surface water storage. These factors would likely reduce the values for calculated evapotranspiration on Savary Island, increasing the potential recharge. The mean precipitation for the dmCDF sites used in the Klinka et al study is 907 mm. (35.7 inches) with a standard deviation of 139.9 mm. (5.5 inches), easily including Savary Island at 948.7 mm. (37.4 inches).

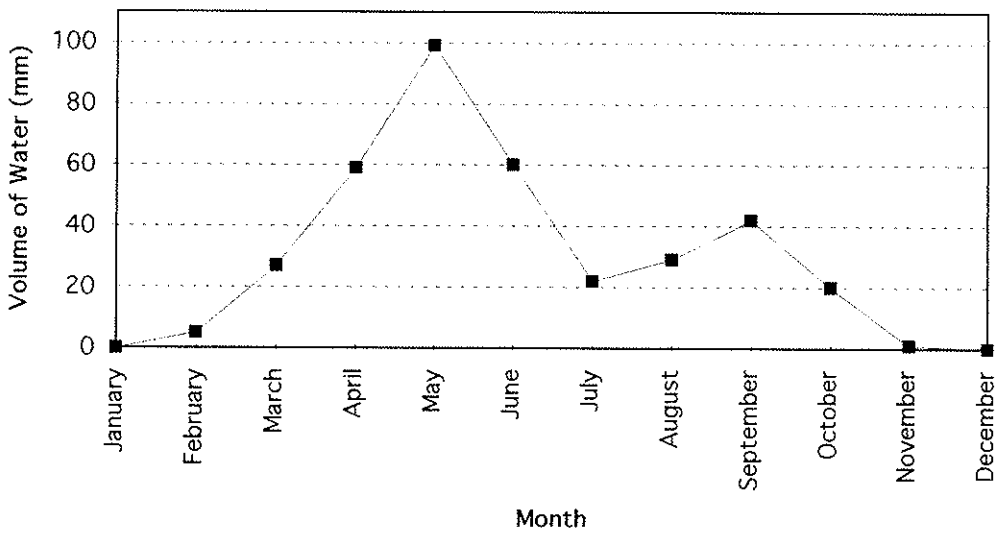
The total calculated actual evapotranspiration for the dmCDF zone is 364 mm. (14.3 inches), based on a calculated potential evapotranspiration of 632 mm. (24.9 inches). The monthly totals demonstrate that the period of groundwater recharge would likely begin towards the end of October and end in the beginning of March (**Table 6 and Figure 3**). Therefore it is concluded that the period of effective recharge includes November through February, which combined with a

TABLE 6
Calculated Rates of Evapotranspiration for the Drier Maritime Coastal Douglas Fir Biogeoclimatic Zone of Southwestern British Columbia (Klinka et al, 1979)

	Klinka et al.	Savary Island
No. of Climatic Data Sets	15	-
Mean Annual Precipitation (mm)	907	948
Mean Annual Temperature (C)	10	-
Mean Precipitation April-September (mm)	214	272
Mean Precipitation November-February (mm)	-	493
Potential Evapotranspiration (mm)	632	-
Actual Evapotranspiration (mm)	364	-
Actual Evapotranspiration April-September (mm)	311	-
Actual Evapotranspiration (mm)		
January	0	-
February	5	-
March	27	-
April	59	-
May	99	-
June	60	-
July	22	-
August	29	-
September	42	-
October	20	-
November	1	-
December	0	-
Water Surplus (mm)		
Calculated(Total Precipitation - Actual Evapotranspiration)	543	543
Based on Nov.-Feb. Precipitation Record	-	493

FIGURE 3

Calculated Actual Evapotranspiration for Drier Maritime Coastal Douglas Fir Biogeoclimatic Zone (Klinka, 1979)



potentially lower rate of evapotranspiration due to the lack of bedrock subcrop, would allow a reasonable margin for error.

3.7 Recharge Considerations

The amount of annual recharge to the main aquifer on Savary Island is the single most important consideration in assessing the quantity of groundwater resources available for perennial consumption. It is also one of the most difficult to measure. The proposal to install a deep well to monitor the saltwater/freshwater interface as one possible means to estimate groundwater recharge was rejected because of its prohibitive cost and a great deal of uncertainty of its probability of success. At present there is not the empirical data on which to base a more accurate estimate of the percentage of annual precipitation that reaches the main aquifer. Estimates of the potential recharge have been made in the past (Brown, 1970; Brown, 1971; Livingston, 1988; Badry, 1995), but have been limited in their scope and have lacked data regarding the geology, levels of groundwater consumption and land use on the island. This section outlines factors to be accounted for in estimating the rate of annual groundwater recharge for the whole island, taken from an expanded understanding of the hydrogeology as well as borrowed in part from previous estimates.

Recharge conditions on Savary Island are dependent on:

- the amount of precipitation received both annually and seasonally;
- the hydrogeological conditions of the island;
- the rate at which absorbed precipitation infiltrates through the various stratigraphic layers to the aquifer;
- the percentage of collected precipitation lost to evapotranspiration;
- the percentage of collected precipitation shed to the sea by perched aquifers and stratigraphic conduits, and;
- the net balance of groundwater consumption on the island, accounting for replenishment from septic fields and watering, the location of replenishment relative to well source, and the subsequent evaporation, transpiration and loss to the sea.

The current amount of precipitation received on Savary can be best estimated from the 1961 to 1990 weather records of nearby Van Anda on Texada Island, which receives an annual total of 948.4 millimetres. The precipitation records from Van Anda best match historical records from Savary Island. Previous estimates of the effective infiltration and aquifer replenishment have conservatively assumed the winter months of December through March to be the period of recharge (Brown, 1971; Livingston, 1988; Badry, 1995). The precipitation received during the months of November to February, as outlined above and based on the Van Anda record, is 492.9 mm. (19.4 inches), which is more than the 406 mm. (16 inches) used by Brown (1971), but similar to the 500 mm. (19.7 inches) used by Livingston (1988). If the value for actual evapotranspiration is used to determine the precipitation available for recharge, then total recharge could be as high as 584 mm. (23.0 inches), still less than the 670 mm. (26.4 inches) used by Badry (1995). The values used by Brown, Livingston and Badry are all based on a recharge period of December through

March. However, if the period of recharge is adjusted to November through February, their values would all be higher.

Evapotranspiration on Savary would vary considerably from area to area. It would be higher from the areas of the perched aquifers and along the high cliff faces, but significantly lower through most of Domain III where the Vashon Drift is thinner and in the area of the dunes. Generally though, it is probable that the calculated values for both potential and actual evapotranspiration presented by Klinka et al (1979) are higher than the rate of evapotranspiration on Savary. Therefore the amount of surplus moisture available for recharge would be higher.

The rate of infiltration has been estimated at 50% of the precipitation from the period of annual recharge (Brown, 1971; Livingston, 1988; Badry, 1995). This figure is also considered conservative, although appropriate in the absence of more detailed data. In consideration of there being a possible 584 mm (23.0 inches) of surplus moisture after accounting for evapotranspiration, and that there is little groundwater outflow, a 50% rate for infiltration may be significantly low.

The brief observations made of the flow rates at Indian Springs suggest that the rate of infiltration is considerably higher than assumed previously, and therefore a greater proportion of the annual precipitation may be available to the main aquifer generally. Livingston (1988) has also suggested that due to the varied hydraulic conductivities of the different horizons in the complex Quadra Sands stratigraphy and the unsaturated flow through fine sands, that infiltration, and therefore recharge, are more constant throughout the year. Although lacking data to support it, this assumption seems reasonable for specific areas of the island, notably those where perched aquifers exist.

In contrast to these assumptions, a notable quantity of groundwater is wicked to the cliff faces within the unsaturated zone along anisotropic horizons that have higher permeability in a lateral direction. The loss of groundwater near the cliff faces possibly compensates the low infiltration rate used to calculate recharge. Also, because there is no surface water storage or runoff (except for the springs) on the island, this loss of moisture from the cliff exposures of the unsaturated zone is accounted for by the calculated rate for evapotranspiration.

There is of course a steady loss of groundwater to the sea along the submerged seepage face. The dimensions of this seepage face and the rate of flow is not known.

Over 57% of developed properties on Savary are concentrated along the shoreline areas. Households along these areas that have drilled deep wells and are dependent on the Main Aquifer for water supply, can be considered to not contribute 100% to recharge through watering or septic and greywater systems because of some amount of loss to the cliff face. This would specifically include households with well sources set well back from the island perimeter, notably the lots along both shorelines within Domain II. The hydrogeological conditions can be assumed to vary from area to area on the island. The following describes specific features of the six domains outlined that should be taken into consideration in estimating recharge.

Domain I (DL 1372) slopes at a grade ranging from 15% to 20% to the north. This combined with the fact that the area is largely underlain by lower permeable layered silt, it would be prone to a greater degree of runoff than other parts of the island, especially the adjacent area of DL 1373. Recharge on DL 1372 to the main Aquifer could be moderately hampered by this, explaining in part the source of the Keefer Bay Shallow Aquifer groundwater. Recharge is expected to be highest nearer to the base of the slope. The granodiorite outcrop area is not considered to contribute significantly to the recharge of the groundwater of Savary Island.

Domain II (DL 1373 and the east half of DL 1375) is generally tabular with steep banks along much of the north and south shores. This more level surface would better enable infiltration of precipitation into the subsurface, providing better potential recharge of the Main Aquifer. The underlying stratigraphy is also comprised of more permeable sand capped by a veneer of Vashon Drift. The entire area of Domain II is considered potential recharge watershed.

Domain III (the west half of DL 1375 to just west of Burnett Road on DL 1376) is overlain by a thick cover of stabilized sand dunes. These dunes are expected to have high rates of infiltration that would remove a greater percentage of precipitation more quickly from the wasting effect of evapotranspiration. This coupled with the observed absence of the Vashon Drift under much of this area and the fact that DL 1375 is the widest part of the island suggest that this area would provide the greatest potential recharge to the Main Aquifer of anywhere on the island. The sand dunes in this area also form topographic basins that would increase the catchment of rain water.

Domains IV and V (the west part of DL 1376 and DL 1377, excluding Indian Point) are covered by Vashon Drift which forms the West Perched Aquifer over much of the area. Potentially a great proportion of the perched groundwater could be drawn out of the system by evapotranspiration. In consideration of the facts that Domain IV represents the narrowest part of the island and that it includes a significant proportion of perched aquifers, it is probably the area of the least groundwater recharge for the Main Aquifer. Domain V (the basin shaped area between Julian Road and west of Rogers Road) is considered to collect a significant amount of perched groundwater that would effectively saturate the underlying stratigraphy and possibly allowing near constant recharge, providing the hydrostatic head that would feed Indian Point.

Domain IV (Indian Point) is not considered to contribute significantly to the recharge of the groundwater system. Infiltration would be high due to the uncompacted nature of the underlying sediments. However, the water table is very shallow in this area, allowing for active evapotranspiration throughout the growing season. If the assumption that this area is hydraulically connected to the Main Aquifer to the east, then the watershed area for Indian Point would be the west part of Domain V.

3.8 Sea Water Intrusion

The Savary Island Main Aquifer is hydraulically connected to the sea, a fact demonstrated by the tidal effect observed in the well water levels recorded both this past year and in previous studies (Livingston, 1971). Subsequently, over production of this resource will ultimately result in its contamination by sea water drawn in to replace the depleted fresh water.

Without a more accurate estimate of recharge, there is insufficient data to predict the potential for sea water intrusion. The pump test data from the RRR wells (Badry, 1995) provides the best theoretical production capacity estimate based on groundwater modeling for the Domain III area, and is discussed here in relation to the whole island. Also included is a partial analysis of the baseline data collected by both this study and field tests conducted in the past regarding the potential for sea water intrusion.

The results from groundwater modeling of the RRR production wells indicate that a pumping rate of 4.73 litres/second (62.4 Imp. gal/min) will not result in sea water intrusion on DL 1375 or have any affect on the adjoining District Lots (Badry, 1994). This conclusion is based on a number of assumptions made about the Main Aquifer in the Domain III area.

The most significant assumption is that the aquifer is two dimensional, with the lower boundary defined as the compact grey-blue silt intersected at 45.7 metres (150 feet)in well RRR94-1. This is based on a single pierce point in a lithostratigraphic environment that is demonstrated to be highly variable. Although regional geological knowledge of the Quadra Sands would generally support this assumption, the only supporting geological data is the intersection of a similar horizon in a well on Hernando Island approximately 8 kilometres (5 miles) to the northwest. If this horizon is discontinuous then the horizontal aquifer model used is faulty.

It is also assumed that the aquifer conditions are homogenous, with porosity a uniform 25-30%; the well log shows that stratigraphy is not uniform and there are no notes to explain how this value for porosity was chosen. The value chosen for porosity is well within the ranges reported for silt to coarse sand, and it is reasonable to assume that the effective porosity will be near to these values, however no core samples were collected and no tests have been done on samples from the drilling.

The assumptions made about the amount of precipitation and the period of recharge are considered inadequate (see Sections 3.6 and 3.7), and the percentage of infiltration of precipitation is possibly too conservative, but these all tend to cancel each other out.

Without recalculating the model, the result is the best estimate of the potential yield of the Main Aquifer. For the sake of comparison (in spite of significant differences in many of the variables, including the total screen lengths), the SSID well has a peak season (July and August) production rate of 3.0 litres/second (39.5 Imp. gpm) averaged over the year. Including the total estimated production

of Blocks 2 and 3, the total peak season production rate on DL 1373 is 5.0 litres/second (66.2 Imp. gpm).

The narrow physiography of Savary Island makes sea water intrusion one of the most significant limitations on well production rates. No site on the island is more than 500 metres (1600 feet) from the shoreline, and most are less than 250 metres (820 feet). The SSID well is approximately 200 metres (650 feet) from the north shoreline. The computer modeled dimensions of the cones of influence calculated for the RRR94-1 well at pumping rates of 4.73 litres/second (62 Imp. gpm) and 6.3 litres/second (83 Imp. gpm) are 180 metres (600 feet) and 250 metres (820 feet) respectively. This demonstrates that sea water intrusion will likely limit over production before harm will come to neighbouring domains beyond the cone of influence of a high production well.

Sea water intrusion has reportedly occurred in the drilled well on Block 7 Lot 2 of DL 1372. Analytical results of this observation are not presented here. The profile of this well suggests that it was drilled too deep into the freshwater lens and caused local intrusion of more brackish groundwaters. It is not known if the sea water intrusion at this site is due to local hydrogeological conditions or indicative of the whole Keefer Bay area. It is important to note that this site has the greatest concentration of development and wells, both beside and behind it, of any along the Keefer Bay shoreline. The combination of a deep well and high groundwater production could explain this occurrence of sea water intrusion.

3.8.1 Groundwater Salinity Levels

Water quality samples were collected in all of the groundwater domains from a total of 27 wells on September 20, 1995 (**Map 1b**). The samples were analyzed for dissolved chlorine (Cl), dissolved sodium (Na) and conductance by Zenon Environmental Laboratories. The results for two samples collected from wells in the past year (including RRR94-1) are also provided, to make a total sample population of 29. Complete lab results are presented in **Appendix V**.

The summary of results shown on **Table 7** is divided between samples from the Main Aquifer and those from perched aquifers, and then subdivided further with regard to the source well location across the width of the island (north, middle or south) relative to:

- the obvious shoreline areas and sources for sea water intrusion;
- the assumed north-south division of hydraulic flow directions and gradients, and;
- the prevailing southeasterly winds.

The 1995 sample results suggest two important conclusions about salt water contamination of the groundwater on Savary Island. First, the data shows a strong correlation between the fact that both the deep and shallow wells on the south shore are consistently higher on average in dissolved Cl, Na and conductance than those in the middle or on the north side of the island. Second, the averages of the results for the Main Aquifer and those for the perched

TABLE 7
Water Quality Sampling Results - Salinity (September 20, 1995)

No.	Location			Sample Number		Sampler	Domain	Position on Island	Cl Dissolved (mg/L)	Na Dissolved (mg/L)	Conductance uS/cm	Comments/Sample Description
	DL	Block	Lot No.	Field No.	Xenon							
Main Aquifer												
1	1372	5	26	95-2B10L26	Y	DWT	I	South	556.0	291.0	1970	Storage tank/gravity system. Sample from kitchen tap. Pumped within 12 hours.
2	1377	8	17	95-7B8L17	O	DWT	V	South	229.0	103.0	982	Pressure tank system. Sample from outside tap.
3	1376	30	12	95-6B30L12	N	DWT	IV	South	125.0	70.7	448	Sample direct from well pump.
4	1377	16	38	95-7B16L38	E	CG	V	South	49.8	38.2	369	Storage tank/gravity system. Sample from outside tap. Pumped within 12 hours.
5	1376	31	21	95-6B31L21	Z	DWT	III	South	48.8	31.3	247	Sample direct from well pump.
6	1377	9	13	95-7B9L13	P	DWT	V	South	33.6	21.4	282	Pressure tank system. Sample from kitchen tap.
7	1377	P. B	5	95-ParcelBL5	G	DWT	IV	South	26.6	15.7	151	Pressure tank system. Sample from kitchen tap.
								South Average	152.7	81.6	636	
8	1372	2	17	95-2B2L17	A	CG	I	North	103.0	61.5	542	Pressure tank system. Sample from kitchen tap.
9	1376	25	2	95-6B25L2	AA	DWT	IV	North	62.8	32.6	324	Sample direct from well pump.
10	1373	2	12	95-3B2L12	I	DWT	II	North	55.0	31.0	330	Storage tank/gravity system. Sample from kitchen tap. Pumped within 12 hours.
11	1376	24	15	95-6B24L15	M	DWT	IV	North	41.9	26.9	209	Pressure tank system. Sample from kitchen tap.
12	1372	3	3	Submitted by Property Owner			II	North	15.0	N/A	N/A	Submitted independently by property owner to Chemex Labs on 05-16-95.
13	1376	32	14	95-6B32L14	Q	DWT	III	North	13.1	21.0	162	Sample direct from well pump.
								North Average	48.5	34.6	313	
14	1377	23	3	95-7B23L3D	F	DWT	IV	Middle	71.2	44.8	453	Sample direct from well pump.
15	1377	20	16	95-7B20L16	S	CG	IV	Middle	47.0	39.0	308	Storage tank/gravity system. Sample from outside tap. Pumped within 24 hours.
16	1375	-	-	Reported in Badry, 1995			III	Middle	43.3	-	267	Submitted independently by Pacific Hydrology to ASL Ltd. on 12-01-94.
17	1377	10	26	95-7B10L26	W	DWT	V	Middle	29.5	23.5	187	Sample direct from well pump.
18	1377	13	18	95-7B13L18	H	PL	V	Middle	26.8	19.4	157	Sample direct from well pump.
								Middle Average	43.6	31.7	274	
Perched Aquifers												
19	1377	8	13	95-7B8L13	J	DWT	V	South	246.0	131.0	952	Sample collected with bucket. Well use very low.
20	1376	26	32	95-6B26L32	K	CG	IV	South	231.0	126	996	Sample direct from well pump.
21	1376	22	12	95-6B22L12	L	DWT	IV	South	153.0	101.0	669	Pressure tank system. Sample from outside tap.
22	1377	16	25	Neilsen Spring	D	DWT	IV	South	97.3	45.1	433	Sample collected at outflow from large storage tank.
23	1377	15	21	95-7B15L21	X	DWT	V	South	66.0	37.1	247	Sample collected with bucket. Well use very low.
								South Average	158.7	88.0	659	
24	1372	7	2	95-2B7L2	B	CG	I	North	119.0	70.6	601	No data.
25	1376	25	28	Indian Spring	T	CG	IV	North	87.6	46.4	358	Sample of free flowing spring water collected at spout.
26	1377	10A	15	95-7B10AL15	V	DWT	VI	North	16.9	7.8	104	Sample direct from well pump.
27	1372	11	4	95-2B11L4	C	CG	I	North	13.7	7.6	149	Storage tank/gravity system. Sample from outside tap. Pumped within 24 hours.
								North Average	59.3	33.1	303	
28	1377	20	10	95-7B20L10	U	DWT	IV	Middle	101.0	60.0	677	Sample collected with bucket. Well use very low.
29	1377	23	3	95-7B23L3S	R	DWT	IV	Middle	52.2	47.7	409	Sample direct from well pump.
								Middle Average	76.6	53.9	543	
									Cl (mg/L)	Na (mg/L)	-	
Dissolved in Sea Water (Firth, 1969)									19,000	10,500	-	
CCREM Drinking Water Quality Guidelines (1987)									≤250	-	-	
BCE Water Quality Criteria - Very Restricted Diets (1994)									-	20	-	

aquifers are similar for each of the three area subdivisions. These results support the conclusion that the salt contamination of both the Main and perched aquifers is from salt spray blown on shore from the southeast and then drawn into the island hydrological cycle with infiltration of precipitation. Dissolved Cl and Na are highly mobile and can be expected to be distributed throughout all the unsaturated and saturated zones of the stratigraphy. Sea level is stated to have been several metres below present levels at Comox to the southwest between 6800 and 8700 years before present (Mathews, 1970; cited in Clague, 1981), providing more than enough time for the draining away of the sea water and the subsequent distribution of Cl and Na vertically through the stratigraphy from the top surface down.

Some anomalies in the data remain, however. The Main Aquifer sample taken from Lot 26, Block 5 on DL 1372 is significantly higher than all the others; at 556.0 mg/L dissolved Cl it is more than twice the recommended level of 250 mg/L stated in the 1987 Canadian Council of Resource and Environment Ministers (CCREM) Drinking Water Quality Guidelines. The source well has only been in service for a year, production from it is fairly limited at an estimated 230 litres per day for six months of the year and there are no other deep wells in the vicinity, making over production an unlikely cause of the high Cl and Na concentrations. The result suggests the following possibilities:

- a local variation in the hydrogeology (e.g.. local anisotropic conditions) that allows direct hydraulic connection to the sea;
- a combination of over production along the north shore area and shallow, north dipping, impervious stratigraphy that has resulted in a preferred hydraulic connection to the sea to the south;
- a local variation in the hydrogeology that results in the concentration Cl and Na percolated down from the surface.

Chloride in water poses little risk to health. The CCREM guideline is set at 250 mg/L more out of concern for taste (1987). The result of 556.0 mg/L Cl is only 2.9% the Cl concentration of sea water (19,000 mg/L Cl; Firth, 1969). The BCE alert level of 20 mg/L dissolved Na are exceeded in most samples for people on very restricted diets (BCE, 1994). The alert level for peolpe on limited restricted diets is 270 mg/L.

A second anomaly in the data that requires mention is the high average result for the perched aquifers located in the middle of the island. The result is higher than the averages for the all but the south area wells. This is partly because of the small number of samples to represent this grouping. Also, the high sample is from a shallow well on Lot 10, Block 20 on DL 1376 located in the area of the thick clay layer exposed at Indian Springs. The Cl and Na contaminated groundwaters from the south shore area would easily flow down gradient to the source well.

The results of the 1995 sampling alone do not provide the data upon which to reach definitive conclusion regarding the risks of sea water intrusion. Multiple samplings of the same wells every year for at least 3 years is required for this. Fortunately, the results of salinity field analysis (based on conductance readings)

of selected wells along the north shore of DL 1372 and 1373 by Spilsbury in 1932 and 1987 are available (**Appendix VI**). Comparison of these results, in spite of differing analytical procedures, to the 1995 results provides some basis for determining the risks of sea water intrusion along the north shore area of DL 1372 and 1373.

The average value from the 1932 data is 151 ppm NaCl (mg/L), with a high of 268 ppm NaCl (mg/L). Assuming the Cl concentration to be the same value, this result (and the range of individual results) is higher to those of the 1995 analyses. The results of the 1987 samples average 104 ppm NaCl (mg/L), excluding the one value of greater than 350 ppm NaCl (mg/L). This result is more comparable to the 1995 results for north shore well sites. The comparison of results suggests little change in the salinity of the groundwater in either the perched or Main aquifers in this area. Although based on analyses of varying reliability, this conclusion indicates there is low risk of sea water intrusion considering the very high groundwater production rates in this area now compared to 62 years ago.

Unfortunately, it was not possible to test the SSID well water at source due to the system being shut down for repairs at the time of sampling. According to a former Water Board member, salinity is reported to increase during pumping (personal communication).

4.0 GROUNDWATER QUALITY

In 1994, the Coast-Garibaldi Health Unit of the B.C. Provincial Ministry of Health undertook a detailed water quality study of 65 wells in the Indian Point area. The results identified many of the wells were above the 1987 CCREM Guidelines for nitrite, total coliform and/or fecal coliform (Glover, 1994). Although Indian Point is hydrogeologically different and more densely developed than most of the rest of the island, it indicates the potential cumulative threat to the groundwater resources of the whole island from septic discharges.

To help establish a baseline of data regarding the general quality of the groundwater on the whole of Savary Island, water samples were collected in all of the groundwater domains from a total of 27 wells on September 20, 1995 (**Map 1b**). The samples were analyzed for pH, dissolved nitrate (NO^3) and dissolved nitrite (NO^2) by Zenon Environmental Laboratories, and total coliform and fecal coliform by the B.C. Centre for Decease Control Provincial Laboratory. Fecal coliform is relied on as an indicator for bacteriological pathogens, and in the absence of a better indicator, for viral pathogens also. Viral pathogens are smaller and more mobile in groundwater than fecal coliform, but show little correlation to fecal coliform. The partial results for two samples collected from wells in the past year are also provided, to make a total sample population of 29. Complete lab results and analytical procedures are presented in **Appendix VII**. Funding limitations unfortunately limited the scope of the analysis undertaken.

September marks both the end of the busy season and the annual drought on Savary Island when water quality would be expected to be its lowest. The

TABLE 8

Water Quality Sampling Results - pH, Nitrates, Nitrites and Microbiological (September 20, 1995)

No.	Location			Sample Number			Domain	pH	NO3+NO2 Dissolved (mg/L)	NO3 Dissolved (mg/L)	NO2 Dissolved (mg/L)	Total Coliform Cfu/100ml	Fecal Coliform Cfu/100ml	
	DL	Block	Lot No	Field No.	Xenon	Prov. Lab								
Main Aquifer														
1	1372	2	17	95-2B2L17	A	99U1357	I	6.9	0.12	0.12	<0.005	76	<1	Pressure tank system. Sample from kitchen tap.
2	1372	5	26	95-2B10L26	Y	99U1352	I	7.1	1.66	1.65	0.015	4	<1	Storage tank/gravity system. Sample from kitchen tap. Pumped within 12 hours.
3	1373	2	12	95-3B2L12	I	99U1336	II	6.7	0.23	0.23	<0.005	40	<1	Storage tank/gravity system. Sample from kitchen tap. Pumped within 12 hours.
4	1373	3	3	Submitted by Property Owner			II	-	-	-	-	0	0	Submitted independently by property owner to Chemex Labs on 05-16-95.
5	1375	-	-	Reported in Badry, 1995			III	7.6	0.14	0.14	<0.001	8	0	Submitted independently by Pacific Hydrology to ASL Ltd. on 12-01-94.
6	1376	24	15	95-6B24L15	M	99U1358	IV	6.6	2.47	2.47	<0.005	270	<1	Pressure tank system. Sample from kitchen tap.
7	1376	25	2	95-6B25L2	AA	99U1360	IV	6.7	1.45	1.45	<0.005	<1	<1	Sample direct from well pump.
8	1376	30	12	95-6B30L12	N	99U1354	IV	6.8	<0.02	<0.02	<0.005	<1	<1	Sample direct from well pump.
9	1376	31	21	95-6B31L21	Z	99U1348	III	7.1	0.10	0.10	<0.005	101	<1	Sample direct from well pump.
10	1376	32	14	95-6B32L14	Q	99U1346	III	6.7	0.28	0.28	<0.005	56	<1	Sample direct from well pump.
11	1377	8	17	95-7B8L17	O	99U1349	V	7.7	<0.02	<0.02	<0.005	<1	<1	Pressure tank system. Sample from outside tap.
12	1377	9	13	95-7B9L13	P	99U1353	V	7.1	0.05	0.03	0.016	O/G	<1	Pressure tank system. Sample from kitchen tap.
13	1377	10	26	95-7B10L26	W	99U1337	V	6.6	1.18	1.17	0.011	15	<1	Sample direct from well pump.
14	1377	13	18	95-7B13L18	H	99U1338	V	6.6	1.51	1.50	0.008	120	<1	Sample direct from well pump.
15	1377	16	38	95-7B16L38	E	99U1351	V	7.2	0.05	0.05	<0.005	20	<1	Storage tank/gravity system. Sample from outside tap. Pumped within 12 hours.
16	1377	20	16	95-7B20L16	S	99U1356	IV	7.0	4.04	4.04	<0.005	23	<1	Storage tank/gravity system. Sample from outside tap. Pumped within 24 hours.
17	1377	23	3	95-7B23L3D	F	99U1350	IV	7.3	0.55	0.55	<0.005	170	<1	Sample direct from well pump.
18	1377	P. B	5	95-ParcelBL5	G	99U1334	IV	6.7	0.54	0.54	<0.005	167	<1	Pressure tank system. Sample from kitchen tap.
	Averages							7.0	0.85	0.84	0.003	63	0	
Perched Aquifers														
19	1372	7	2	95-2B7L2	B	99U1355	I	6.9	0.17	0.17	<0.005	<1	<1	No data.
20	1372	11	4	95-2B11L4	C	99U1342	I	6.5	0.04	0.04	<0.005	500	2	Storage tank/gravity system. Sample from outside tap. Pumped within 24 hours.
21	1376	22	12	95-6B22L12	L	99U1341	IV	6.6	4.84	4.84	<0.005	300	<1	Pressure tank system. Sample from outside tap.
22	1376	25	28	Indian Spring	T	99U1359	IV	5.8	0.77	0.77	<0.005	1	<1	Sample of free flowing spring water collected at spout.
23	1376	26	32	95-6B26L32	K	99U1340	IV	7.0	<0.02	<0.02	<0.005	O/G	2	Sample direct from well pump.
24	1377	8	13	95-7B8L13	J	99U1339	V	6.4	3.52	3.20	0.324	1000	<1	Sample collected with bucket. Well use very low.
25	1377	10A	15	95-7B10AL15	V	99U1335	VI	6.3	0.14	0.14	<0.005	<1	<1	Sample direct from well pump.
26	1377	15	21	95-7B15L21	X	99U1344	V	5.4	<0.02	<0.02	<0.005	500	8	Sample collected with bucket. Well use very low.
27	1377	16	25	Neilsen Spring	D	99U1347	IV	7.1	0.82	0.82	<0.005	800	<1	Sample collected at outflow from large storage tank.
28	1377	20	10	95-7B20L10	U	99U1343	IV	7.0	0.73	0.68	0.049	830	6	Sample collected with bucket. Well use very low.
29	1377	23	3	95-7B23L3S	R	99U1345	IV	6.5	0.71	0.70	0.007	<1	<1	Sample direct from well pump.
	Averages							6.5	1.07	1.03	0.035	357	2	
CCREM Water Quality Guidelines (1987)								6.5-8.5	≤10.0 mg/L	≤10.0 mg/L	≤1.0 mg/L	≤10/mL *	0/mL	

* Coliform may not be present more in than 10% of samples taken over 30 day period, nor be present in two consecutive samples from the same site.

sample analysis is considered to reflect this fact with seasonally higher results. The type of water pressure system employed at each site is expected to also have some effect on the results. Specifically, a gravity system requires a large storage tank that if not maintained can often be the source of higher total coliform levels in the water. Also, some of the shallow wells sampled were not in active use, skewing the results. Variables of this sort, including the collection point of the sample, are listed with a summary of results on **Table 8**. Three samples were collected at each site, with the microbiological samples collected in sterile plastic bottles. The samples were sent to Vancouver within 24 hours for microbiological analysis. Some water sources were from storage tanks that had been pumped full more than 12 hours before sampling, potentially reducing the concentrations of detectable of coliform.

The summary of results shown on **Table 8** is divided between samples from the Main Aquifer and those from perched aquifers. The perched aquifer wells are generally lower in water quality than the deeper wells based on the CCREM guidelines and comparison of the calculated averages.

Four wells failed outright based on fecal coliform counts above 0 Cfu/100ml. The sample from Lot 4, Block 11 on DL 1372 is from a sand point well source, suggesting contamination of the groundwater in this area. The other wells are all dug shallow wells with no to limited production at the time of testing. In consideration of the heavy summer rainfalls in 1995, it is possible that these wells have been contaminated for surface runoff water. However, studies have shown that viruses that are not destroyed in the aerobic unsaturated zone and are able to enter the groundwater can travel over 60 metres (200 feet) from source (Buzzards Bay Proj., US EPA, 1991; cited in Schreier et al., 1994). The well on Lot 21, Block 15 on DL 1377 and the well on Lot 32, Block 26 on DL 1376 require improved well head protection. All 4 contaminated wells require retesting at intervals throughout the year.

Total coliform was high in samples from both deep and shallow wells, regardless of the type of water system used. The shallow wells are again significantly higher as a result of their more direct connection to shallow groundwater. The overgrown (O/G) result for the drilled well on Lot 13, Block 9 on DL 1377 is unusual, and is possibly the result of the well being relatively shallow, or there is a spot source within the water plumbing system itself. More regular testing is required to monitor fluctuations in the total coliform in these wells.

None of the nitrate or nitrite levels are over the CCREM guideline levels, although they are again higher for the shallower wells. Higher levels of nitrite can cause infantile methemoglobinemia (Blue Baby Syndrome), a condition that reduces the oxygen carrying capacity of red blood cells in infants. Nitrate has been partly linked to the formation of carcinogens in the digestive system (Cogger, 1988; cited in Schreier et al., 1994). Some shallow well pH levels are lower than the recommended guideline, but pose little risk to health. The CCREM guidelines are primarily set to minimize corrosion.

Aside from being a little acid, the water from Indian Springs is very good quality. In consideration of the fact that the area above the spring is all fully subdivided,

there is potential in the future for septic fields to be located above within its catchment area, threatening its quality. Contamination of the Springs through improper management would affect a large number of households that are dependent on it. As for the high coliform count in the sample from Neilsen Spring, this is likely from the wooden storage tank from which the sample was take, Subsequent sampling of this site should take care to take the sample from the source.

5.0 LAND USE

Land use on Savary is largely limited to seasonal recreational dwellings. Only approximately 10% to 15% of the properties are occupied year round, of which between 20% and 25% are in the SSID. A summary of the level of development on the island is provided in **Table 9** and **Map 2a**.

TABLE 9

Savary Island Land Use
Developed Lots by District Lot and Groundwater Domain

District Lots						
	Developed Lots	Percent of Total*	Multiple Lots	Foreshore Lots	Percent Foreshore	Under Construction
1372	100	5.9%	18	59	59%	3
1373	112	6.6%	3	46	41%	2
1375	0	0.0%	0	0	-	0
1376	59	3.5%	6	44	75%	4
1377	200	11.7%	24	107	53%	11
Total	471	27.7%	51	256	54%	20
Ground Water Domains						
	Developed Lots	Percent of Total*	Multiple Lots	Foreshore Lots	Percent Foreshore	Under Construction
I	94	5.5%	18	55	58%	3
II	118	6.9%	3	50	42%	2
III	10	0.6%	0	8	80%	3
IV	86	5.1%	8	55	63%	5
V	63	3.7%	4	42	67%	6
VI	100	5.9%	18	46	46%	1
Total	471	27.7%	51	256	54%	20
* Total number of lots on island (approximate)						1701

The data provided above is approximate and subjective, depending on how "development" is classified. For this study, it is used more to indicate both property development and use, and is defined to include properties that have some structural improvement (a shack, a trailer, a cottage -- finished or unfinished, or an 80 year old house) that is occupied on an annual basis for any period of time. The classification for multiple lots is an attempt to quantify how

many developments occupy more than one lot, including the approximately 6 properties that have been legally joined from two or more lots. Properties reported as under construction are presently being actively developed but have been unoccupied up to this point. Some of the data is taken from the Ministry of Land Assessment Record and is unverified. Also, many of the developed sites have been left untouched on 20% to 70% of the property area.

The 471 properties on Savary that are classified here as developed represent only 27.7% of the total 1701 (approximate -- some lots have been legally combined) individual lots presently described in the assessment record, including the 32 owned by the Crown. But with many of the larger acreage lots, including DL 1375, still undeveloped, these 471 properties only represent 14.4% of the land base on Savary. If consideration was given to the fact that between 30% and 60% the properties developed has been left undisturbed, the percentage of undeveloped land base is quite significant. The present development represents 22.2% of the land base on DL 1372 and 1373, and 18.8% of the land base on DL 1376 and 1377. The 90 lots proposed for DL 1375 as outlined by RRR Construction would represent a total of approximately 6.7% of the island land base. A considerable area occupied by the roads and other utility areas such as the airstrip has not been included.

In spite of the present low levels of development on the island, there is only one large single area protected from development under the present regulatory restrictions that apply to Savary. This is the 14.1 hectare (35 acre) Common Area of VR1143 (the Parcel B subdivision) on DL 1373 that is thought act as a watershed for Indian Point and the area to the south. The only public lands are the 32 Crown owned lots totaling approximately 6 hectares (15 acres). And none of these are officially designated as groundwater watersheds.

There are a number of commercial businesses operating on the island including:

- the Mad Hatter Restaurant - DL 1373, Pl. 14148, Lot 40;
- the Savary Island Store - DL 1373, Pl. 14148, Lot 48;
- B&D Lumber - DL 1376, Bl. 23, Lots 11 &12, and;
- Brackenwood Propane - DL 1376, Bl. 32, Lot 13.

A gravel stock pile owned by the Ministry of Highways and a Community Fire Hall under construction occupy Crown Lots 18 and 19, and 25 and 26 respectively in Block 29 on DL 1376.

There are no significant commercial consumers of groundwater on the island. The only service operating that is dependent on groundwater supply is a small laundry operation located within the SSWD. Other businesses include two realty companies, a number of bed and breakfast guest houses, small cottage industry outlets, and storage areas and shops for a variety of service and trades people.

Commercial claming occurs on the north beach areas in September of each year. A quota of 113,400 kg. (250,000 lb.) was harvested by a total of 161 licensed clam diggers (Savary Island News, October 1995) in two 2-day openings.

Problems with overnight campers has prompted the possibility of having one day openings only. The beaches are open to recreational and Native Food Fishery clam diggers only for the remainder of the year.

Camping occurs unofficially along the south shore of DL 1372, know as South Beach, and the north shore area of DL 1373, 1375 and 1376 (**Map 2a**). Due to the unregulated nature of the beach use, there is no accurate estimate of the level of usage of these areas for camping. With the increases in kayaking and tourism generally, there has been a noticeable increase in the number of people using these areas, including a large over night excursion of reportedly more than 50 people from the Powell River area in August of this past year. There are no septic waste disposal services provided in these areas.

Vehicle traffic on the island has become a major issue. Although beyond the scope of this study, a survey to estimate the number of cars presently on island was done at the same time as the well inventory and water use survey was done. Out of the 142 households interviewed, there are a total of 44 vehicles. Of the 142 property owners interviewed, 37 were from DL 1372 and 1373 that do not require a vehicle. Also, 4 of the households have 2, reducing the number of households with vehicle(s) to 40. The result is that 35% of all the households interviewed from DL 1376 and 1377, have vehicles. The greatest impact vehicles have on groundwater is compaction of the soil, subsequently affecting recharge potential. This would be negligible however.

The total number of people estimated to visit or live on Savary of the total 142 households interviewed was 427. Representing approximately 30% of the active property owners, the responses of the households interviewed suggest that the peak season population of the island is over 1000 people. The winter population varies between approximately 50 to over 100, depending on the number of people making unseasonal visits. There are approximately 70 to 80 full time residents, the greatest percentage of which (estimated between 20% and 25%) are located in the SSID.

5.1 Ground Water Consumption

The field program undertaken in 1995 included a survey of property owners to collect data on individual groundwater consumption rates. This data has been used as the basis for a detailed estimate of the present annual rate of groundwater production on Savary Island. Of the 142 property owners interviewed, 111 are dependent on groundwater for their household water supply. In combination with this data, the metered consumption histories of the SSID properties added 93 more detailed records for a total statistical population of 204, approximately 45% of the properties actively in use.

The data was divided between consumers of groundwater from the Main Aquifer and those from perched aquifers. A series of assumptions have been built into the calculations of the estimates and are presented in **Appendix VIII**. The groundwater consumption estimates for Savary Island are summarized on **Table 10**. The consumption data and estimates, based on a block by block level of

TABLE 10
Summary of Groundwater Consumption Estimates for Savary Island - 1995

Litres

	Whole Island		DL 1372	DL 1373	DL 1375	DL 1376	DL 1377
TOTAL AVERAGE ANNUAL GROUNDWATER CONSUMPTION PER DAY (Litres/Year/365 Days)	34,656		6,935	13,808	0	2,488	11,426
TOTAL AVERAGE PEAK SEASON GROUNDWATER CONSUMPTION PER DAY (Litres/July-August/60 Days)	118,371		27,912	43,351	0	5,629	41,478
AVERAGE PEAK SEASON PER CAPITA GROUNDWATER CONSUMPTION PER DAY (Litres/July-August/60 Days/ Per Person)	62		68	123	0	45	75
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE MAIN AQUIFER PER YEAR (Litres/Year)	7,076,769		649,781	4,789,405	0	724,291	913,291
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE PERCHED AQUIFER PER YEAR (Litres/Year)	5,476,453		1,882,044	153,428	0	183,772	3,257,209
TOTAL AVERAGE GROUNDWATER CONSUMPTION PER YEAR (Litres/Year)	12,553,221		2,531,825	4,942,832	0	908,064	4,170,500

Imperial Gallons

	Whole Island		DL 1372	DL 1373	DL 1375	DL 1376	DL 1377
TOTAL AVERAGE ANNUAL GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./Year/365 Days)	7,624		1,525	3,037	0	547	2,513
TOTAL AVERAGE PEAK SEASON GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./July-August/60 Days)	26,039		6,140	9,536	0	1,238	9,124
AVERAGE PEAK SEASON PER CAPITA GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./July-August/60 Days/ Per Person)	14		15	27	0	10	16
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE MAIN AQUIFER PER YEAR (Imp. Gal./Year)	1,556,700		142,935	1,053,540	0	159,325	200,900
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE PERCHED AQUIFER PER YEAR (Imp. Gal./Year)	1,204,675		414,000	33,750	0	40,425	716,500
TOTAL AVERAGE GROUNDWATER CONSUMPTION PER YEAR (Imp. Gal./Year)	2,761,375		556,935	1,087,290	0	199,750	917,400

detail, are presented in **Appendix IX** (litres) and **Appendix X** (Imp. gallons). The data is summarized on **Maps 2b, 2c, 2d, 2e** and **2f**.
Estimates are provided for the:

- total annual consumption rate per day;
- total peak season (July and August) consumption rate per day;
- per capita consumption rate during peak season (July and August) per day;
- total annual consumption rate per day for the Main Aquifer only, and;
- total annual consumption rate per day for the perched aquifers only.

Consumption level thresholds have been assigned to the results to help distinguish areas of lower production rates from those of relatively higher ones. The thresholds applied are not statistically derived, and are for illustrative purposes only.

Clearly the greatest level of groundwater consumption from the Main Aquifer, based on all categories of consumption examined, is from DL 1373. And it can be reasonably concluded that although the SSID area constitutes a large groundwater consumer as a whole, it is surpassed by the Lot 2 and 3 consumers when the density of property development per capita rates are examined.

Shallow groundwater consumption is more evenly spread around the island, although Indian Point as a whole, and Block 7 on DL 1372 stand out. It is no coincident that these are two of the most densely developed areas on the island. There are a few anomalies in the data that require some explanation. Some areas on the island have concentrations of full-time or longer term, part-time residents, which tends to skew the results a bit and increase consumption averages. These areas include parts of SSID, notably the central block in Plan 14149, and Blocks 10, 22, 23, 24, 25, 26, 29, 30 and 32 of DL 1376 and 1377.

5.2 Alternative Water Sources

An estimated 10% of property owners on the island are solely dependent on rain water catchment systems as the sole source of household water. New technologies and well-designed systems can completely replace the need for a well source for water. The use of a catchment system is almost negligible in its interference of the hydrological cycle of the island.

Some problems do exist that are specific to Savary however. Property owners atop the cliffs along the south shore have reportedly had problems keeping the blown silt out of their roof top catchment systems. Improved gutter designs may solve this problem. A better solution, which has added safety and environmental benefits, is to build with an appropriate set-back and maintain tree protection along the cliff edge.

Water quality is a concern that can be overcome with a properly designed system that includes porcelain filters. And dual storage tanks with a total capacity in the range of 4500 to 9000 litres (1000 to 2000 Imp. gallons) is adequate for longer

term use for a family of four, provided some effort is made to conserve and water using appliances are kept to a minimum.

A surprising number of people are dependent on spring water for drinking water to supplying all their household needs. It is not reasonable to consider these sources as adequate alternative sources for anything but drinking water.

5.3 Septic Waste Management

The suitability of conventional on site sewage disposal systems to the local hydrogeological conditions of Savary Island is a key factor in managing the island groundwater. Schreier et al. (1994) outline the key factors for determining suitability for any site are outlined as "...soil depth, percolation, slope, soil material properties, hydrologic conditions, intrusion of air into the soil profile, parcel size, climatic conditions and proximity to rivers, tidal zones, aquifers and neighbouring properties." The key factors from this list that relate to Savary would be soil depth, percolation, soil material properties and proximity to aquifers and tidal zones.

Soil development is limited to a thin (approximately 0.3 metres; 1 foot) A horizon in most areas on Savary. However the depth to which the microbiological populations that aid in the bioremediation of septic wastes are found in the soils (the "living soil") on Savary has not been determined. A thin soil combined with expected above average percolation rates suggest that the soils on Savary might function more as a physical filter than a more efficient living biological filter. These factors are the key to determining the potential for septic contamination of the groundwater. The thickness of the unsaturated zone, where aerobic conditions help in the digestion of organic wastes, becomes vital. An unsaturated zone thickness of 4.2 metres (14 feet) is suggested as required for sites within 75 metres (250 feet) of vegetated wetlands. Using just this guideline, the Main Aquifer can be assumed fairly safe (Buzzard Bay Proj., EPA, 1991; cited in Schreier, 1994). But, in consideration of a number of factors, including potential lot densities, the long-term cumulative effects on the aquifer could prove disastrous.

The perched, or shallow aquifers, including Indian Springs, are considerably more at risk, a fact demonstrated by the 1994 groundwater study of Indian Point (Glover) and the study discussed in this report. The quick transport of pathogens into these shallow anaerobic groundwater environments would aid in the movement of contaminants up to 60 metres (200 feet) from their source (EPA, 1991; cited in Schreier, 1994).

This suggests serious risk for the tidal habitats in the areas surrounding Indian Point and Keefer Bay where the aquifers are known to be less than 4 meters deep. Pathogens and nitrates from the adjacent properties could cause local health hazards, or increased algae growth (coastal eutrophication) resulting in serious environmental and health impacts, respectively.

It is unlikely that the effluent from SSID septic waste disposal systems are the cause of any environmental damage to the Keefer Bay area because of the

greater that 30 metres (100 feet) of vertical filtration through the unsaturated zone and more than 100metres (330 feet) within the saturated zone that these wastes would have to travel to reach tide water. An increase in nitrates from septic discharges could cause a depletion in eel grass and subsequently fish habitat as result of increased algae growth (EPA, 1991; cited in Schreier, 1994). Eel grass growth in tidal areas of Savary Island may be more affected by annual variations in the longshore transport and deposition of coastal sands.

Data on the household septic and greywater treatment systems employed on the island was also collected in the 1995 survey. the results are tabulated below in **Table 11**.

These results show that conventional septic treatment systems are the most common on the island. However, due to the age of some of these systems and the unregulated process under which most of them were installed, the majority are below regional Health standards. It is also not well understood if these conventional systems are adequate given the unique combination of Savary's hydrogeological environment and the density of lots over much of the island.

Standards for new septic system installations have been aggressively enforced for the past two years, but the ministry does have full retroactive powers of authority to force compliance in situations where obvious groundwater contamination is occurring. There are numerous "weeping box" systems on the island, some immediately adjacent to tide water, that now are expected to handle liquid waste volumes that are well above average and far beyond their intended capacities. Weeping boxes slated wooden reservoirs 1.2 m. x 1.2 m. x 2.4 m. (4 ft. x 4 ft. x 8 ft.)

TABLE 11

Summary of Household Waste Treatment Systems

	Septic	Ministry Approval	Kitchen Greywater	Bath Greywater
Conventional Tank/Field	62 (51%)	**5** (6 Pending)	58 (48%)	58 (47%)
Outhouse	34 (28%)	0 (?)	0	0
Weeping Box	20 (16%)	0	16 (13%)	13 (11%)
Composting Toilet	6 (5%)	0	0	0
Drainage Field Only	0	0	3 (2%)	0
Pit	0	0	31 (26%)	41 (34%)
Grease Trap and Pit	0	0	14 (11%)	10 (8%)
Totals	122	5	122	122

Although the health regulations have no authority over the locating of a well, it does have provide control over the placement of septic systems relative to wells. A septic system, including and outhouse, must be permitted and located 30 metres (100 feet) from any well head, or 75 metres (250 feet) from any coastal wetland. Numerous examples exist on the island where this standard is not maintained. This regulation is also beginning to limit the development of some lots (reportedly 4) on the island.

New subdivision requirements have been recently outlined for the Coast-Garibaldi Health Region that requires a minimum lot size for properties not serviced by an approved water works system of 10,000 square metres (2.5 acres) (On site Sewage Disposal Standards for Subdivision Assessment, 1995). This new standard, while only applicable to new subdivision proposals excludes most of the present properties on Savary.

There is a great advantage to encouraging the use of composting units from both groundwater quality and consumption stand points. There are no specific regulations regarding the installation of composting toilet units. The regulations at present do not allow any reduction in the required dimensions of greywater disposal fields, implementation of alternative greywater garden watering systems, or the disposal of the composted residual material. However, the Regional Health Inspector is making concessions in this regard in consideration of the specific conditions on Savary.

6.0 HYDROLOGICAL BUDGET ESTIMATES

Water balance and groundwater modeling estimates have been calculated in the past for the DL 1372 and 1373 area (Brown, 1971; Livingston, 1988) and DL 1375 (Badry, 1995). A water balance has not been attempted before for the whole island. Two simple methods are used in the calculation of a hydrological budget for the island. First, the estimated rate for Actual Evapotranspiration is used to volume of surplus moisture available for recharge. Second, a model is used that is similar to the one employed by Livingston (1988) to provide a crude estimate of the recharge to the Main Aquifer. A number of parameters are assumed, as stated below.

Proper monitoring equipment would enable the measurement of annual variations in the stored volumes of the Main Aquifer. With a value for changes in the storage of the Main Aquifer, more appropriate calculation of the safe quantity of the groundwater available for consumption would be possible. Based on each of the domain areas, calculations of demand/storage percentages, or sustainable yield that includes the rate of change of storage in the saturated zone, are suggested.

6.1 Community Consumption Estimates and Projections

Groundwater consumption on Savary Island is estimated to be 12,553,221 litres/year (1.26×10^7 litres/year; $2,76 \times 10^6$ Imp. gal./yr.). It is estimated that

there are at present close to 950 individual title holders to the approximately 1700 lots on the island. This is twice the present level of development estimated in this report. Based on this, the seasonal and annual use of the island and its resources can be expected to double at least in the future. Hence, the consumption of groundwater on the island can also be assumed to double, triple or quadruple in the future to something between to 2.50 x 10^7 litre/year (5.50 x 10^6 Imp. gal./yr.) and 5.00 x 10^7 litres/year (1.10 x10^7 Imp. gal./yr.).

6.2 Evapotranspiration

Actual Evapotranspiration (**AE**) on Savary is estimated to be 364 mm based on the work by Klinka (1979). Based on an average annual precipitation (**P**) of 948 mm (Van Anda), the amount of surplus moisture available would be 584 mm.

6.3 Calculated Recharge Rates

If it is assumed that the rate of infiltration is uniform on measured area of the island, and the losses and gains resulting from consumption practices are both relatively negligible, two crude estimates of the annual rate of recharge (**R**) of the Main Aquifer can be calculated. Outflow is estimated to be approximately 4 times the annual flow of Indian Springs.

Firstly, using the value for **AE**, annual recharge can be estimated with the following formula. Concern about the potentially elevated rate of loss from the cliff faces is compensated for by subtracting the area of the cliff exposures (**CA**) on the island from the total area (**TA**).

R = Total Annual Recharge
P = Total Annual Precipitation (Texada Is.)
= 0.949 metres
AE = Actual Evapotranspiration (Klinka, 1979)
= 0.364 metres
TA = Total Area of Savary Is.
= 4,496,000 $(metres)^2$
CA = Total Cliff Area
= 330,000 $(metres)^2$
O = Outflow (springs)
= 1000 metres

$$\mathbf{R = ((P \times (TA-CA)) - ((AE \times TA)+O)) \times 1000\ litres/(metre)^3}$$

$$\mathbf{= 2.2 \times 10^9\ litres}$$

A second estimate for **R** can be calculated by multiplying 50% of the average November to February precipitation total (**p**) by **TA**, less the estimated area of the cliffs According to the following equation:

p = Average November - December Precipitation
= 0.493

$$R = (((p \times 50\%) \times (TA-CA)) - O) \times 1000 \text{ litres/(metres)}^3$$

$$= 1.0 \times 10^9 \text{ litres}$$

The two estimates are of similar magnitude, suggesting a reasonable level of accuracy. The ratio of present demand to recharge expressed as a percent is only 0.5% to 1%, indicating that there is more than enough groundwater resources present of meet present and future needs. The results of this calculation for each of the District Lots are presented in **Table 12**.

Although these values for recharge and aquifer capacity are based on an over simplified hydrogeological models, they are considered to be reasonable estimates based on an expanded understanding of the island hydrogeology. With two orders of magnitude between recharge rates (x 10^8) and both present, and four times present, consumption levels (x 10^6), there is abundant room for error.

TABLE 12

Calculated Recharge Estimates

	Consumption	Recharge			
		AE Method		(p x 50%) Method	
	(litres/yr)	(litres/yr)	(Imp. gpd)	(litres/sec)	(Imp. gpd)
1372	2.53×10^6	3.0×10^8	6.6×10^7	1.4×10^8	3.1×10^7
1373	4.94×10^6	1.6×10^8	3.5×10^7	1.2×10^8	2.6×10^7
1375	0	7.3×10^8	1.6×10^8	3.0×10^8	6.6×10^7
1376	0.91×10^6	3.0×10^8	6.6×10^7	1.5×10^8	3.3×10^7
1377	4.17×10^6	7.3×10^8	1.6×10^8	3.0×10^8	6.6×10^7
Whole Island	1.26×10^7	2.2×10^9	4.9×10^8	1.0×10^9	2.2×10^8
Total Estimated Main Aquifer Capacity				3.37×10^{10} litres 7.42×10^9 Imp. Gal.	
Demand/Recharge Ratio (as a percentage)				0.5% to 1%	
Demand/Storage Ratio (as a percentage)				0.04%	

6.4 Aquifer Capacity

The assumptions made by Badry (1995) regarding the aquifer thickness and porosity are the best estimates available for calculating the groundwater storage capacity of the main aquifer. Using the area of Savary, a porosity of 25% and an aquifer thickness of 30 metres (98 feet), the calculated capacity of the Main Aquifer is in the range of 3.37×10^{10} litres of groundwater.

7.0 ONGOING MONITORING PROGRAM

It is recommended that the moneys available would be best utilized as follows:

- initiation of a 3 to 5 years of well monitoring of selected existing wells;
- installation of a permanent water level monitoring equipment on Well RRR94-1 in order to collect reliable background data in an area of no development (to be done in cooperation with the Ground Water Section of BCE and RRR Construction);
- purchase and installation of 4 to 5 electronic well water level data loggers, establishing a series of 4 to 5 community water level monitoring wells along the length of the island;
- None permanent monitoring should be conducted for periods of over a year, beginning in the areas of highest present consumption (in consideration of the fact that consumption in these areas is not expected to rise due to near full development, but will in others);
- purchase of automatic rain gauge.

A more definitive understanding the quantity of groundwater available, the rate of recharge to the groundwater resources, groundwater flows and distribution, and the overall hydrogeological environment can only be attained through a careful and properly funded monitoring program. As a result, it is recommended that some of the funds raised for this study be held in trust by the PRRD to cover ongoing costs and to provide partial funding for analysis of the data in 3 to 5 years hence.

Additional support is anticipated from Dr. Brian Ricketts of the Geological Survey of Canada. Dr. Ricketts is investigating the potential of conducting a geophysical survey of the island as part of his research. The survey would include an electromagnetic survey that could help delineate both the saltwater/freshwater interface and clay horizons to depths of over 150 metres beneath the island. A second survey using seismic equipment would provide good profile of the geology of the island to depths of over 500 metres. Data from these studies would be very helpful to understanding the hydrogeology of the island.

In consideration of an improved understanding of the hydrogeology of Savary Island, the objective work program of this study was modified. Specifically, the original proposal to drill a deep well to monitor the freshwater/saltwater interface beneath the island for long term monitoring has been rejected. The proposal for an interface well has had a long history on the island, and if a such a well could be successfully established and funded, it would provide invaluable data. However, the anticipated high cost of such a well, scheduling difficulties and the numerous technical and geological problems that would likely be encountered, make this option a poor use of the limited resources available.

8.0 OTHER GEOTECHNICAL ASPECTS

The physical stability of the south shore cliffs on Savary have been a concern for many years. The cliffs are in a constant state of erosion resulting for the most part from wave undercuts at the base, but also from the wind. The cliffs had stabilized for some years with a broad natural berm of drift wood at its base that gave reasonable protection from storms. However, a series of strong southeast

storms combined with extreme high tides in December of 1994 cleared the log debris and caused 0.5 to 1.0 metre (1.6 to 3.3 foot) undercuts along sections of the cliff up to 500 metres (1600 feet) long. These undercuts can be expected to cause slumping of successively higher and potential larger sections of the cliff until some sections of the top surface fail. The scale of these failures is not expected to significantly threaten private property, but this is not certain in the absence of a more detailed geotechnical study. It would however be prudent to include in an Official Community Plan or by-law if and when drafted, a required minimum setback for these properties.

Long shore erosion has also had an effect on the lower profile areas of the island such as Indian Point. The effects of current and the longshore transport of sand is presently the subject of a study undertaken by Dr. Brian Bournhold of the Geological Survey of Canada.

Earthquakes pose a very real threat to the island. The 1946 large magnitude earthquake (7.2 on the Richter scale) centred just inland from Campbell River was reportedly strongly felt at Indian Point (M. E. Leighton, personal communication). Although no damage was reported, trees swayed completely over and a significant tidal swell occurred. No observations were made of the potentially unstable south shore areas because there were no inhabitants there.

9.0 CONCLUSIONS

Savary Island is largely underlain by a thick succession of unconsolidated glaciofluvial deposited sediments of the Quarternary Quadra Sands and Vashon Drift. The stratigraphy is laterally complex and very changeable over tens of metres. A small granodiorite remnant anchors the island at Mace Point on the east end.

Geological mapping demonstrated both the vertical and horizontal complexity of the Quadra Sands stratigraphy on Savary Island, specifically the lack of continuity of the numerous and relatively impermeable clay horizons.

There are two classifications of groundwater aquifers present on the island:

- the Main Aquifer which underlies the whole island, and;
- five isolated shallow aquifers located along the island.

The Main Aquifer is up to 30 metres (98 feet) thick and is hosted in the loose sands of the Quadra Sands unit near to the mean tide elevation of approximately 3 metres (10 feet). The shallow aquifers include the Keefer Bay Shallow Aquifer along the north shore of DL 1372 and 1373. The three hydraulically isolated shallow aquifers that comprise the West Perched Aquifers on DL 1376 and 1377 are perched on silty clay horizons of the Vashon Drift or related horizons. The Indian Point Shallow Aquifer is a shallow groundwater source possible hydraulically connected to the Main Aquifer to the east and hosted in the accreted sands of the sand spit that comprises Indian Point.

The Main Aquifer has been divided into six groundwater domains along the length of the island, each of which is subdivided into north and south sections.

There are an estimated 102 deep drilled wells, 55 shallow dug wells and 142 shallow sand point wells totaling 299 in number on the island. Of these 257 are estimated to be in active use on either a seasonal or full time basis. Depth to the Main Aquifer ranges form 6 metres (20 feet) to 46 metres (150 feet). The shallow aquifers range in depth from less than a metre (3 feet) to 6 metres (20 feet). Four springs and seeps are known on the island, three (including Indian Springs) of which three are used for are used for water supply.

Water quality determinations from this study identify the shallow aquifers as particularly vulnerable to microbiological contamination. Only 4 of the 11 tested were below the CCREM Drinking Water Guidelines for both total and fecal coliform. Of the 11, 4 had fecal coliform counts. Of the 18 Main Aquifer wells tested, none had fecal coliform, but only 6 had total coliform counts below the guidelines standard of 10 counts/100 ml. The total coliform counts for the deep wells tested were much lower than those for the shallow wells and may be attributed in part to contamination within the water pressure system. the water quality of Indian Springs is very good. Only one well exceeded the CCREM guideline for salinity. The source of most of the chlorine and sodium in the groundwater is concluded to be from wind blown salt spray that is dissolved into the infiltrating precipitation. The BCE alert level of 20 mg/L dissolved Na is exceeded in most samples for people on very restricted diets.

Land use on the island consists of primarily seasonal recreational development occupying 471 (27.7%) of the approximately 1701 lots on the island. The number of developed lots comprise only 14.4% of the total land base on the island though.

Groundwater consumption on the island is estimated to be 1.26×10^7 litres per year (2.76×10^6 Imp. gallons per year), with the greatest production from DL 1373. Groundwater consumption on DL 1373 is approximately 5.0 litres/second during the peak season of July and August (1.6 litres/sec. averaged over the whole year, 1.5 litres/sec. of which from the Main Aquifer). Maximum recommended capacity for the RRR94-1 well was 4.71 litres/second (Badry, 1994). Other areas of high production include the north shore area of DL 1372 and Indian Point.

Recharge on the island is crudely estimated to be between 1.0×10^9 litres/year (2.2×10^8 Imp. gal./yr.) and 2.2×10^9 litres/year (4.9×10^8 Imp. gal./yr.), significantly more than the present level of consumption. These calculations are based in part on an estimate evapotranspiration rate of 632 mm. (24.9 inches) for the Coastal Douglas Fir biogeoclimatic zone as determined by Klinka (1979), and the November to December precipitation of 493 mm (19.5 inches) reported for Van Anda on Texada Island.

The ratio of present groundwater consumption to annual recharge is very low at between 0.5% and 1.0%.

10.0 RECOMMENDATIONS

The fast growth of British Columbia is now catching up to Savary Island. Unfortunately for all of us, the days of unregulated freedom on the island can not continue without the destruction of many of the rural qualities that have made it popular. And regardless of the conclusions of this report regarding the potentially high level of sustainable yield possible on Savary, the implementation of controlled management of the groundwater resources should begin now. Although the risks from contamination are, in the absence of hard data, considered at this time to be greater than those of resource depletion or sea water intrusion, local hydrogeological variations could cause unexpected results seriously affecting the investment value of area specific properties.

The following are areas recommended for further work, consideration, implementation and promotion;

1) Development of a community well head protection plan that is inclusive of both private and community well services;

2) Establishment and continued maintenance of a community well registry and well log inventory

3) Facilitate linkages for sharing of groundwater data between various levels of government (Provincial Groundwater Section, Regional Health Unit and Regional District and Savary Island Committee);

4) Facilitate installation of BCE monitoring equipment on RRR94-2 well and commencement of long term well monitoring program;

5) Purchase of down hole well water data logger(s) to be installed for 4 to 6 month periods in selected private wells representative all groundwater domain areas as part of a well water level monitoring program;

6) Annual (at least) water quality sampling of the baseline wells;

7) Continuous daily monitoring of precipitation on island;

8) Establishment of protected groundwater recharge watersheds, and the requirement for the setting aside of a significant proportion of land for such purpose in all future subdivisions;

9) Detailed hydrology report based on monitoring data collected in 3 to 5 years from now;

10) Endorsement of alternative water sources such as rain catchment systems;

11) Endorsement of alternative septic treatment systems, such as composting toilets and tertiary in ground septic treatment systems;

12) Encouragement of the use of water saving devices, such as low volume shower heads, low volume toilets.

13) Encouragement of the use of water saving practices, such as showering less frequently, re-using washwater for multiple cycles, flushing only when necessary, using greywater for garden watering, limit gardens to produce and native plants.

14) Protection of the springs from septic contamination by limiting development (specifically outhouses and septic fields) over them;

15) Positioning of septic fields away form cliff areas to allow for potential recharge;

16) Completion of well head level survey and hydraulic gradient map;

17) Establishment of more community well services (on a metered, possibly user pay plan), the additional benefit being increased fire fighting capability and safety;

18) Taxation incentives for the owners of multiple properties to group them into one, non-sub-dividable title;

19) Facilitation of more education on groundwater conservation and protection;

20) Lobby for provincial groundwater legislation that enables regulation in selected critical areas, water management planning, protection of water quality, and standards for well construction, servicing and abandonment;

21) Development of an Official Community Plan that includes management strategies for groundwater resources.

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Savary Island Property Owners Association
British Columbia Ministry of Health
RRR Construction
Capilano College

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Paul Leighton and Ken Lamport

Christen Gaell, Liz and Dawn Mills

Appendix I

Qualifications

10.0 STATEMENT OF QUALIFICATIONS

I, DAVID W. TUPPER, of 1040 Aubeneau Crescent, West Vancouver, British Columbia, do hereby certify that:

1) I am a consulting geologist.

2) I am a member in good standing of the Association of Professional Engineers and Geoscientist of British Columbia (Reg. No. 20521).

3) I am a graduate of the University of British Columbia (1985) with a Bachelor of Science degree.

4) I am the author of this report entitled "A Preliminary Assessment of the Groundwater Resources of Savary Island, British Columbia"", dated January, 1996.

5) This report is fulfills the obligations required for graduation from the Post Baccalaureate Environmental Studies Program at Capilano College in North Vancouver, B.C.

6) I have been employed in mineral exploration since 1979 and have practiced my profession continuously since graduation, largely on a contractual basis.

Dated at Vancouver, British Columbia this 2nd day of January, 1996.

Respectfully submitted,

D. W. TUPPER

David W. Tupper, B.Sc., P. Geo.

Appendix II

1995 Savary Island Well, Groundwater Consumption and Septic Waste Survey Data

SAVARY ISLAND GROUNDWATER STUDY - WELL AND WASTE DISPOSAL INVENTORY INFORMATION

No.	Legal		Dwelling	Usage		Water	Well Information					Catchment	Consumption	Waste Disposal				Vehicle
	D.L.	Block		No. Persons	Days/Yr	Source	Depth	Date	Diameter	Driller	Log	Storage	Imp. gal/day	Toilet	Kitchen	Shower	Approved	
1	1372	2	Cottage	2	90	Drilled Well	30 ft.	-	6 in.	-	No	-	125	Tank/Field	Tank/Field	Tank/Field	No	0
2	1372	2	Cottage	1	180	Drilled Well	30 ft.?	-	6 in.	-	No	-	110	Tank/Field	Tank/Field	Tank/Field	No	0
3	1372	2	Cottage	2	30	Dug Well	-	-	-	-	-	-	45	Tank/Field	Tank/Field	Tank/Field	No	0
4	1372	3	None	0	0	Drilled Well			6 in.			-	0	-	-	-	-	0
5	1372	3	Cottage	3	130	Catchment	-	-	-	-	-	1700	40	Box	Box	Box	No	0
6	1372	3	Cottage	2	35	Sandpoint	16 ft.	1993	-	-	-	-	10	Outhouse	Pit	Pit	No	0
7	1372	4	Cottage	2	30	Catchment	-	-	-	-	-	500	15	Outhouse	Pit	Pit	No	1
8	1372	4	Construction	2	50	Catchment	-	-	-	-	-	500	0	Tank/Field	Tank/Field	Tank/Field	Pending	0
9	1372	4	Construction	2	60	Catchment	-	-	-	-	-	1000	10	Tank/Field	Tank/Field	Tank/Field	Pending	1
10	1372	4	Cottage	1	365	Catchment	-	-	-	-	-	N/A	10	N/A	N/A	N/A	No	1
11	1372	4	Cottage	4	21	Catchment	-	-	-	-	-	800	10	Outhouse	Pit	Pit	No	0
12	1372	7	Cottage	4	100	Dug Well	-	-	-	-	-	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
13	1372	7	Cottage (X2)	7	60	Dug Well (X2)	N/A	-	-	-	-	-	300	Tank/Field	Tank/Field	Tank/Field	No	0
14	1372	7	Cottage (x2)	5	100	Drilled Well	30 ft.	N/A	6 in.	Nelson	No	-	200	Tank/Field	Tank/Field	Tank/Field	No	0
15	1372	7	Cottage	2	250	Dug Well/Springs	10 ft.	N/A	-	-	-	-	45	Tank/Field	Tank/Field	Tank/Field	No	0
16	1372	7	Cottage	3	100	Sandpoint	15 ft.	N/A	-	-	-	-	50	Box/Field	Grease Trap	Grease Trap	No	0
17	1372	8	Cottage	4	60	Sandpoint	N/A	-	6 in.	-	-	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
18	1372	8	Cottage	0	0	Drilled Well	30 ft.	1994	6 in.	Perry	Yes	-	0	Tank/Field	Tank/Field	Tank/Field	No	0
19	1372	8	Cottage	3	70	Sandpoint/Drilled Well			6 in.	Perry	Yes	-	100	Tank/Field	Tank/Field	Tank/Field	Yes	0
20	1372	8	Cottage	2	90	Sandpoint/Drilled Well	35 ft.	N/A	6 in.	Perry	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
21	1372	8	Cottage	2	60	Sandpoint	N/A	N/A	-	-	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
22	1372	8	Cottage	1	60	Sandpoint	N/A	N/A	-	-	No	-	50	Tank/Field	Tank/Field	Tank/Field	No	0
23	1372	8	Cottage	4	80	Sandpoint	14 ft.	N/A	-	-	No	-	80	Tank/Field	Tank/Field	Tank/Field	No	0
24	1372	8	Cottage	4	60	Sandpoint	N/A	N/A	-	-	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
25	1372	8	Cottage	5	75	Sandpoint	15 ft.	N/A	-	-	-	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
26	1372	8	Cottage	4	60	Sandpoint	N/A	N/A	-	-	-	-	20	Tank/Field	Grease Trap	Grease Trap	No	0
27	1372	9	None	0	0	None	-	-	-	-	-	-	0	-	-	-	-	0
28	1372	11	Cottage	3	75	Drilled Well	35 ft.	-	6 in.	-	No	-	120	Tank/Field	Box	Box	No	0
29	1372	11	Cottage	4	120	Drilled Well	N/A	N/A	6 in.	Nelson	No	-	150	Field	Field	Field	No	0
30	1372	2732	Undeveloped	0	0	Drilled Well	158 ft.	1994	6 in.	Perry	Yes	-	0	Tank/Field	Tank/Field	Tank/Field	No	0
31	1372	2732	Undeveloped	0	0	Drilled Well	160 ft.	1994	6 in.	Perry	Yes	-	0	Tank/Field	Tank/Field	Tank/Field	No	0
31	1373	2	Cottage	4	60	Drilled Well	104 ft.	1987	6 in.	Fyfe	Yes	-	200	Tank/Box	Tank/Box	Box	No	0
32	1373	2	Cottage	6	75	Drilled Well	N/A	1987	6 in.	Fyfe	No	-	250	Box	Box	Box	No	0
33	1373	2	Cottage	6	60	Drilled Well	N/A	1987	6 in.	Fyfe	No	-	200	Box	Grease Trap	Grease Trap	No	0
34	1373	2	Cottage	3	45	Drilled Well	N/A	1987	6 in.	Fyfe	No	-	100	N/A	N/A	N/A	No	0
35	1373	3	Cottage	5	70	Drilled Well			6 in.	Fyfe	Yes	-	250	Tank	Tank	Tank	No	0
36	1373	3	Cottage	2	90	Dug Well	N/A	N/A	-	-	-	-	200	Box	Grease Trap	Grease Trap	No	0
37	1373	3	Cottage	5	80	Drilled Well	105 ft.	1987	6 in.	Fyfe	No	-	200	Tank/Box	Tank/Box	Tank/Box	No	0
38	1373	3 (2)	Cottage (x3)	10	60	Drilled Well	N/A	N/A	6 in.	Fyfe	No	-	600	Box	Box	Box	No	0
39	1373	11433	Cottage	6	50	Drilled Well	N/A	N/A	6 in.	Fyfe	No	-	300	Tank/Field	Tank/Field	Tank/Field	No	0
40	1373	11433	Cottage	6	50	Dug Well	15 ft.	1973	-	-	Yes	-	15	Tank/Field	Tank/Field	Tank/Field	No	0

SAVARY ISLAND GROUNDWATER STUDY - WELL AND WASTE DISPOSAL INVENTORY INFORMATION

No.	Legal		Dwelling	Usage		Water						Catchment	Consumption	Waste Disposal				Vehicle
	Dist.	Block		No. Persons	Days/Yr	Source	Depth	Date	Diameter	Driller	Log	Storage	Imp. gal/day	Toilet	Kitchen	Shower	Approved	
41	1376	20	House	3	365	Dug Well	8 ft.	1995	-	-	Yes	-	20	Tank/Field	Tank/Field	Tank/Field	Pending	1
42	1376	22	House	2	365	Dug Well/Catchment	18 ft.	-	-	-	Yes	750 gal.	40	Tank/Field	Tank/Field	Tank/Field	Yes	0
43	1376	22	House	2	365	Drilled Well	200 ft.	-	6 in.	-	No	-	50	Tank/Field	Tank/Field	Tank/Field	Yes	1
44	1376	23	House	2	365	Catchment	-	-	-	-	-	100 gal.	5	Outhouse	Pit	Pit	No	1
45	1376	24	Cottage	0	0	Catchment/Spring	-	-	-	-	-	100 gal	0	N/A	N/A	N/A	-	0
46	1376	25	Cottage	2	240	Drilled Well		1981	6 in.	Nelson	N/A	-	125	Tank/Field	Tank/Field	Tank/Field	No	1
47	1376	25	Cottage	4	30	Indian Springs	-	-	-	-	-	-	50	Outhouse	Pit	Pit	No	1
48	1376	25	House/Trailer	1	320	Catchment/Spring	-	-	-	-	-	-	50	Outhouse	Pit	Pit	No	0
49	1376	25	House/Trailer	1	365	Drilled Well	91 ft.	1994	6 in.	Anderson	Yes	-	10	Outhouse	Pit	Pit	No	1
50	1376	25	Cottage	4	30	Drilled Well/Springs	N/A	-	6 in.	Nelson	No	-	8	Outhouse	Pit	Pit	No	0
51	1376	25	Cottage	4	60	Indian Springs	-	-	-	-	-	-	7	Outhouse	Grease Trap	Grease Trap	No	0
52	1376	26	House	4	365	Catchment/Spring	-	-	-	-	-	840 gal.	15	Box	Box	Box	No	1
53	1376	26	Cottage	2	365	1377/Blk. 13/Lt. 18	-	-	-	-	-	-	12	Outhouse	Pit	Pit	No	2
54	1376	27	House	3	365	Catchment	-	-	-	-	-		20					2
55	1376	27	Cottage	2	60	Catchment	-	-	-	-	-	900 gal.	30	Tank/Field	Grease Trap	Grease Trap	No	0
56	1376	28	House	2	365	Indian Springs	-	-	-	-	-	-	5	Outhouse	Pit	Pit	No	1
57	1376	28	Cottage	2	210	Catchment/Spring	-	-	-	-	-	1300	150	Box	Irrigation	Irrigation	No	1
58	1376	29	Trailer/Tent	7	40	Indian Springs	-	-	-	-	-	-	10	Outhouse	Pit	Pit	No	0
59	1376	29	Cottage	2	70	Drilled Well/Catchment	N/A	-	6 in.	Perry	No	100 gal.	30	Composting	Pit	Pit	No	1
60	1376	29	House	2	240	Drilled Well	115 ft.	N/A	6 in.	Nelson	No	-	35	Tank/Field	Tank/Field	Tank/Field	No	1
61	1376	30	House	2	365	Drilled Well			6 in.	Perry		-	100	Tank/Field	Tank/Field	Tank/Field	Pending	1
62	1376	30	Cottage	0	0	Drilled Well	N/A	N/A	6 in.	N/A	No	-	0	Tank/Field	Tank/Field	Tank/Field	No	0
63	1376	31	Cottage	4	30	Drilled Well	N/A	N/A	6 in.	Perry	No	-	5	Composting	Grease Trap	Grease Trap	No	0
64	1376	32	House	2	365	Drilled Well	108 ft.	N/A	6 in.	Nelson	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
65	1376	32	Cottage	5	55	1376/Blk. 32/Lt. 14	-	-	-	-	-	-	50	Tank/Field	Tank/Field	Tank/Field	No	0
66	1377	3A	Cottage (x2)	3	80	Sandpoint	7 ft.	1970	-	-	-	-	200	Tank (x2)	Tank (x2)	Tank (x2)	No	0
67	1377	3A	Cottage	4	50	Sandpoint	N/A	N/A	-	-	-	-	100	Box	Field	Field	No	0
68	1377	3A	Cottage	3	45	Sandpoint	8 ft.	N/A	-	-	-	-	50	Box	Box	Pit	No	0
69	1377	4 (6)	Cottage	6	30	Sandpoint	12 ft.	N/A	-	-	-	-	100	Tank/Field	Grease Trap	Pit	No	0
70	1377	5	Cottage	6	60	Sandpoint	16 ft.	N/A	-	-	-	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
71	1377	6	Cottage	2	60	Sandpoint	15 ft.	N/A	-	-	-	-	60	N/A	N/A	N/A	No	1
72	1377	6	Cottage	3	40	Sandpoint	17 ft.	N/A	-	-	-	-	25	Box	Box	Pit	No	0
73	1377	6	Cottage	3	60	Sandpoint	N/A	N/A	-	-	-	-	10	Box	Box	Box	No	0
74	1377	6	Cottage	4	60	Sandpoint	N/A	N/A	-	-	-	-	50	Tank/Field	Tank/Field	Tank/Field	No	0
75	1377	6	Cottage	2	60	Sandpoint	N/A	N/A	-	-	-	-	50	Tank	Tank	Tank	No	0
76	1377	6	Cottage	2	70	Sandpoint	14 ft.	1990	-	-	-	-	10	Outhouse	Pit	Pit	No	0
77	1377	7	Cottage	4	60	Sandpoint	N/A	N/A	-	-	-	-	80	Tank/Field	Field	Tank	No	0
78	1377	9A	House	2	365	Dug Well	18 ft.	1994	-	-	-	-	40	Tank/Field	Tank/Field	Tank/Field	Yes	2
79	1377	9A	Cottage	4	60	Sandpoint	13 ft.	N/A	-	-	-	-	125	Tank/Box	Tank/Box	Tank/Box	No	0
80	1377	9A	Cottage	4	60	Sandpoint	12 ft.	N/A	-	-	-	-	100	Tank/Field	Tank/Field	Tank/Field	No	0

SAVARY ISLAND GROUNDWATER STUDY - WELL AND WASTE DISPOSAL INVENTORY INFORMATION

No.	Legal		Dwelling	Usage		Water						Catchment	Consumption	Waste Disposal				Vehicle
	D.L.	Block		No. Persons	Days/Yr	Source	Depth	Date	Diameter	Driller	Log	Storage	Imp. gal/day	Toilet	Kitchen	Shower	Approved	
81	1377	9A	Cottage	2	50	Sandpoint	16 ft.	N/A	-	-	-	-	70	Box	Grease Trap	Pit	No	0
82	1377	9A	Cottage	4	65	Sandpoint	14 ft.	N/A	-	-	-	-	25	Outhouse	Pit	Pit	No	0
83	1377	9A	Cottage	2	135	Sandpoint	15 ft.	N/A	-	-	-	-	80	Tank/Field	Tank/Field	Tank/Field	No	0
84	1377	9A	Cottage	4	70	Sandpoint	15 ft.	N/A	-	-	-	-	50	Tank/Field	Tank/Field	Tank/Field	No	0
85	1377	9A	Cottage	7	90	Dug Well	13 ft.	N/A	-	-	Yes	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
86	1377	9A	Cottage	4	70	1377/Blk. 9A/Lt. 40	-	N/A	-	-	-	-	70	Tank/Field	Tank/Field	Tank/Field	No	0
87	1377	9A	Cottage	4	120	Dug Well	10 ft.	N/A	-	-	Yes	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
88	1377	9A	Cottage	2	120	Sandpoint	20 ft.	N/A	-	-	-	-	50	Tank/Field	Grease Trap	Tank/Field	No	0
89	1377	10A	Cottage	5	60	Sandpoint	12 ft	N/A	-	-	-	-	150	Tank/Field	Tank/Field	Tank/Field	No	0
90	1377	10A	Cottage	4	20	Sandpoint	N/A	N/A	-	-	-	-	50	Tank/Field	Tank/Field	Tank/Field	No	0
91	1377	10A	Cottage	2	270	Sandpoint	18 ft.	N/A	-	-	-	-	100	Tank/Field	Tank/Field	Tank/Field	No	1
92	1377	Parcel B	House	2	365	Drilled Well	N/A	-	6 in.	Nelson	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	1
93	1377	8	Cottage	4	21	Dug Well	16 ft.	1992	-	-	Yes	-	80	Tank/Field	Tank/Field	Tank/Field	No	0
94	1377	8	Cottage	N/A	N/A	Dug Well	18 ft.	N/A	-	-	No	-	0	N/A	N/A	N/A	N/A	0
95	1377	8	Cottage	4	30	Dug well	15 ft.	N/A	-	-	No	-	10	Outhouse	Pit	Pit	No	0
96	1377	8	Cottage	2	40	Drilled Well	N/A	N/A	-	-	No	-	2	Outhouse	Pit	Pit	No	0
97	1377	8	Cottage (x3)	2	60	Dug Well & Blk.8/Lt.18	16 ft.	N/A	-	-	Yes	-	10	Tank/Field	Tank/Field	Tank/Field	No	0
98	1377	8	Cottage	2	120	1377/Parcel B/Lt. 5	-	-	-	-	-	-	1	Outhouse	Pit	Pit	No	0
99	1377	8	Cottage	2	30	Catchment/Blk. 9/Lt. 1	-	-	-	-	-	-	5	Outhouse	Grease Trap	Pit	No	0
100	1377	8	Cottage	4	60	Drilled Well	54 ft.	1980	6 in.	Nelson	No	-	100	Tank/Field	Tank/Field	Tank/Field	No	0
101	1377	9	House	2	365	Drilled Well			6 in.	Nelson	N/A	-	100	Box	Box	Box	No	1
102	1377	9	Cottage	5	80	Drilled Well			6 in.			-	70	Tank/Field	Tank/Field	Tank/Field	No	0
103	1377	9	Cottage	2	60	Drilled Well	65 ft.	1983	6 in.	Nelson	No	-	30	Outhouse	Pit	Pit	No	1
104	1377	9	Cottage	3	45	Drilled Well	77 ft.	1992	6 in.	Perry	Yes	-	30	Outhouse	Grease Trap	Grease Trap	No	0
105	1377	9(10)	Cottage	4	70	Drilled Well	-	-	6 in.	Nelson	N/A	-	80	Tank/Field	Tank/Field	Tank/Field	No	0
106	1377	10(3)	House	2	365	1377/Blk. 10/Lt. 26	-	-	-	-	-	-	60	Box	Box	Box	No	1
107	1377	10	House	2	365	Drilled Well	140 ft.	N/A	6 in.	Nelson	No	-	140	Box	Box	Box	No	1
108	1377	10	Construction	2	365	1377/Blk.10/Lt.26	-	-	-	-	-	-	10	Outhouse	Pit	Pit	No	1
109	1377	10	Tent	5	20	Indian Springs	-	-	-	-	-	-	5	Outhouse	Pit	Pit	No	0
110	1377	13	Construction	0	0	Drilled Well			6 in.	Nelson	N/A	-	0	None	None	None	-	0
111	1377	14	Cottage	1	240	Catchment	-	-	-	-	-	500 gal.	15	Outhouse	Pit	Pit	No	1
112	1377	14	Cottage	4	60	Drilled Well	153	1980	6 in.	Perry	Yes	-	5	Outhouse	Pit	Pit	No	1
113	1377	15	Cottage	2	60	Dug Well	5 ft.	1981	-	-	-	-	25	Outhouse	Pit	Pit	No	1
114	1377	15	Cottage	2	60	1377/Blk.15/Lt.26	-	-	-	-	-	-	40	Box/Pit	Box/Pit	Box/Pit	No	0
115	1377	15	Cottage	2	180	Dug Well	8 ft.	-	-	-	-	-	150	Tank	Tank	Tank	No	1
116	1377	15	Cottage	2	20	Drilled Well	N/A	N/A	6 in.	N/A	No	-	10	Composting			No	0
117	1377	15	Cottage	4	25	Drilled Well			6 in.		Yes	-	40	Composting	Pit	Pit	No	0
118	1377	15	Cottage	4	50	Drilled Well		1994	6 in.	Anderson	Yes	-	50	Box	Box	Box	No	1
119	1377	15	Cottage	5	45	Drilled Well	110 ft.	N/A	6 in.	Nelson	No	-	100	Box	Box	Box	No	0
120	1377	15	Cottage	3	45	Meadow Spring	-	-	-	-	-	-	5	Composting	Grease Trap	Pit	No	1

SAVARY ISLAND GROUNDWATER STUDY - WELL AND WASTE DISPOSAL INVENTORY INFORMATION

No.	Legal		Dwelling	Usage		Water						Catchment	Consumption	Waste Disposal				Vehicle
	D.L.	Block		No. Persons	Days/Yr	Source	Depth	Date	Diameter	Driller	Log	Storage	Imp. gal/day	Toilet	Kitchen	Shower	Approved	
121	1377	16	Cottage	2	120	1377/Blk.16/Lt.41	-	-	-	-	-	-	20	Tank/Field	Tank/Field	Tank/Field	No	1
122	1377	16	Cottage	2	60	Drilled Well			6 In.	Nelson		-	20	Tank/Field	Tank/Field	Tank/Field	No	0
123	1377	16	Cottage	5	50	1377/Blk.16/Lt.37	-	-	-	-	-	-	10	Outhouse	Pit	Pit	No	0
124	1377	16	Cottage	4	70	Drilled Well	110 ft.	1992	6 in.	Perry	Yes	-	120	Box	Box	Box	No	0
125	1377	16	Cottage	2	40	Drilled Well	150 ft.	1992	6 in.	Perry	Yes	-	100	Tank/Field	Tank/Field	Tank/Field	Pending	1
126	1377	16	Cottage	4	50	Drilled Well	142 ft.	1992	6 in.	Perry	Yes	-	70	Outhouse	Pit	Pit	No	1
127	1377	16	Cottage	5	50	Catchment	-	-	-	-	-	700 gal.	15	Composting	Grease Trap	Grease Trap	No	0
128	1377	16	Cottage	4	30	Neilson Spring	-	-	-	-	-	-	5	Outhouse	Pit	Pit	No	0
129	1377	16	Cottage	2	160	Drilled Well	N/A	N/A	6 in.	N/A	No.	-	40	Box	Box	Pit	No	1
130	1377	17	Trailer	2	30	1377/Blk.16/Lt.6	-	-	-	-	-	-	8	Outhouse	Pit	Pit	No	0
131	1377	17	Tent	2	60	Indian Springs	-	-	-	-	-	-	4	None	Pit	Pit	No	0
132	1377	17	Cottage	1	60	1377/Blk.17/Lt.21	-	-	-	-	-	-	5	Outhouse	Pit	Pit	No	0
133	1377	18	Cottage	3	7	Indian Springs	-	-	-	-	-	-	10	Outhouse	Pit	Pit	No	0
134	1377	18	Cottage	5	75	Dug Well	18 ft.	-	-	-	No	-	40	Field	Field	Field	No	1
135	1377	18	Cottage	4	70	Dug Well/Springs	12 ft.	N/A	-	-	-	-	10	Outhouse	Pit	Pit	No	0
136	1377	19	Cottage	2	200	Springs	-	-	-	-	-	-	5	Outhouse	Pit	Pit	No	0
137	1377	20	House (x2)	1	365	Drilled Well	N/A	N/A	6 in.	Nelson	No	-	20	Tank/Field	Tank/Field	Tank/Field	No	1
138	1377	21	Cottage	4	30	Dug Well	15 ft.	1994	-	-	Yes	-	15	Tank/Field	Tank/Field	Tank/Field	Pending	0
139	1377	21	House	1	365	Dug Well	10 ft.	N/A	-	-	Yes	-	15	Outhouse	Grease Trap	Grease Trap	No	1
140	1377	22	House	2	365	Catchment	-	-	-	-	-	600 gal.	15	Tank/Field	Tank/Field	Tank/Field	Yes	2
141	1377	23	Cottage	3	60	Drilled Well/Catchment		-	6 in.	-		200 gal.	250	Tank/Field	Tank	Tank	No	0
142	1377	23	Cottage	2	7	Dug Well	10 ft.	N/A	-	-	-	-	10	Tank/Field	Tank/Field	Tank/Field	No	0
			Total	427	-													44
			Average	3	114													-

SAVARY ISLAND GROUNDWATER STUDY - COMMENTS

No.	Legal		Comments
	D.L.	Block	
1	1372	2	
2	1372	2	Grey water and Septic systems seperate.
3	1372	2	
4	1372	3	Vacant lot.
5	1372	3	
6	1372	3	Hand pump on well.
7	1372	4	Bring drinking water from off island.
8	1372	4	
9	1372	4	
10	1372	4	Site has bad odour.
11	1372	4	
12	1372	7	Dock is too narrow and inadequate to service the entire island. A new one is needed.
13	1372	7	Tank and Field for each cottage.
14	1372	7	Septic system for each cottage.
15	1372	7	Well contaminated - excess iron. Spring water used for drinking. Septic old and inadequate.
16	1372	7	
17	1372	8	
18	1372	8	
19	1372	8	Drilled well welded closed.
20	1372	8	Drilled well not used; welded shut.
21	1372	8	Septic shared with neighbour. System installed in 1917; never emptied or updated.
22	1372	8	Septic shared with neighbour. System installed in 1917; never emptied or updated.
23	1372	8	
24	1372	8	
25	1372	8	
26	1372	8	
27	1372	9	
28	1372	11	Cars and the dust they cause are a major nuisance. Also, gas powered carts are noisy, especially when left idling.
29	1372	11	
30	1372	2732	
31	1372	2732	
31	1373	2	Shallow well became brackish.
32	1373	2	People in the wharf area want to see monitoring well with ongoing costs budgeted.
33	1373	2	
34	1373	2	Shallow well brackish. People still putting garbage in ocean, including half empty paint cans.
35	1373	3	Supports improvement of airstrip on DL. 1375.
36	1373	3	
37	1373	3	Septic and greywater systems serparate. Shallow well contaminated by septic.
38	1373	3 (2)	
39	1373	11433	
40	1373	11433	Well log: 0-5 ft.: loose sand and boulders; 5-15 ft.: sand. Water table at 14 ft. Flow too slow for sandpoint.

SAVARY ISLAND GROUNDWATER STUDY - COMMENTS

No.	Legal		Comments
	D.L.	Block	
41	1376	20	Well Log: 0-4 ft: Sand; 4-8 ft: Clay.
42	1376	22	Well Log: 0-4': red/brn. sand; 4-12': clean loose sand; 12-16': clay; 16-18': gravel/boulder; 18': clay. Not in favour of vehic
43	1376	22	
44	1376	23	Septic planned.
45	1376	24	Cottage for sale.
46	1376	25	No shortage of water - plenty of water.
47	1376	25	Licence on Indian Springs.
48	1376	25	
49	1376	25	Lot used for 3 trailers for "Christians Under Stress".
50	1376	25	Not using well.
51	1376	25	
52	1376	26	
53	1376	26	Car needed for business, but would like to see more bicycles and less cars. A lot of misiformation about by-law.
54	1376	27	
55	1376	27	500 gallon storage for household water, and 400 gallon storage for garden watering. Use porcelain filters.
56	1376	28	
57	1376	28	
58	1376	29	Vehicles go too fast along road where there are small children. Spring running faster in 1995 than in 1994.
59	1376	29	Frequent user of airstrip.
60	1376	29	Composting toilets should be allowed and promoted by regulators.
61	1376	30	
62	1376	30	Cottage built on speculation - for sale.
63	1376	31	
64	1376	32	
65	1376	32	
66	1377	3A	
67	1377	3A	Level of vehicle use appalling.
68	1377	3A	
69	1377	4 (6)	
70	1377	5	
71	1377	6	
72	1377	6	Do not want vehicles on island.
73	1377	6	
74	1377	6	Septic field plugged after approximately 12 years.
75	1377	6	
76	1377	6	
77	1377	7	Do not want vehicles on island. Roads should not be improved. Taxes collected should be used to buy empty lots.
78	1377	9A	Sand encountered from 0-18 feet down well.
79	1377	9A	
80	1377	9A	

SAVARY ISLAND GROUNDWATER STUDY - COMMENTS

No.	Legal		Comments
	D.L.	Block	
81	1377	9A	Need to deal with water quality and supply issues before problems like the car issue.
82	1377	9A	Noticed less vehicles in 1995 than in 1994.
83	1377	9A	Fires are a major concern, notably with renters. Vehicles are not needed and people drive too fast.
84	1377	9A	Well contaminated
85	1377	9A	Sandpoint (13 ft.) production too low. Well in gravel. Water level down 1.5 ft. from March to July. Lts. 43/44 grouped.
86	1377	9A	There should be a bond ($1000 say) to bring vehicles on island.
87	1377	9A	Well log: 0-10 ft.: Sand. Concerned about composting toilet being used on lot behind.
88	1377	9A	Too many vehicles on island.
89	1377	10A	Worried about the clam beds as a result of the septic problems at Indian Point. Well had fecal coliform .
90	1377	10A	
91	1377	10A	Need truck for firewood and pick ups at the dock.
92	1377	Parcel B	Well available on lot 4 for monitoring. Lot approximately 10 acres.
93	1377	8	Log: 0-12ft: Sand/clay interbeds; 12-18ft: Clay;18ft: Bldr. Water at 5 ft. Yield 40 gph. Ditch limits water hgt to 4 ft.
94	1377	8	
95	1377	8	
96	1377	8	Well has odour (possibly fuel contamination?).
97	1377	8	Well log: 0-4 ft.: Sand and boulders; 4-16 ft.: brown sandy clay. Not in support of any development of DL. 1375.
98	1377	8	
99	1377	8	Sunset Trail should be restricted to pedestrians only. One car per day on average on Sunset Trail.
100	1377	8	Do not want cars on island. Drinking water supplied to neighbour.
101	1377	9	
102	1377	9	Shallow contaminated and replaced with deeper drilled well.
103	1377	9	Truck needed during construction. Roads need to be better organized. Want new dock. Well gravel packed; no screen.
104	1377	9	Outhouse pit is in clay.
105	1377	9(10)	
106	1377	10(3)	
107	1377	10	Gives water to people in area. Dug well went dry when Parcel B ditched in 1972. 0-18 ft.: sand; 18-25 ft.: clay.
108	1377	10	
109	1377	10	
110	1377	13	
111	1377	14	Car not used.
112	1377	14	Hand pump on well.
113	1377	15	Concerned about privacy and how data from water study will be used.
114	1377	15	Impose by-law that limits development to owners of two or more lots only. Stop any development of DL 1375.
115	1377	15	Will sell property when the island get to a 35% leve of development. See no need for generators.
116	1377	15	
117	1377	15	
118	1377	15	Truck brought on and off island with each visit. Catchment system dismantled.
119	1377	15	Well shared with neighbours. Dug 18 foot dry well at front of lot in sand and compact silty sand.
120	1377	15	Have license to Meadow Spring. Truck use seasonal and kept to minimum, replacing taxi needs only. Dock inadequate.

SAVARY ISLAND GROUNDWATER STUDY - COMMENTS

No.	Legal		Comments
	D.L.	Block	
121	1377	16	
122	1377	16	
123	1377	16	
124	1377	16	
125	1377	16	Iron contamination in first well and required deppening. Perry extended well from boulder at 130 ft. to 150 ft.
126	1377	16	Truck brought on island seasonally required to bring construction supplies and remove garbage.
127	1377	16	Boat replaces the need for a vehicle, catchment meets all water needs and composting toilet better for island.
128	1377	16	
129	1377	16	Use airstrip regularly.
130	1377	17	
131	1377	17	
132	1377	17	Need to protect the environment of the island more.
133	1377	18	
134	1377	18	Truck brought on island seasonally.
135	1377	18	Well goes dry in September.
136	1377	19	Spring in front of cabin. Also has cottage in SSID.
137	1377	20	Dug Well not used. Dug well log: 0-5 ft; sand: 5-16 ft: blue clay.
138	1377	21	
139	1377	21	Well log: 0-10 ft.: Clay. Dry August to October, but 1 ft. below surface in winter. Recharge slow due to clay.
140	1377	22	
141	1377	23	Catchment used for watering; consumption figure includes watering.
142	1377	23	

Appendix III

Well Logs

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 94 10 17

NTS MAP [ ] WELL No. [ ] ELEV [ ] Log No. [ ]

UTM [Z] E [ ] N [ ] UTM Date 19__ Well Type

Owner's Name & Address: Gbislain Dam, Powell River, 487 4390

Legal Description & Address: DL 1372 Blk 3. ~~DL 16~~ Lt 16

Driller: Sonny Leclerc.

1 TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2 WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse d ☐ other

3 WATER WELL USE: 1 ☐ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind 5 ☐ Other

4. DRILLING ~~OPERATIVES~~ 0

5 MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; height above ground level ___ ft

FROM ft	TO ft	LOG DESCRIPTION	SWL ft
0	9'	Brown Silty Sand	
9'	13'	Gravel + Sand (Blue) (Grey)	
13	34	Layered Sand, Silt gravel	
34	35'	(Grey) Blue Fine Silty Sand.	
31		Grey Clay Layer + Silt lens	

8 WELL LOCATION SKETCH

9. CASING: Materials 1 ☐ Steel 2 ☐ Galv 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

						units
Hole Diameter	6"					ins
Diameter	6"					ins
from	0					ft
to						ft
Thickness	219					ins
Weight						lb/ft

Pitless unit ___ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ Used 2 ☐ Used

Perforations: ___

Shoe(s): welded

Open hole, from 0 to 0 ft ins 0 ins

Grout: Drill Cuttings

10. SCREEN: 1 ☑ Nominal (Telescope) Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ___

Material 1 ☑ Stainless Steel 2 ☐ Plastic

Set from 34 to 39 ft below ground level

Screen RISER, SCREEN & BLANKS					Pump	units
Length	5'				1'	ft
Diam. I.D	5"				5"	ins
Slot Size	4				0	ins
from	34				39	ft
to	39				40	ft

Fittings, top ~~& Packer~~ bottom Sump

Gravel Pack 0

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Duration ___ hrs ___ test ___ ft

Rate 3 USgpm Temp ___ °C Static ___ ft after test

☐ DRAWDOWN in ft

mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: Sub RECOMMENDED PUMP SETTING: 38 2-3

14. WATER TYPE: 1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Mineral

colour clear smell 1 ☐ Yes 2 ☐ No

15. WATER ANALYSIS: 1 Hardness ___ 2 Iron [ ] mg/L 3 Chlorides ___ mg/L 4 pH [ ] Fluoride ___

SITE ID No ___ Lab Job No ___

16. FINAL WELL COMPLETION DATA

Well Depth 460 ft Well Yield 3 USgpm

Static Water Level ? ft Artesian Flow ___ USgpm

Back filled 0

Well Head Completion 21

17. DRILLER (SURNAME) ANDERSON (PRINT) Signature ___

18. CONTRACTOR, Address: Canyon Drilling Ltd. Powell River

Member, BCWWDA ☑ yes ☐ no

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date

NTS MAP | WELL No. | ELEV | Log No. | Aquifer | Well Type

Owner's Name & Address: John Warmsbucher ... Lot 8 ... Sunny Cleland

Legal Description or Address: DL 1372 Blk 5 Lot 29 ... [redacted] 3910

1. TYPE OF WORK: 1 ✓ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ✓ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse 5 ☐ Other

3. WATER WELL USE: 1 ✓ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind ☐ Other

4. DRILLING ADDITIVES: 0

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing
Height above ground level 2' ft

FROM ft	TO ft	LOG DESCRIPTION	SWL ft
0	14	Brown silty Sand	
14	55	Layed Brown sand Silt low	
55	79	layed, compact silt + sand + gravel Poke	
79	104	Layed coarse fine gravel	
		Water 92-104	
		2	

7. CONSULTANT: Address:

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galv 3 ☐ Wood 4 ☐ Plastic 5 ☐ Con ☐ Other

			units
Hole Diameter	6"		ins
Diameter	6"	Perm	ins
from	0	98	ft
to	98	100	ft
Thickness	2.19		ins
Weight			lb/ft

Pitless unit ... ft 1 ☐ above 2 ☐ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used
Perforations:
Shoe(s): Welded on
Open hole, from 0 to 0 ft ins
Grout: Drill cuttings

10. SCREEN: 1 ☐ Nominal (Telescope) Size
Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other
Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other
Set from 100 to 104 ft below ground level

RISER SCREEN & BLANKS

				units
Length	4'	2'		ft
Diam I D	5"	5"		ins
Slot Size				ins
from				ft
to	104'			ft

Fittings, top Packer bottom Threaded
Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Duration hrs
Rate 5 USgpm Temp °C Static level ft
Water Level 92 ft after test of hrs

☐ DRAWDOWN in ft

mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: Deep RECOMMENDED PUMP SETTING: 102' RECOMMENDED PUMPING RATE: 4 USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Cloudy
colour clear smell 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness mg/L 2 Iron mg/L 3 Chloride mg/L 4 pH Field Lab

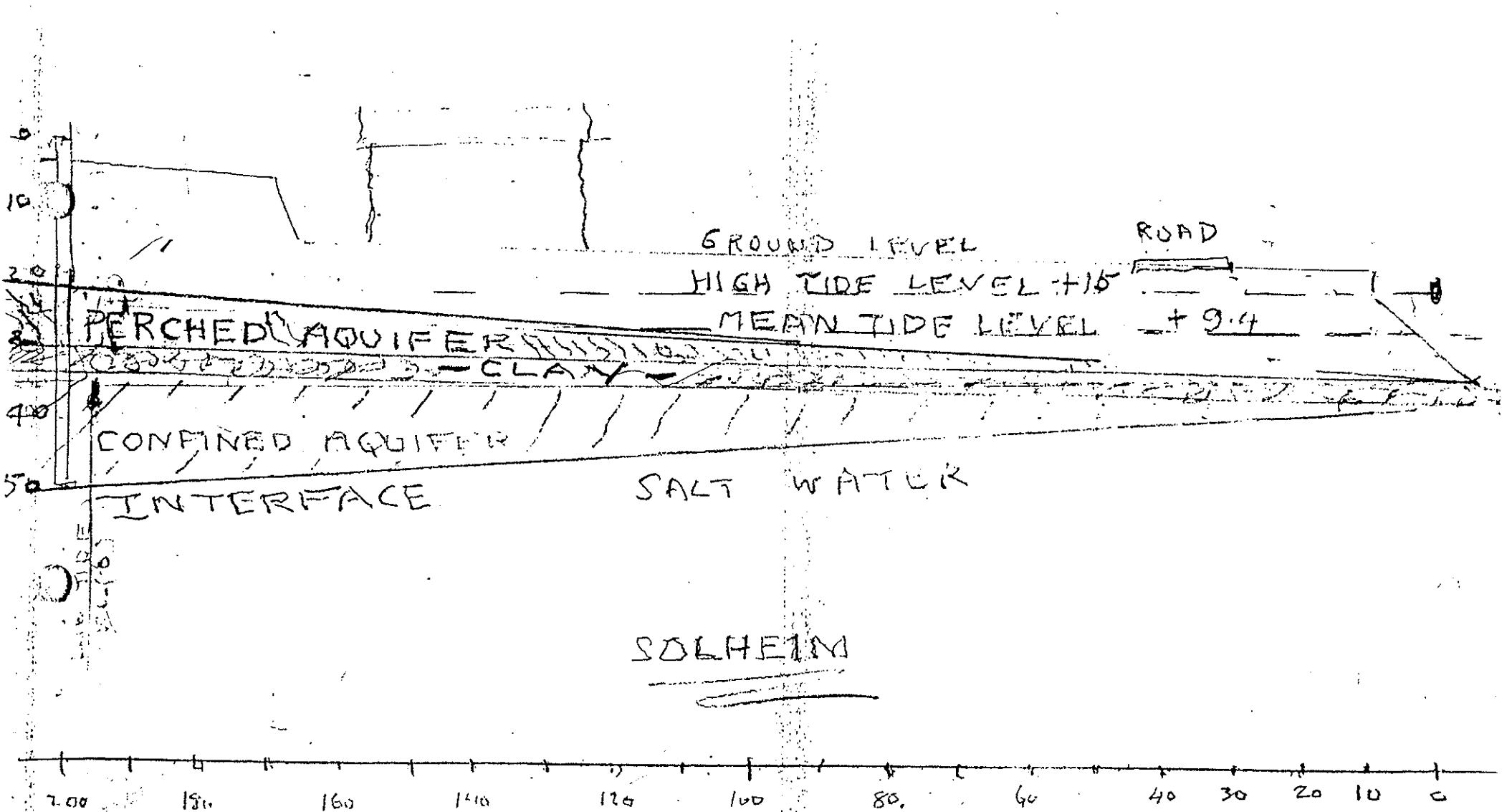
SITE I D No

16. FINAL WELL COMPLETION DATA
Well Depth 104 ft Well Yield 5 USgpm
Static Water Level 92 ft Artesian Flow US Dyn ft
Back filled
Well Head Completion 2'

17. DRILLER (PLEASE PRINT) SURNAME: ANDERSON FIRST: PAUL
Signature Paul Anderson

18. CONTRACTOR, Address: Cannest Drilling Ltd. Powell River

Member, BCWWDA ☐ yes ☐ no


GROUND LEVEL
ROAD
HIGH TIDE LEVEL +1.5
MEAN TIDE LEVEL +0.4
PERCHED AQUIFER
CLAY
CONFINED AQUIFER
INTERFACE
SALT WATER
SOLHEIM
200
180
160
140
120
100
80
60
40
30
20
10
0

Province of British Columbia

BC Environment — Water Management Division

WATER WELL RECORD

Date [ ]

NTS MAP [ ] WELL No [ ] ELEV [ ]

UTM [Z] [ ] [E] [ ] [N] UTM Date 19__ Well Type

Owners Name & Address: Del + Jane Valois 10206 - 10th St Dawson Creek BC.

Legal Description or Address: RE 1/4 of Sawmill Island, DL 1372, Blk. 7, Lot 35/6

Descriptive Location:

1. TYPE OF WORK: 1 ✓ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ✓ cable tool 2 ☐ Bored 3 ☐ Jetted A ☐ Rotary a ☐ mud b ☐ air c ☐ reverse Other

3. WATER WELL USE: 1 ✓ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind ☐ Other

4. DRILLING ADDITIVES: 0

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; height above ground level ft

FROM ft	TO ft	WATER LOG DESCRIPTION	SWL ft
0	6'	Brown sand + rocks	
6	18	Brown white clay	
18	24	sand Red Clay + Rocks	
24	34	Sand + gravel + water	

7. CONSULTANT: Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☐ Steel 2 ☐ Galv 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

						units
Hole Diameter	6"					ins
Diameter	6"					ins
from	0					ft
to	29'6"					ft
Thickness	2.19					ins
Weight						lb/ft

Pitless unit ✓ ft 1 ☐ above 2 ☐ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used
Perforations: 0
Shoe(s): welded
Open hole, from 0 to 0 ft Diameter 0 ins
Grout: drill cuttings

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Size
Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other
Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other
Set from 29'6" to 34 ft below ground level

Screen RISER, SCREEN & BLANKS					units
Length	4-6" ends	Rubber			ft
Diam. I.D	5"				ins
Slot Size	.15				ins
from	29-6"				ft
to	34				ft

Fittings, top rubber bottom Drive Bottom
Gravel Pack 0

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☐ Bailing 5 ☐ Pumping

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date
Rate 6-10 USgpm Temp °C SWL before test ft
Water Level 14 ft after test of hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE | RECOMMENDED PUMP SETTING | RECOMMENDED PUMPING RATE USgpm

14. WATER TYPE: 1 ☐ Fresh 2 ☐ Salty 3 ☐ Mineral 4 ☐ Cloudy
colour Clear smell 0 gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness mg/L 2 Iron mg/L 3 Chloride mg/L 4 pH Field Date Lab Test

SITE I D No

16. FINAL WELL COMPLETION DATA
Well Depth 34 ft Well Yield 20 USgpm
Static Water Level 14 ft Artesian Flow 10 USgpm Dynamic (Pumping) Level ft
Back filled 0
Well Head Completion 18"-24"

17. DRILLER (PLEASE PRINT) SURNAME ANDERSON Given Name PAUL
Signature

18. CONTRACTOR, Address Dawson Drilling Ltd.

Member, BCWWDA ✓ yes ☐ no

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 94 / 6 / 25 (YR / MO / DY)

MAP ____ WELL No ____ ELEV ____

Owners Name & Address HAROLD ROBERTSON. 201 1551 MARINERS WALK VAN V6J 4X9

Legal Description & Address LOT 3 of SP B&P PL 2732 DL 1372. SAVARY ISLAND.

Descriptive Location ON Lot 38

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	3	ROOTS + SAND.	
3	19	DRY SAND	
19	30	(WD) SAND	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

Hole Diameter							units
Diameter	6						ins
from	+2						ins
to	26						ft
Thickness	219						ft
Weight							ins
							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations:

Shoe(s): GOPHER.

Open hole, from ____ to ____ ft Diameter ____ ins

Grout:

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other

Set from 26 to 30 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I.D	6 3/8						ins
Slot Size	8						ins
from	26						ft
to	30						ft

Fittings, top K. PACKER bottom PLUG.

Gravel Pack

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 94 / 6 / 25

Rate 5 USgpm Temp ____ °C SWL before test 12 ft

Water Level 24 ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	24 ft	5 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR / MO / DY)

SITE I D No

16. FINAL WELL COMPLETION DATA

Well Depth 30 ft Well Yield 5 US gpm

Static Water Level 12 ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled

Well Head Completion

17. DRILLER PLEASE PRINT SURNAME WILLIS FIRST NAME WALLY

Signature

18. CONTRACTOR,

Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWOA ☑ yes ☐ no ;

Province of British Columbia — Ministry of Environment — Water Management Division

WATER WELL RECORD

Date 84 5 29 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address MR HUGGARFORD.

Legal Description & Address LOT #32 Blk 8 DL1372

Descriptive Location ____

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level 14" ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	18	BROWN SAND	
18	30	GR SAND	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	6						ins
from	+14						ft
to	26'7						ft
Thickness	21.9						ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): GASPAR.

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I.D	5"						ins
Slot Size	.8						ins
from	30						ft
to	26						ft

Fittings, top K ROCKAR bottom FLOT.

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date 84 5 29 (YR MO DY)

Rate 5 USgpm Temp ____ °C SWL before test 13 ft

Water Level 25 ft after test of 1.5 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	24 ft	5 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME TOMLIN FIRST NAME WALLY

Signature ____

18. CONTRACTOR ERNY'S WELL DRILLING

Address 1709 - 197 A Street Langley, B.C. Ph: 534-1347

ERNY'S WELL DRILLING 1709 - 197 A Street Langley, B.C. 534-1347

Member, BCWWDA 1 ☑ yes ☐ no ; ____

Province of British Columbia — Ministry of Environment — Water Management Division

WATER WELL RECORD

Date 92 06 30 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM: Z ____ E ____ N ____ Date 19__ Well Type ____

Owners Name & Address MR. ROGER LANGFIELD RR#1, COCONUT POINT RD BOWEN ISLAND

Legal Description & Address SALARY ISLAND. SOUTH OF DOCK

947-9641

Descriptive Location DL 1372 Blk 10 Lt 15 & 16?

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	35	SANDY SOIL.	
35	78	DRY BROWN SAND	
78	95	LIGHT BROWN (WET) SAND	
		[No Clay (?) DRY]	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	~~6~~	6					ins
from		118					ins
to		91					ft
Thickness		219					ft
Weight							ins
							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): CUTTER

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 96 to 92 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5"						ins
Slot Size	.8						ins
from	96						ft
to	92						ft

Fittings, top K PACKER bottom FLAT

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☑ Pump 2 ☑ Bail 3 ☐ Air Date 92 06 30 (YR MO DY)

Rate 10 USgpm Temp. ____ °C SWL before test 65 ft

Water Level 91 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
Sub	91 ft	10 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____

Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER PLEASE PRINT SURNAME ZWICKLS FIRST NAME MARK

Signature ____

18. CONTRACTOR,

Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWOA ☑ yes ☐ no ; ____

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date

N.T.S. MAP | WELL No. | ELEV | Location Accuracy

Owner's Name & Address

Legal Description & Address

Descriptive Location

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; casing height above ground level ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	18	DRY BROWN SAND	
18	22	SANDY CLAY	
22	30	LIGHT BROWN SAND (L.B)	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING Materials: 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

								units
Hole Diameter								ins
Diameter	6							ins
From	1							ft
To	24							ft
Thickness								ins
Weight								lb/ft

Pitless unit ft 1 ☐ above 2 ☐ below ground level

☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations

Shoe (s)

Open hole, from to ft. Diameter ins

Grout

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other

Set from 20 to 26 ft below ground level

RISER, SCREEN & BLANKS								units
Length	4							ft
Diam. I D	5"							ins
Slot Size	8							ins
from	26							ft
to	30							ft

Fittings, top K PACKER bottom PLUG

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date

Rate 7 USgpm Temp °C SWL before test 14 ft

Water Level 24 ft after test of 4½ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL
1							

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	24 ft	6 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour smell ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness mg/L 2 Iron mg/L 3 Chloride mg/L 4 pH Field Date Lab Date

SITE I.D. No

16. FINAL WELL COMPLETION DATA

Well Depth 30 ft Well Yield 7 US gpm

Static Water Level ft Artesian Flow US gpm Pressure Head

Back filled

Well Head Completion

17. DRILLER (PLEASE PRINT) SURNAME FIRST NAME

Signature

18. CONTRACTOR

Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member: B.C.W.W.D.A. ☑ yes ☐ no

R.R.#2, Qualicum Beach, B.C. V0R 2T0

#18 c/o Pete Saunders

WELL DATA SHEET

OWNER: Name Peter Mathesen Address Savary Island

LOCATION OF WELL: (LEGAL) DL 1373 Blk. 3 Lt. 6

POSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test well ☐ Other ☐

TYPE OF WORK: Owner's number of well (if more than one) . . .

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

DIMENSIONS; Diameter of well 6 in.
Drilled 107 ft. Depth of completed well 107' ft.

CONSTRUCTION DETAILS:

Casing installed: Threaded ☐ Welded ☑
250 Gage 6 " Diam. from 0 ft. to 102 ft.
Gage " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.

Screens: Yes ☑ No ☐
Manufacturer's name Mustang
Type Stainless Model No. Ø
Diam. 6 Slot size 15 from 102 ft. to 107 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel
Gravel placed form ft. to ft.

Surface seal: Yes ☐ No ☑ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

PUMP: Manufacturer's name
Type H.P.
Pump intake set at ft.

WATER-LEVELS:
Land-surface elevation above mean sea-level . . . ft.
Static level ft. below top of well Date
Artesian pressure lb. per sq. in. Date
Artesian water is controlled by (Cap, valve, etc.)

WELL TESTS: Drawdown is amount water-level is lowered below static level.
Was a pump test made? Yes ☑ No ☐ If yes, by whom? Fyfe
Yield 20 gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water-level measured from well top to water-level).

Time	Water-level	Time	Water-level	Time	Water-level

Date of test Aug 11/87
Bailer test 20 gal./min. with ft. drawdown after hrs.
Artesian gpm. Date
Recommended pump setting ft.
Recommended maximum pump output gpm.

WELL LOG:

Formation: *Describe by colour, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
@ 0' mixture of topsoil + brown dry sand.	0	14·2
@ 10' brown dry sand little gravel.	10·0	24·2
@ 25' brown dry sand little gravel.	25·9	29·11
@ 29' mostly dry med - course brown sand.	29·9	39·8
@ 40' mostly dry med - course brown sand.	49·9	49·5
@ 50' mostly dry med - course brown sand.	50·0	59·5
@ 60' mostly dry med - course brown sand.	60·0	69·5
@ 75' moist fine brown sand.	73	76·3
@ 80' course wet brown sand.	80·10	87·6
@ 85' course wet brown sand.	85·0	86·6
@ 106 starting to get finer sands	86·8	90·2
@ 100' tighter structure - less permeable -	90·10	100·0
Set @ 15 screen	100·0	110·0
Well Summary	102·0	102·6
Depth - 107.0'		
Casing - 102.0'		
Screen - 1 @ 15' mustang threaded ends		
Shoe - 1 Fyfe style		
Flow - 20 g/m		
S.W.L. - 75'		

Work started Aug 7, 1987 Completed Aug 11, 1987

WATER ANALYSIS:
Hardness ppm. pH
Iron ppm. Chloride ppm.
Temperature of water
Taste Odour
Colour Turbidity

WELL DRILLER:
Name Jim Fyfe (Person, firm, or corporation)
Address

To: Glenn
Tupper (206) 952 7656
483 — 4741
#7

FYFE'S WELL DRILLING LTD.
R.R.#2, Qualicum Beach, B.C. V0R 2T0

752-9358

~~Peter Saunders~~

WELL DATA SHEET

OWNER: Name Marge Shannaman Fred Address Savary Island

LOCATION OF WELL: (LEGAL) DL 1373 Blk 2 Lt. 12

PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☐ Test well ☐ Other ☐

TYPE OF WORK: Owner's number of well (if more than one) . . .

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

DIMENSIONS: Diameter of well 6 in.
Drilled 109 ft. Depth of completed well 109 ft.

CONSTRUCTION DETAILS:

Casing installed: Threaded ☐ Welded ☑
250 Gage 6 " Diam. from 2 ft. to 104 ft.
Gage " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by
perforations from ft. to

Screens: Yes ☑ No ☐
Manufacturer's name Mustang
Type Stainless Model No. 0
Diam. 6 Slot size 10 from 104 ft. to 109 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel
Gravel placed form ft. to ft.

Surface seal: Yes ☐ No ☑ What depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

PUMP: Manufacturer's name
Type H.P.
Pump intake set at ft.

WATER LEVELS:
Land-surface elevation above mean sea-level . . . ft.
Static level ft. below top of well Date
Artesian pressure lb. per sq. in. Date
Artesian water is controlled by (Cap, valve, etc.)

WELL TESTS: Drawdown is amount water-level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield 20 gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water-level measured from well top to water-level).

Time	Water-level	Time	Water-level	Time	Water-level

Date of test June 29/87.
Bailer test 20 gal./min. with ft. drawdown after hrs.
Artesian flow gpm. Date
Recommended pump setting ft.

WELL LOG:

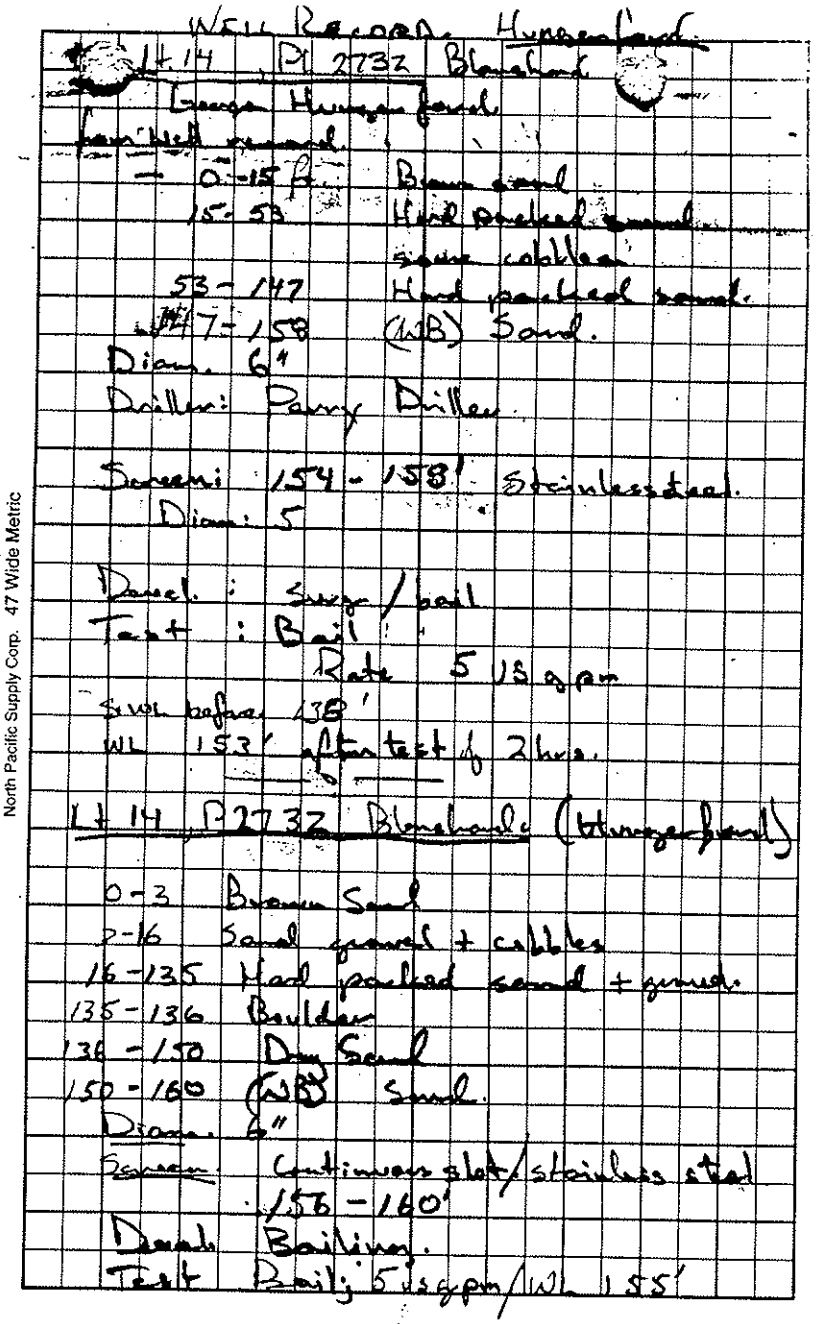
Formation: *Describe by colour, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
@ 0' mixture of top soil + dark brown sand	0	14·3
@ 14' fine dry brown sand	10·0	24·3
@ 24' fine to course dry brown sand.	10·0	30·3
some gravel.	10·0	40·3
@ 75 moist fine brown sand.	10·0	50·3
	10·0	60·3
	10·0	70·3
	10·0	80·3
	10·0	90·3
	9·11	100·3
@ 95' course wet sand + sand gravel	8·8	108·8
	-4·8	104·0
Set # 10 slot Screen.		
Well Summary		
- Depth - 109.0'		
- Casing - 104.0'		
- SCREEN - 1 - # 10 Slot Mustang (threaded ends)		
- SHOE - 1 - 6" gator style		
- Flow - 20 g/m		
- S.W.L. - 70'		

Work started June 22, 1987 Completed June 29, 1987

WATER ANALYSIS:
Hardness ppm. pH
Iron ppm. Chloride ppm.
Temperature of water
Taste Odour
Colour Turbidity

WELL DRILLER:
Name (Person, firm, or corporation)



Well Record. Hungerford
Lt 14 Pl 2732 Blanchard
Geo: Hungerford
Form Well Record.
0-15 ft Brown sand
15-53 Hard packed sand, some cobbles
53-147 Hard packed sand.
147-158 (WB) Sand.
Diam. 6"
Driller: Perry Driller
Screen: 154-158' Stainless steel.
Diam: 5
Devel.: Surge/bail
Test: Bail
Rate 5 1/2 gpm
Swl before 138'
WL 153' after test of 2 hrs.
Lt 14 P2732 Blanchard (Hungerford)
0-3 Brown Sand
3-16 Sand gravel + cobbles
16-135 Hard packed sand + gravel.
135-136 Boulder
136-150 Dry Sand
150-160 (WB) Sand.
Diam. 6"
Screen: Continuous slot/stainless steel
156-160'
Devel. Bailing.
Test Bail 5 1/2 gpm/WL 155'

FYFE'S WELL DRILLING LTD.
R.R.#2, Qualicum Beach, B.C. V0R 2T0
752-9158

WELL DATA SHEET

#5 C/o Peter Saunders

OWNER: Name John Devlin Address Savary Is.

LOCATION OF WELL: (LEGAL) Rosemary

PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test well ☐ Other ☐

TYPE OF WORK: Owner's number of well (if more than one) .....
New well ☑ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☑ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

DIMENSIONS: Diameter of well 6 in. Drilled ..... ft. Depth of completed well ..... ft.

CONSTRUCTION DETAILS:
Casing installed: Threaded ☐ Welded ☑
250 Gage 6 " Diam. from 0 ft. to 103 ft.
..... Gage ..... " Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☑
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☑ No ☐
Manufacturer's name Plastic mfg.
Type Slot Model No. .....
Diam. 6 Slot size 12 from 103 ft. to 105 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☐ No ☑ To what depth? ..... ft.
Material used in seal .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

PUMP: Manufacturer's name .....
Type ..... H.P. .....
Pump intake set at ..... ft.

WATER LEVELS:
Land-surface elevation above mean sea-level ..... ft.
Static level ..... ft. below top of well Date .....
Artesian pressure ..... lb. per sq. in. Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

WELL TESTS: Drawdown is amount water-level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If yes, by whom? .....
Yield ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water-level measured from well top to water-level).

Time	Water-level	Time	Water-level	Time	Water-level

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... gpm. Date .....
Recommended pump setting ..... ft.
Recommended maximum pump output ..... gpm.

WELL LOG:
Formation: Describe by colour, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Purchase & top soil & brown sand	0	26
@ 5' dry brown sand	26	203
+ brown clay	10.0	38.1
@ 20' course fdry brown sand	9.11	48.7
@ 27' course light dry sand	10.0	58.7
@ 32' dry brown sand	9.11	68.6
@ 80' moist fine brown sand	10.0	78.6
@ 93' heaving course brown sand	10.0	88.6
@ 108' light fine sand.	10.0	98.6
Open hole	6.0	104.6
Set @ 12 slot screen	2.8	111.2
- Well Summary	8.2	103.0
Depth - 108.0		
Casing - 103.0		
Screen - 1 @ 12 Alustrong (threaded ends)		
SHOE - 1 Fyfe style		
Flow - 15 g/m		
SWL - 20'		

Work started June 16 19 87 Completed June 19 19 87

WATER ANALYSIS:
Hardness ..... ppm. pH .....
Iron ..... ppm Chloride ..... ppm.
Temperature of water .....
Taste ..... Odour .....
Colour ..... Turbidity .....

WELL DRILLER:
Name John Fyfe (Person, firm, or corporation)
Address .....

Springer well
DL 1376 Blk 24 Lt 114

Nelson Drilling 1981

0 - 38'	Sand	0 -	11.6m
38 - 100'	Sandy Clay	11.6m -	30.5m
100 - 103'	Clay	30.5m -	31.4m
103 - 126'	Sandy Clay	31.4m -	38.4m
126 - 133'	Sand / WB	38.4m -	40.5m
133 - 140'	Sandy Clay	40.5m -	42.6m
		42.6 -	46.6

Test Bail Rate 2 US gpm

SWL 117' (35.7m)

- added 13' because well production too low

North Pacific Supply Corp 47 Wide Metric

Province of British Columbia

BC Environment — Water Management Division

WATER WELL RECORD

Date 94 11 01

NTS MAP 92 G/5E — WELL No. — ELEV — Location Accuracy — UTM — Date 19__ — Well Type

Owner's Name: Gordon Payne

Legal Description: Lot DL 1376 Blk 25 Lot 22/23 — 1.O. Box 91 Lund B.C. V0N-2G0

Descriptive Location: Savary Island

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted — a ☐ rotary a ☐ mud b ☐ air c ☐ reverse — d ☐ other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation — 4 ☐ Comm & Ind ☐ Other

4. DRILLING ADDITIVES: 0

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing — Height above ground level 2' ft

FROM ft	TO ft	LOG DESCRIPTION	SWL ft
0	6'	Brown Packed Sand	
6'	17	Brown Dirty Sand (Clay)	
17'	47	White Brown Sand	
47'	65	Grey blue clay & Stone Layers	
65'	77	Fine Brown Silty Sand	
77	91	Clear water bring sand white Brown	

7. CONSULTANT: Address

8. WELL LOCATION SKETCH

9. CASING: Materials — 1 ☑ Steel 2 ☐ Galv 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

					units
Diameter	6"				ins
from					ins
to					ft
Thickness					ft
Weight					ins
					lb/ft

Pitless unit 2' ft 1 ☐ above 2 ☑ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☑ Threaded — 1 ☐ New 2 ☐ Used
Perforations:
Shoe(s): 1 — 6" Weld on
Open hole, from 0 to 0 ft — Diam 0 ins
Grout: 4 — 3' Bentonite

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Actual Size
Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other
Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other
Set from 87 to 91 ft below ground level

RISER, SCREEN & BLANKS

					units
Length	Riser	2' — 5" O.D.			ft
Diam. I.D.	Screen	4' — Slot 10			ins
Slot Size					ins
from	87				ft
to	91				ft

Fittings, top K Packer bottom Bail Bottom
Gravel Pack 0

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date
Rate 7 USgpm Temp °C Static level before test ft
Water Level ft after test of hrs

☐ DRAWDOWN in ft — ☐ RECOVERY in ft

mins	WL	mins	WL	mins	WL	mins	WL
160	87						

13. RECOMMENDED PUMP TYPE: Sub — RECOMMENDED PUMP SETTING: 65 — RECOMMENDED PUMPING RATE: 4-7 USgpm

14. WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy
colour clear smell NO Sand 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness mg/L
2 Iron mg/L 3 Chloride mg/L
4 pH Field Date Lab Date

SITE ID No.

16. FINAL WELL COMPLETION DATA
Well Depth 91 ft — Well Yield 7+ USgpm
Static Water Level 77 ft — Artesian Flow 0 USgpm — Pressure ft
Back filled 0
Well Head Completion 2'

17. DRILLER (PLEASE PRINT) SURNAME ANDERSON — PAUL
Signature Paul Anderson

18. CONTRACTOR
Address Connect Drilling Ltd.
Powell River Box 86 V8A-4Z5

Member, BCWWDA ☑ yes ☐ no

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 94/11/1

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Zone ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address: Paula Bastien + Rick Schwartz DL 1376

Legal Description & Address: LOT 33 Plan 402B District LOT 1376 New Westminster Group one 464 moss st Victoria BC

Descriptive Location: Savary Island V8A-4N4

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse 5 ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind. ☐ Other

4. DRILLING ADDITIVES: -0-

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing, height above ground level 2 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	1	Brown Gravel + Top Soil	
1	4	Brown Gravel + Sand	
4	68	Layed brown Sand Silty	
68	87	Layed light brown clay (Sandy)	
87	103	Brown clean Sand	

7. CONSULTANT Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

								units
Hole Diameter	6"	5"						ins
Diameter								ins
from	0	97						ft
to	97	103						ft
Thickness	219							ins
Weight								lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): 1 - 6" Wilson

Open hole, from -0- to ____ ft Diameter -0- ins

Grout: 0 - 7' Bentonite

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other

Set from 99 to 103 ft below ground level

RISER, SCREEN & BLANKS								units
Length	2'	RISER						ft
Diam. I.D	5"							ins
Slot Size	21	SCREEN	12 slot					ins
from	99							ft
to	103							ft

Fittings, top K Packer bottom Bail

Gravel Pack -0-

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date ____

Rate 10 USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

☑ DRAWDOWN in ft ☐ RECOVERY in ft

mins	WL	mins	WL	mins	WL	mins	WL
160	90						

13. RECOMMENDED PUMP TYPE: Sub RECOMMENDED PUMP SETTING: 100 ft RECOMMENDED PUMPING RATE: 5+7 USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ Salty 3 ☐ Mineral 4 ☐ Cloudy

colour clear smell ____ gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 103 ft Well Yield 10 USgpm

Static Water Level 84 ft Artesian Flow -0- USgpm Pressure ____ ft

Back filled -0-

Well Head Completion 3'

17. DRILLER (PLEASE PRINT) SURNAME ANDERSON PAUL

Signature Paul Anderson

18. CONTRACTOR, Address Contrast Drilling Ltd Box 86 Powell River BC V8A-4Z5

Member, BCWWDA ☑ yes ☐ no

Province of British Columbia — BCEnvironment — Water Management Division

WATER WELL RECORD

Date 87/11/13

NTS MAP [ ] WELL No. [ ] ELEV [ ] Location Accuracy [ ]

UTM [Z] [E] [N] UTM Date 19__ Well Type [ ]

Owners Name & Address Warren Moore

Legal Description or Address Block 31 Lot 19 DL 1376 Plan 2714

Descriptive Location Savary Island

1 TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2 WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse Other

3 WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind. ☐ Other

4 DRILLING ADDITIVES -0-

5 MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

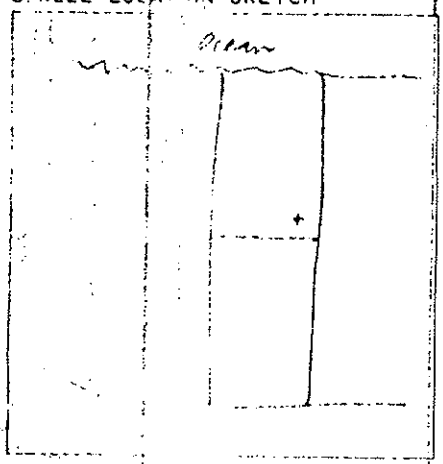
Height above ground level ____ ft.

FROM ft	TO ft	6 WELL LOG DESCRIPTION	SWL ft
0	1'	Brown top Soil	
1'	66'	Loose sand, compacted gravel, large rocks	
66	104	Fine silt and sand (Brown)	
104	119	Loose brown clay	
119	132	Fine Sand Clear water bearing sand	

7 CONSULTANT

Address

8 WELL LOCATION SKETCH



9 CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

						units
Hole Diameter	6"					ins
Diameter						ins
from						ft
to						ft
Thickness	21?					ins
Weight	15lb					lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used

Perforations: [ ]

Shoe(s): 1-6" wilkon

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: drill cuttings, bentonite

10 SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ True Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic Other

Set from 128 to 132 ft below ground level

RISER, SCREEN & BLANKS						units
Length	4-4'	2 risers				ft
Diam. I.D	5"					ins
Slot Size	.10					ins
from	128					ft
to	132					ft

Fittings, top K Packer bottom Cone Bottom

Gravel Pack -0-

11 DEVELOPED BY: 1 ☐ Surging 2 ☑ Bailing 3 ☐ Air 4 ☑ Boiling 5 ☐ Pumping ☐ Other

12 TEST: 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 87/11/13

Rate 8 USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13 RECOMMENDED PUMP TYPE Sub | RECOMMENDED PUMP SETTING 128 ft | ANTICIPATED PUMPING RATE 4 USgpm

14 WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☐ sulphur 4 ☐ cloudy

colour clear smell No ; gas 1 ☐ yes 2 ☐ no

15 WATER ANALYSIS: 1 Hardness [ ] mg/L 2 Iron [ ] mg/L 3 Chloride [ ] mg/L 4 pH [ ]

Field Date [ ] Lab Date [ ]

SITE I D No [ ]

16 FINAL WELL COMPLETION DATA

Well Depth 132 ft Well Yield [ ] USgpm

Static Water Level 97 ft Artesian Flow 10 US gpm Pressure [ ] ft

Back filled -0-

Well Head Completion 20"

17 DRILLER PLEASE PRINT SURNAME Anderson FIRST [illegible]

Signature [signature]

18 CONTRACTOR, Address

Member, BCWWDA ☑ yes ☐ no ; ____

The Province of British Columbia accepts no responsibility for the complete or accuracy of this record

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date 92 5 22 (YR MO DY)

NTS MAP ______ WELL No. ____ ELEV ____ Location Accuracy ______

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ______

Owners Name & Address: MR ROBERT LANGLEY / C26 MALASPINA RR#2 POWELL RIVER

Legal Description & Address: DL 1377 BLK 9 LOT H&S SAVARY ISLAND

Descriptive Location ______

1. TYPE OF WORK: 1 ☑ New Well; 2 ☐ Reconditioned; 3 ☐ Deepened; 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool; 2 ☐ Bored; 3 ☐ Jetted; 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse; ☐ Other

3. WATER WELL USE: 1 ☑ Domestic; 2 ☐ Municipal; 3 ☐ Irrigation; 4 ☐ Comm. & Ind.; ☐ Other

4. DRILLING ADDITIVES ______

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level ______ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	2	SAND	
2	17	SAND COBBLES + BOULDERS.	
17	27	TILL + BOULDERS	
27	33	TILL	
33	51	SANDY CLAY.	
51	78	(WB) SAND.	

7. CONSULTANT ______ Address ______

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel; 2 ☐ Galvanized; 3 ☐ Wood; 4 ☐ Plastic; 5 ☐ Concrete; ☐ Other ______

						units
Hole Diameter						ins
Diameter	6					ins
from	+1.8					ft
to	74					ft
Thickness	.219					ins
Weight						lb/ft

Pitless unit ______ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ______

Shoe(s): GOPHER.

Open hole, from ______ to ______ ft Diameter ______ ins

Grout: ______

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ______

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ______

Set from 78 to 73'3" ft below ground level

RISER, SCREEN & BLANKS						units
Length	4					ft
Diam. I.D.	5 3/8					ins
Slot Size	8					ins
from	78					ft
to	74					ft

Fittings, top K PACKER bottom PLOT

Gravel Pack ______

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 92 5 22

Rate 7 USgpm Temp ____ °C SWL before test 30 ft

Water Level 73 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	70 ft	6 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ______ smell ______; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L; 2 Iron ____ mg/L; 3 Chloride ____ mg/L; 4 pH ____

SITE I D No ______

Field Date ______ Lab Date ______ (YR MO DY)

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ______

Well Head Completion ______

17. DRILLER (PLEASE PRINT) SURNAME: TOWNES FIRST NAME: WALLY

Signature [signature]

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley B.C.
V3A 4P4 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; ______

Province of British Columbia — Ministry of Environment and Par — Water Management Branch

WATER WELL RECORD

Date 92 / 11 / 11 (YR / MO / DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address: TIMOTHY CUSHING

Legal Description & Address: LOT 2 OF 2A PL 5891 DL 4377 NWD SALVARY ISLAND

LOT 2 BLK 8A PL 5891 DL 4377

Descriptive Location: ____

1. TYPE OF WORK: 1 ☐ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☐ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES: ____

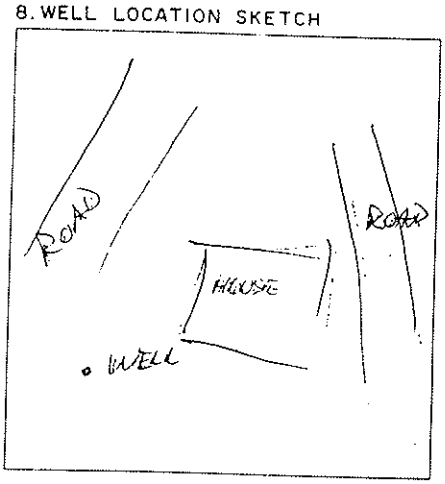
5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	8	SAND.	
8	35	SAND + GRAVEL DRY	
35	43	SAND + GRAVEL (WB)	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH



9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	6"						ins
from	0						ins
to	35'						ft
Thickness	219						ft
Weight							ins
							lb/ft

Pitless unit ____ ft. 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): GOPHER

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5"						ins
Slot Size	12						ins
from	39 3						ft
to	43'						ft

Fittings, top KIACKAN bottom FI

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 92 / 11 / 11 (YR / MO / DY)

Rate 4 USgpm Temp ____ °C SWL before test 15 ft

Water Level 39 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
S.C.D	31 ft	4 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR / MO / DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME ZIOLKOWSKI FIRST NAME WALTER

Signature ____

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Phone 534-1347

Member, BCWWDA ☑ yes ☐ no ; ____

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date 9 21 / 6 / 2 0 (YR / MO / DY)

TS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ / UTM Date 19__ Well Type ____

Owners Name & Address WAYNE Mc DONALD. HESS RD AUX. NELSON BC

Legal Description & Address DL 1377 Blk 9 Lt 15

Descriptive Location SAVORY ISLAND

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
2	3	BOULDERS + SAND	
3	LP	SANDY CLAY	
LP	53	HARD PACKED SAND	
53	77	L.B. SAND	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	6						ins
from	+1.8						ins
to	73						ft
Thickness	219						ft
Weight							ins
							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): COPPER.

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 77 to 73 ft below ground level

RISER, SCREEN & BLANKS #1							units
Length	4						ft
Diam. I D	5						ins
Slot Size	10						ins
from	77						ft
to	73						ft

Fittings, top K PACKR bottom PLUG

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Boiling 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 9 21 / 6 / 2 0

Rate 5 USgpm Temp ____ °C SWL before test 3.6 ft

Water Level 71 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	71 ft	5 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____

Field Date ____ Lab Date ____

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME THOMAS FIRST NAME CRAIG

Signature ____

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; ____

Province of British Columbia — Ministry of Environment and Parks — Water Management Branch

WATER WELL RECORD

Date 92 11 30

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address RICK SPRINGER 7788 HEATHER ST CHILLIWACK V2P 5M6

Legal Description & Address LOT 22 BLOCK 14 DL 1377

Descriptive Location ____

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level ____ ft

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	8	ROOTS + SAND	
8	9	BOULDERS	
9	18	SAND	
18	19'6"	BOULDERS	
19'6"	32	SAND & GRAVEL	
32	43	TIGHT GRAVEL	
43	77	DRY SAND	
77	134	DRY SAND	
134	137	(L.B) BROWN SAND	
137	150	BROWN SAND : L.B	
150	153	GRAY FINE SAND	

7. CONSULTANT ____ Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	6						ins
from	+1						ft
to	149						ft
Thickness	219						ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations ____

Shoe(s) GARLOCK

Open hole, from ____ to ____ ft Diameter ____ ins

Grout ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 148'2" to 153' ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I.D	5						ins
Slot Size	.8						ins
from	153						ft
to	149						ft

Fittings, top K LOCK bottom FLAT

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Boiling 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 92 11 30

Rate 4 USgpm Temp ____ °C SWL before test 97 ft

Water Level 48 ft after test of 3 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: SUB | RECOMMENDED PUMP SETTING: 148 ft | RECOMMENDED PUMPING RATE: 4 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____

SITE I D No ____ Lab Date ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER PLEASE PRINT SURNAME Towns FIRST NAME Harry

Signature ____

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley B.C.
V3A 4P4 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no : ____

The Province of British Columbia accepts no responsibility for the contents or accuracy of this record

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 95 5 24

NTS MAP [ ] WELL No. [ ] ELEV [ ] Log No [ ]
UTM [Z] [ ] [E] [ ] [N] UTM Date 19__ Well Type [ ]

Owners Name & Address: Ted Hack
Legal Description & Address: 2902 Brookridge Dr. N. Vancouver B.C. V7R-3A8 988-7600
Descriptive Location: Medonis DL 1377 Blk 15 Lt 24

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned
2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse 5 ☐ Other
3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind ☐ Other
4. DRILLING ADDITIVES: 0
5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level ___ ft.

FROM ft	TO ft	WELL LOG DESCRIPTION	SWL ft
0	1	Brown Top soil	
1	4'	Boulders + Coarse gravel	
4	11	Grey Hardpan + gravel (Dense)	
11	43'	Coarse white, grey sand	
43	51	Fine grey sand silty	
51	84	Layed, fine sand, clay lens, gravel	
84	93-6"	clean white sand + water	
93-6"	99	Fine silty sand + water + Broken layed clay + Gravel	

7. CONSULTANT: Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

								units
Hole Diameter	6"							ins
Diameter	6"							ins
from	0							ft
to	87-6"							ft
Thickness	219							ins
Weight								lb/ft

Pitless unit ___ ft 1 ☐ above 2 ☐ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used
Perforations: ___
Shoe(s): Guide on
Open hole, from 0 to 0 ft Diameter 0 ins
Grout: 0-13' Bentonite

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Type Size
Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other
Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other
Set from 89-6" to 93-6" ft below ground level

Screen RISER, SCREEN & BLANKS				Liner	Liner	units
Length	4'			2'	5.5'	ft
Diam. I.D	5"			5"	5"	ins
Slot Size	6			0	0	ins
from	89-6"			87-6"	93-6"	ft
to	93-6"			89-6"	99'	ft

Fittings, top ___ bottom ___
Gravel Pack ___

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date ___
Rate 10 USgpm Temp ___ °C Static level ___ ft
Water Level 80 ft after test of ___

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: Sub | RECOMMENDED PUMP SETTING: 95 ft | RECOMMENDED PUMPING RATE: 3-5 USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Cloudy
colour clear smell 0 sand 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ___ mg/L
2 Iron ___ mg/L 3 Chloride ___ mg/L
4 pH ___ Field Date ___ Lab Date ___

SITE ID No ___

16. FINAL WELL COMPLETION DATA
Well Depth 99 ft Well Yield 1/10 USgpm
Static Water Level 80 ft Artesian Flow ___ USgpm Pressure ___ ft
Back filled 0
Well Head Completion 2'

17. DRILLER (PLEASE PRINT) SURNAME ANDERSON Initials ___
Signature ___

18. CONTRACTOR, Address
Crescent Drilling Ltd.
Member, BCWWDA ☑ yes ☐ no

The Province of British Columbia accepts no responsibility for the contents of any record

NELSON WELL DRILLING & SERVICING

CABLE TOOL & ROCK DRILLING

№ 455

P.O. Box 92
Union Bay, B.C. V0R 3B0

Phone 335-2272

UNIT No. 22W

DATE June 21 19 82

NAME OF WELL OWNER Mr. Paul Watkinson

No.

SAVARY ISLAND

TYPE OF JOB Drilling Water Well

CONTRACTOR'S TIME Hrs.

RIG TIME Hrs.

DRILLER: J. Nelson
HELPER:
HELPER:

FROM	TO	HRS.	DESCRIPTION OF WORK PERFORMED	
			72 feet of drilling @ 16.00 per ft.	1152.00
			69 feet of well casing .210 thickness	690.00
			1 - .006 Stainless Steel well Screen	500.00
			One 6" drive shoe	75.00
			Developing well 2 hrs.	100.00
			Mowing fee	100.00
				2617.00
			Less deposit	500.00
			Balance due.	2,117.00

Balance due upon receipt of Statement

Please mail direct to
Union Bay Credit Union
Union Bay. B.C.
V0R 3B0
Attention Mrs. Pat Waterfield

DL 1377 Blk 15 Lt 41
- owner estimates 44.5 g/m
[illegible]

Accepted and Acknowledged by

TOOL PUSHER J. Nelson

WELL OWNER

AUTHORIZED AGENT

2% INTEREST CHARGED ON OVERDUE AMOUNT PER MONTH

Province of British Columbia — Ministry of Environment and Parl — Water Management Branch

WATER WELL RECORD

Date 82/06/15 (YR/MO/DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address: M. I. SKINNER 948 KINGS RD. WEST VAN.

Legal Description & Address: LOT 3 BLOCK 16 D.L. 1372 SAVORY ISL.
LOT 3 BL 16 LOT 1372

Descriptive Location: ____

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing
casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
1	5	Brown sandy clay	
5	15	Brown sand, boulders	
15	16	Boulder	
16	25	Sand & cobbles	
25	33	Sand	
33	55	Sand, large cobbles	
55	80	Light dry sand	
80	81	Sand, water	
81	107	Boulders	
107	110	Light sand, dry	
110	142	Coarse water sand	
142	142	Fine sand (WB)	

7. CONSULTANT ____
Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	6						ins
from	+1						ft
to	138						ft
Thickness	.219						ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used
Perforations: ____
Shoe(s): GOPHER
Open hole, from ____ to ____ ft Diameter ____ ins
Grout: ____

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Pipe Size
Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____
Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other ____
Set from 132 4 to 142 ft. below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I.D	5 3/8						ins
Slot Size	8						ins
from	138						ft
to	142						ft

Fittings, top K PACKER bottom FLAT
Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☑ Pump 2 ☑ Bail 3 ☐ Air Date 82/06/15 (YR/MO/DY)
Rate 2.5 USgpm Temp ____ °C SWL before test 99.6 ft
Water Level 13.6 ft after test of 4 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	130 ft	2.5 USgpm

14. WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☐ clear 4 ☐ cloudy
colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L
2 Iron ____ mg/L 3 Chloride ____ mg/L
4 pH ____ Field Date ____
Lab Date ____ (YR/MO/DY)

SITE I D No. ____

16. FINAL WELL COMPLETION DATA
Well Depth ____ ft Well Yield ____ US gpm
Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft
Back filled ____
Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME ZUKOWSKI FIRST NAME GARY
Signature ____

18. CONTRACTOR,
Address
GARY'S WELL DRILLING
5708 - 187 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; ____

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date (YR / MO / DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address: [illegible] PUALERY

Legal Description & Address: (TEMLISON ROAD)

LOT 4 BLOCK 16 TEMLISON RD SOUTH LESLIE

Descriptive Location: DL 1377

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Commercial & Industrial ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	2	[illegible] SAND	
2	16	CLAY & GRAVEL	
16	35	FINE SAND	
35	110	FINE - MEDIUM SAND	
110	116	FINE - COARSE SAND	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	6						ins
from	+16						ft
to	106						ft
Thickness	2.19						ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): SUMMER

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 110 to 106 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I.D	5"						ins
Slot Size	8						ins
from	106						ft
to	110						ft

Fittings, top K BACKHOE bottom BLANK

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Boiling 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date (YR / MO / DY) 2 1 7 15

Rate 5 USgpm Temp ____ °C SWL before test 94 ft

Water Level 95 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	125 ft	5 USgpm

14. WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☐ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____

Field Date ____ Lab Date (YR / MO / DY) ____

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME [illegible] FIRST NAME [illegible]

Signature [signature]

18. CONTRACTOR,

Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; ____

The Province of British Columbia accepts no responsibility for the contents or accuracy of this record

Province of British Columbia — Ministry of Environment and Parks — Water Management Branch

WATER WELL RECORD

Date 92 / 5 / 4 (YR / MO / DY)

NTS MAP ____ UTM Z ____ E ____ N ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Date 19__ Well Type ____

Owners Name & Address GEORGE SPONG SPONG CONSTR. CO. 16143 9 AVE. WHITE ROCK

Legal Description & Address SURVEY PLAN 11113 LOT 5+6 BLOCK 16, LOT 5+6 - BLOCK 16 DL 1377

Descriptive Location ____

1. TYPE OF WORK: 1 ☐ New Well 2 ☐ Reconditioned 3 ☑ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
120	151	SAND (1.13)	

7. CONSULTANT ____ Address ____

8. WELL LOCATION SKETCH

SITE I D No ____

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter	6"						units
Diameter	6"						ins
from	1'						ins
to	148.0						ft
Thickness							ft
Weight							ins
							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): ____

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 115 to 141 ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top K PACKER bottom 116

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 92 / 5 / 4 (YR / MO / DY)

Rate 5 USgpm Temp ____ °C SWL before test 100 ft

Water Level 140 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	140 ft	4.5 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR / MO / DY)

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME TOMKINS FIRST NAME ISAAC

Signature ____

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K3 Ph 534-1347

Member, BCWWOA ☑ yes ☐ no ; ____

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date 9 4

NTS MAP [2] WELL No. ELEV Location Accuracy

E N Date 19 Well Type

Owners Name & Address: Jim INGLIS 345 Braemar RD N. Van, BC V7N-2T4

Legal Description & Address: LOT 25 Block 16 Plan 2"# District Lot 1377 New Westminster Group 1 Land District

Descriptive Location:

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind. ☐ Other

4. DRILLING ADDITIVES: 0

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing Height above ground level 2' ft

FROM ft	TO ft	WELL LOG DESCRIPTION	SWL ft
0	1	Brown Top Soil	
1'	12'	Packed brown sand + Stones	
12'	83'	Packed brown silt + sand + clay layers	
83'	104'	Grey brown loose sand	
104'	151'	Grey silt + Sand layers + Broken clay Grey	
151'	158'	Brown fine sand	
158'	162'	Fine brown silt	
		Water 129 – 162'	

7. CONSULTANT Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

								units
Hole Diameter	6"	5"						ins
Diameter								ins
from	0	153						ft
to	153	162						ft
Thickness	.219	SS.						ins
Weight								lb/ft

Pitless unit 0 ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☑ New 2 ☐ Used

Perforations: 0

Shoe(s): 1 – weld on

Open hole, from 0 to 0 ft Diameter ins

Grout: Drill Cuttings

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other

Set from to ft below ground level

RISER, SCREEN & BLANKS								units
Length	RISER	SCREEN	SUMP					ft
Diam. I.D	5"	5"	5"					ins
Slot Size		.8						ins
from	153	154	158					ft
to	154	158	162					ft

Fittings, top K Packer bottom Rock

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Dat Rate 7 USgpm Temp °C SWL ft after test ft

Water Level ft after test of hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: Sub RECOMMENDED PUMP SETTING: 158 ft RECOMMENDED PUMPING RATE: 5' USgpm

14. WATER TYPE: 1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Cloudy

colour 0 smell 0 gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness mg/L 2 Iron mg/L 3 Chloride mg/L 4 pH Field Date Lab Date

SITE I D No

16. FINAL WELL COMPLETION DATA

Well Depth 162 ft Well Yield 6 US gpm

Static Water Level 129 ft Artesian Flow 10T US gpm Dynamic ft

Back filled 0

Well Head Completion

17. DRILLER PLEASE PRINT SURNAME ANDERSON V. PAUL

Signature Paul Anderson

18. CONTRACTOR, Address

Cayuse Well Drilling Ltd
Powell River Box 86 V8A-4Z5

Member, BCWWDA ☑ yes ☐ no

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date 92 6 25 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address ERIC KRUNZER 1091 216 ST LANGLEY

Legal Description & Address LOT 35 BL 16 PL 2714 DL 1377 SAVARY ISLAND.

Descriptive Location ____

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

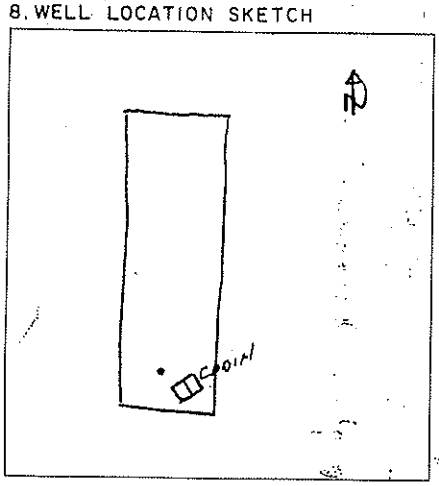
5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	2	BLACK TOP SOIL.	
2	7	SANDY CLAY.	
7	13	BOULDERS + COBBLES	
13	17	BOULDERS + COBBLES	
17	35	SAND + GRAVEL	
35	105	DRY BROWN SAND.	
105	118	(W.B) WITH SAND.	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH



9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

Hole Diameter							units
Diameter	6						ins
from	+18						ft
to	109						ft
Thickness							ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): GUIDE.

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length	4	4					ft
Diam. I.D	5	5					ins
Slot Size	8	10					ins
from	114	104					ft
to	118	110					ft

Fittings, top K PACKER bottom PLOT

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 92 6 25 (YR MO DY)

Rate 7 USgpm Temp ____ °C SWL before test 100 ft

Water Level 100 ft after test of ~~____~~ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	108 ft	6 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I.D No. ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME ZAKKAS FIRST NAME KALLY

Signature ____

18. CONTRACTOR, Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley B.C.
V3A 4P4 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; ____

Province of British Columbia — Environment — Water Management Division

WATER WELL RECORD

Date 9 21 5 1 13 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address KURT PRAXL 2651 ZURICH DR ABBOTSFORD

Legal Description & Address SAVARY ISLAND BLOCK 17 DL 1377 LOT 36 & 37

Descriptive Location ____

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other ____

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

casing height above ground level ____ ft

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	5	BROWN SAND + CUBBLES	
5	25	DRY GRAY SAND	
25	36	DRY BROWN SAND	
36	41	LIGHT GRAVEL	
41	47	GRAVEL + LARGE COBBLES	
47	133	DRY BROWN SAND LIGHT	
133	152	(WB) BROWN FINE SAND	
152	155	(WB) GRAY SAND	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	6						ins
from	+18"						ft
to	151						ft
Thickness	219						ins
Weight							lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: ____

Shoe(s): GARLAR

Open hole, from ____ to ____ ft Diameter ____ ins

Grout: ____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from 155 to 150.3" ft below ground level

RISER, SCREEN & BLANKS							units
Length	41						ft
Diam. I D	5						ins
Slot Size	8						ins
from	155						ft
to	150.3						ft

Fittings, top K PACKAR bottom FLAT

Gravel Pack ____

11. DEVELOPED BY: 1 ☑ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date 9 21 5 1 13 (YR MO DY)

Rate 2 USgpm Temp ____ °C SWL before test 145 ft

Water Level 150 ft after test of 2.5 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	150 ft	2 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth ____ ft Well Yield ____ US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME TOMKINS FIRST NAME WILLIE

Signature ____

18. CONTRACTOR,

Address

PERRY'S WELL DRILLING
1708 - 197 A Street
RR #1, Langley B.C.
V3A 4P4 Ph: 534-134~

Member, BCWWDA ☑ yes ☐ no ; ____

Province of British Columbia **Environment** Water Management Division

WATER WELL RECORD

Date 92 07 16 (YR MO DY)

NTS MAP _____ WELL No. _____ ELEV _____ Location Accuracy _____

UTM Z _____ E _____ N _____ UTM Date 19__ Well Type _____

Owners Name & Address PAUL MCKINNON 7036 11 ST (WEST) WEST VAN V7T 2M5

Legal Description & Address SAVARY ISLAND LOTS 32+33 BLOCK 18 LOT 1372

Descriptive Location _____

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☑ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ air c ☐ reverse ☐ Other _____

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other _____

4. DRILLING ADDITIVES _____

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

casing height above ground level _____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	20	FINE BROWN SAND	
20	28	GREY SAND CLAY	
28	85	DRY HARD PACKED SAND	
85	131	DRY PACKED SAND	
131	146	(WB) SAND. FINE	

7. CONSULTANT _____

Address _____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other _____

							units
Hole Diameter							ins
Diameter	6						ins
from	+18						ft
to	142						ft
Thickness	215						ins
Weight							lb/ft

Pitless unit _____ ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: _____

Shoe(s): CAPHAR

Open hole, from _____ to _____ ft Diameter _____ ins

Grout: _____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other _____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other _____

Set from _____ to _____ ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5½						ins
Slot Size	8						ins
from	142						ft
to	146						ft

Fittings, top K PACKER bottom PLAT.

Gravel Pack TOP OF PACKER 141'

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other _____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date 92 07 16 (YR MO DY)

Rate 5 USgpm Temp _____ °C SWL before test 125 ft

Water Level 142 ft after test of 2 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUB	140 ft	5 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour _____ smell _____ ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness _____ mg/L 2 Iron _____ mg/L 3 Chloride _____ mg/L 4 pH _____

Field Date _____ Lab Date _____ (YR MO DY)

SITE I D No _____

16. FINAL WELL COMPLETION DATA

Well Depth _____ ft Well Yield _____ US gpm

Static Water Level _____ ft Artesian Flow _____ US gpm Pressure Head _____ ft

Back filled _____

Well Head Completion _____

17. DRILLER PLEASE PRINT SURNAME TWEEDALE FIRST NAME KIRK

Signature _____

18. CONTRACTOR,

Address

PERRY'S WELL DRILLING
1709 - 197 A Street
RR #1, Langley, B.C.
V2Z 1K2 Ph: 534-1347

Member, BCWWDA ☑ yes ☐ no ; _____

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 95 05 26

NTS MAP [ ] WELL No [ ] ELEV [ ] Location Accuracy [ ]

UTM [Z] [ ] [E] [ ] [N] Date 19__ Well Type [ ]

Owners Name & Address: Mr Lance Padgett — Smithers Island — 463-9863

Legal Description & Address: Island

Descriptive Location: Island

1. TYPE OF WORK: 1 ✓ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ✓ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☐ Rotary a ☐ mud b ☐ oil c ☐ reverse 5 ☐ Other

3. WATER WELL USE: 1 ✓ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm & Ind. ☐ Other

4. DRILLING ADDITIVES: 0

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; height above ground level 2' ft

FROM ft	TO ft	WELL LOG DESCRIPTION	SWL ft
0	1	Brown top soil	
1	13	Brown Sand Silty	
13	55	Layed brown sand silt clay	
55	79	Layed Silt, Compacted Sand gravel (Frost)	
79	103	Rocks Layed Sand + gravel Fond Bruck	
		water 90'—103'	

7. CONSULTANT Address:

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galv 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

					units
Hole Diameter	6"				ins
Diameter	6"				ins
from	0				ft
to	94-6"				ft
Thickness	2.19				ins
Weight					lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level 1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used

Perforations: [ ]

Shoe(s): Drive shoe welded

Open hole, from 0 to 0 ft diameter ins

Grout: 0—17' Bentonite

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Type Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS					units
Length	4'	Sump			ft
Diam. I.D	5"				ins
Slot Size	10				ins
from	94-6"	98-6"			ft
to	98-6"	103			ft

Fittings, top K Packer bottom Plate

Gravel Pack 0

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Blowing 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail 3 ☐ Air Date [ ] Rate 6 USgpm Temp ___ °C Static water level before test ___ ft Water Level 90 ft after test of ___

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE: Sub — RECOMMENDED PUMP SETTING: 101 ft — RECOMMENDED PUMPING RATE: 4 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☐ other 4 ☐ cloudy

colour clear smell no Sediment 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 Hardness [ ] mg/L 2 Iron [ ] mg/L 3 Chloride [ ] mg/L 4 pH [ ] Field [ ] Lab [ ]

SITE ID No [ ]

16. FINAL WELL COMPLETION DATA

Well Depth 103 ft Well Yield 6 USgpm

Static Water Level 90 ft Artesian Flow [ ] USgpm Artesian Pressure [ ]

Back filled 0

Well Head Completion 2'

17. DRILLER (PLEASE PRINT) SURNAME: AHOGERSOM — Signature [ ]

18. CONTRACTOR Address: Canwest Drilling LTD Powell River

Member, BCWWDA ☑ yes ☐ no

GR. U/1. 1.2.5

WELL NO. I

DL. 1373 # 1

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

Z WELL NO.

Z X Y NO.

LEGAL DESCRIPTION: LOT 129 SEC. ____ TP. ____ R. ____ D.L. 1373 LAND DISTRICT NEW WEST PLAN ____

DESCRIPTIVE LOCATION SAVARY ISLAND LICENCE NO. ____ DATE ____

NAT. TOPO. SHEET NO. 92 F/1

WELL LOCATION MAP SHEET # 54

OWNER'S NAME MARINELAND INVESTMENTS ADDRESS SAVARY ISLAND

DRILLER'S NAME FRIESEN (265) ADDRESS LANGLEY DATE COMPLETED ____

DEPTH 105' ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION DRILLED CASING DIAM 8" LENGTH ____

SCREEN LOCATION 95-105' SCREEN ☒ SIZE #15 LENGTH 10' TYPE JOHNSON

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DI CE TO WATER 75' ☐ ESTIMATED WATER LEVEL

FROM TOP OF CASING ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE EST. 35 GPM DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE 48°F pH 6.8 SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) 70 ppm mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Co\ CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)	63 ppm		POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)	.1 ppm	
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. 1401653

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION
0	4	SAND
4	22	TILL
22	26	GRAVEL
26	55	FINE GRAVEL
55	71	FINE SAND
71	91	SANDSTONE
91	98	CLAY & GRAVEL
98	111	FINE GRAVEL BECOMIN
		SILTY IN BOTTOM

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☑ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

92F.097.1.3.3

DIST. LOT 1373 2

WELL NO. 2

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

Z ☐☐☐ WELL NO. ☐☐

Z X Y NO.

NAT. TOPO. SHEET NO. 92F/ SHT 5

LEGAL DESCRIPTION: LOT 129 SEC. ____ TP. ____ R. ____ D.L. 1373 LAND DISTRICT NEW WEST PLAN ____

DESCRIPTIVE LOCATION SAVARY ISLAND LICENCE NO. ____ DATE ____

OWNER'S NAME MARINELAND INVESTMENTS ADDRESS SAVARY ISLAND

DRILLER'S NAME ____ ADDRESS ____ DATE COMPLETED ____

DEPTH 91' ELEVATION OF ____ ☐ESTIMATED ☐SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION WASH BORE CASING DIAM 1.5" LENGTH ____

SCREEN LOCATION BOTTOM AT 91' SCREEN ☒ SIZE ____ LENGTH ____ TYPE WELL POINT

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

TANCE TO WATER ____ ☐ESTIMATED WATER LEVEL

FROM ____ ☐MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ µmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($CaCO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm
CARBONATE (CO_3)		
BICARBONATE (HCO_3)		
SULPHATE (SO_4)		
CHLORIDE (Cl)		
$NO_2 + NO_3$ (NITROGEN)		
* TKN. (NITROGEN)		
PHOSPHORUS (P)		

CATIONS	mg/l	epm
CALCIUM (Ca)		
MAGNESIUM (Mg)		
SODIUM (Na)		
POTASSIUM (K)		
IRON (DISSOLVED)		

* TKN = TOTAL KJELDAHL NITROGEN

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY SITE NO. ____

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION
0	5'	DRY SILTY SAND, FEW
		STONES
5	8	SAND
8	10	TAN CLAY
10	91	SAND WITH SEVERAL VE
		COMPACT BEDS, ESPEC
		BELOW 55'.
		OBSERVATION WELL
		-THIS IS LOCATED 22
		FROM THE MAIN PUM
		WELL.

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☑ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

WELL NO. 3

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

Z WELL NO.

LEGAL DESCRIPTION: LOT ____ SEC. ____ TP. ____ R. ____ D.L. 1373 LAND DISTRICT NEW WEST PLAN ____

DESCRIPTIVE LOCATION SAVARY ISLAND - S. SHORE LICENCE NO. ____ DATE ____

Z X Y NO.

5 1 54

NAT. TOPO. SHEET NO. 92F/

OWNER'S NAME MARINELAND INVESTMENTS ADDRESS SAVARY ISLAND

DRILLER'S NAME ____ ADDRESS ____ DATE COMPLETED SEP. 70

DEPTH 10.5' ELEVATION OF ____ ☐ESTIMATED ☐SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION DUG & POUNDED CASING DIAM ____ LENGTH ____

SCREEN LOCATION 8.5 - 10.5 SCREEN ☒ SIZE #10 LENGTH 3' TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DI' NCE TO WATER ____ ☐ESTIMATED WATER LEVEL

FR ____ ☐MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ____

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

LITHOLOGY

FROM	TO	DESCRIPTION
0	3'	LOOSE SAND
3	4	COARSE BEACH GRAVEL
4	10.5	COMPACT FINE SAND
		OBSERVATION WELL (FOR THREE DAYS)
		VERY SALTY WATER

INT 041 1.3.3

D.L. 1373 # 4

WELL NO. 4

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

Z WELL NO.

LEGAL DESCRIPTION: LOT ____ SEC. ____ TP. ____ R. ____ D.L. 1373 LAND DISTRICT NEW WEST PLAN ____

DESCRIPTIVE LOCATION B. VOWELL'S PROPERTY - N. SHORE, SAVARY ISL. LICENCE NO. ____ DATE ____

Z X Y NO.

OWNER'S NAME MARINELAND INVESTMENTS ADDRESS SAVARY ISLAND

DRILLER'S NAME ____ ADDRESS ____ DATE COMPLETED 20/09/16

SHT 54

NAT. TOPO. SHEET NO. 92 F/11

DEPTH 18' ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GR TL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DI. NCE TO WATER ____ ☐ ESTIMATED WATER LEVEL

FROM ____ ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE APPROX 2 GPM DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
• TKN. (NITROGEN)					
PHOSPHORUS (P)					

• TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ____

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION
0	5'	MIDDEN DEBRIS, MOSTL SHELLS
5	5.5	GRAVEL BEACH
5.5	16.5	FINE SAND.
		OBSERVATION WELL

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL ☒ REPORT

OTHER ____

WELL NO. 5

D.L. 1373 #5

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT 11 ~~SEC.~~ BLK 2 TP. ____ R. ____ D.L. 1373 LAND DISTRICT NEW WEST PLAN 5205

DESCRIPTIVE LOCATION E. CHRISTOPHER PROP. - NORTH SHORE, SAVARY ISL. LICENCE NO. ____ DATE ____

OWNER'S NAME MARINELAND INVESTMENTS ADDRESS SAVARY ISL.

DRILLER'S NAME ____ ADDRESS ____ DATE COMPLETED 1970

DEPTH 4' ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DI CE TO WATER ____ ☐ ESTIMATED WATER LEVEL

FROM ____ ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

Z ☐☐ WELL NO. ☐☐☐☐☐☐ S

Z X Y NO.

SISL.5C

NAT. TOPO. SHEET NO. 92F/1

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
• TKN. (NITROGEN)					
PHOSPHORUS (P)					

• TKN = TOTAL KJELDAHL NITROGEN

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY SITE NO. ____

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION
0	5'	MIXED DEBRIS, MOST SHELLS
		GRAVEL BEACH
		SALTY TASTE

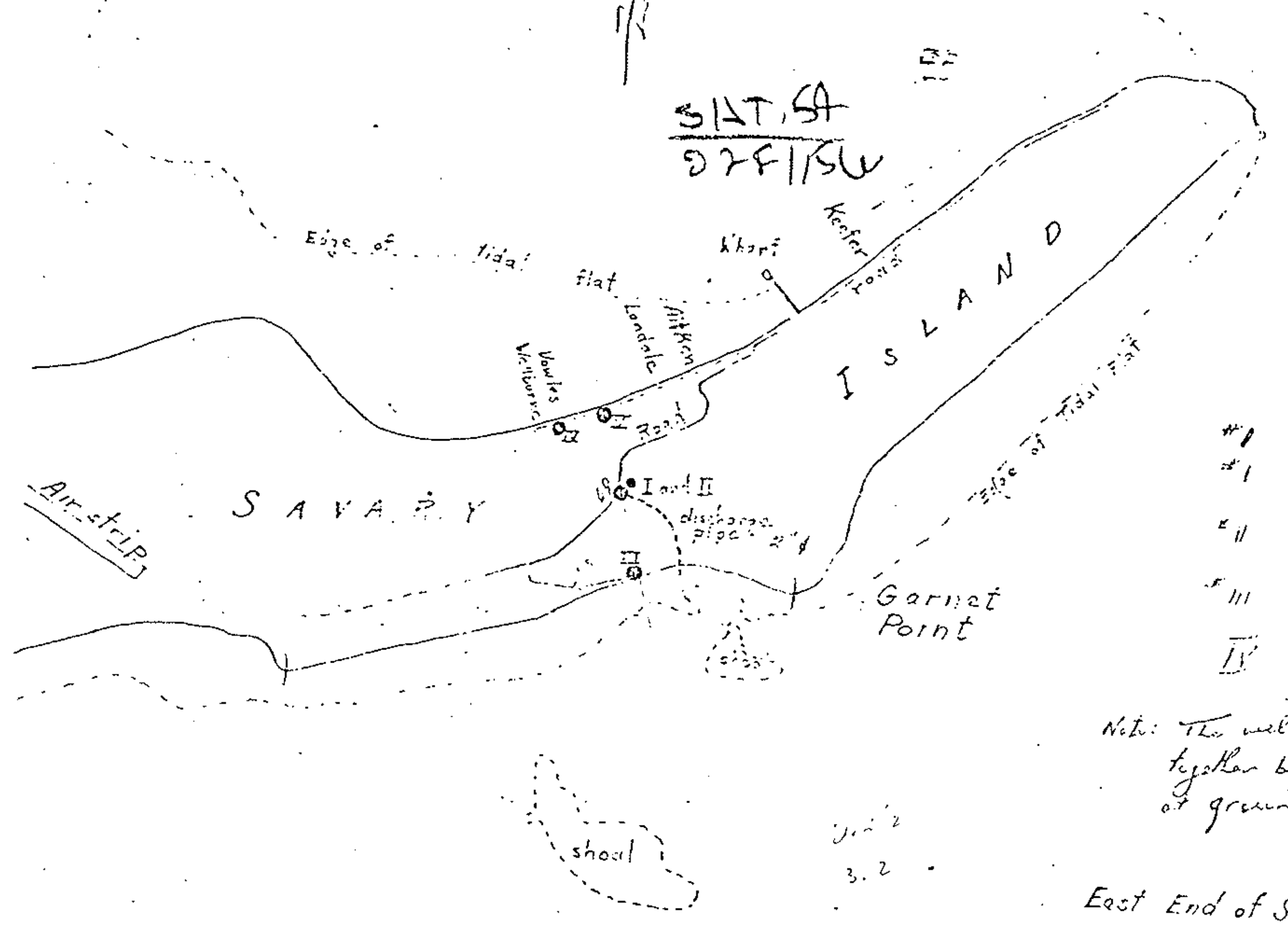
"The attached information has been supplied gratuitously to the Province of British Columbia and has not been independently confirmed. Those persons relying on it do so at their own risk, and [illegible] should be cautioned against its use in making financial and other commitments. Comments on the well records may be obtained on request by contacting the drillers concerned."

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____



#1 105' (10' screen) 95' static ...

#II 91'

#III 10½

IV 18

Note: The wells are not tied together by a set of levels at ground level.

East End of Savary Island
from air photo B.C. 4317-57
Scale 1" = approx. ¼ mi

Appendix IV

Well Head Level Survey Data

Well Head Level Survey Data				
Station Number	Legal Description of Well Location			Elevation (metres asl)
	DL	Block	Lot	
Δ82	1377	P. B	4	14.03 m
Δ56b	1377	9	5	11.90 m
Δ52b	1377	9	15	10.63 m
Δ38a	1377	15	13	26.54 m
Δ1	1377	15	26	25.94 m
Δ6a	1377	16	2	30.85 m
Δ7a	1377	17	42	31.91 m
Δ15b	1377	13	18	37.05 m
Δ21	1377	18	14	41.76 m
Δ22b	1377	17	14	41.80 m
Δ27b	1377	20	11	44.24 m
Δ31d	1377	23	3	46.39 m
Δ100	1355	RRR94-1		24.25 m

Appendix V

Chemical Water Quality Sample Results

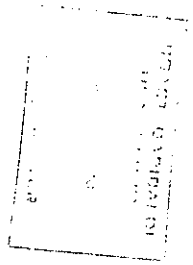
ZENON ENVIRONMENTAL LABORATORIES
Certificate of Analysis

Reported To :

HEALTH- COAST GARIBALDI(11) Client Code HB

COAST GARIBALDI HEALTH UNIT
4313 B ALBERTA AVENUE
POWELL RIVER, BC
V8A 5G7

Submitted By : DAN GLOVER
FAX : DAN GLOVER
Phone : 485-2874



Requisition Forms :

	Zenon ID
Form 10027883 received on 22-SEP-1995 completed on 26-OCT-1995 containing sample(s)	95026920
	95026921
	95026922
	95026923
	95026924
	95026925

From sampling site NOSITE SAVARY ISLAND WATER STUDY 1995

Remarks :

- All results are blank corrected except for Hi-Res MS data.
- 'MDC' = Minimum Detectable Concentration
- '<' = Less than MDC
- '---' = Not analyzed
- Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- Organic analyses are not corrected for surrogate recoveries except for Isotope Dilution methods.

Methods used by Zenon are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 17th Edition, published by the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the B.C. Ministry of Environment.

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026920

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.9	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	542	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	103	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.12	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.12	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	61.5	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026920 comment : SITE #A

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026921

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.9	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	601	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	119	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.17	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.17	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	70.6	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026921 comment : SITE #B

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026922

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.5	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	149	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	13.7	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.04	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.04	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	7.57	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026922 comment : SITE #C

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026923

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.1	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	433	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	97.3	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.82	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.82	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	45.1	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026923 comment : SITE #D

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026924

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.2	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	369	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	49.8	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.05	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.05	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	38.2	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026924 comment : SITE #E

ANALYTICAL REPORT
Form 10027883

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026925

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.3	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	453	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	71.2	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.55	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.55	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	44.8	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026925 comment : SITE #F

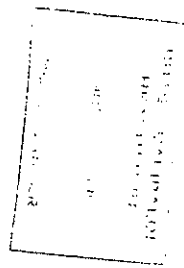
ZENON ENVIRONMENTAL LABORATORIES
Certificate of Analysis

Reported To :

HEALTH- COAST GARIBALDI(11) Client Code HB

COAST GARIBALDI HEALTH UNIT
4313 B ALBERTA AVENUE
POWELL RIVER, BC
V8A 5G7

Submitted By : DAN GLOVER
FAX : DAN GLOVER
Phone : 485-2874



Requisition Forms :

Zenon ID

Form 11032601 received on 22-SEP-1995 completed on 26-OCT-1995 containing sample(s) 95026926
95026927
95026928
95026929
95026930
95026931

From sampling site NOSITE SAVARY ISLAND WATER STUDY 1995

Remarks :

- All results are blank corrected except for Hi-Res MS data.
- 'MDC' = Minimum Detectable Concentration
- '<' = Less than MDC
- '---' = Not analyzed
- Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- Organic analyses are not corrected for surrogate recoveries except for Isotope Dilution methods.

Methods used by Zenon are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 17th Edition, published by the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the B.C. Ministry of Environment.

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026926

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.7	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	151	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	26.6	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.54	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.54	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	15.7	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026926 comment : SITE #G

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026927

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.6	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	157	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	26.8	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	1.51	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	1.50	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.008	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	19.4	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026927 comment : SITE #H

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026928

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.7	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	330	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	55.0	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.23	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.23	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	31.0	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026928 comment : SITE #1

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026929

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.4	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	952	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	246	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	3.52	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	3.20	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.324	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	131	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026929 comment : SITE #3

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026930

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.0	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	996	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	231	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	< 0.02	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	< 0.02	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	126	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026930 comment : SITE #K

ANALYTICAL REPORT
Form 11032601

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026931

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.6	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	669	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	153	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	4.84	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	4.84	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	101	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026931 comment : SITE #L

ZENON ENVIRONMENTAL LABORATORIES
Certificate of Analysis

Reported To :

HEALTH- COAST GARIBALDI(11) Client Code HB

COAST GARIBALDI HEALTH UNIT
4313 B ALBERTA AVENUE
POWELL RIVER, BC
V8A 5G7

Submitted By : DAN GLOVER
FAX : DAN GLOVER
Phone : 485-2874

Requisition Forms :

	Zenon ID
Form 11032602 received on 22-SEP-1995 completed on 26-OCT-1995 containing sample(s)	95026932
	95026933
	95026934
	95026935
	95026936
	95026937

From sampling site NOSITE SAVARY ISLAND WATER STUDY 1995

Remarks :

- All results are blank corrected except for Hi-Res MS data.
- 'MDC' = Minimum Detectable Concentration
- '<' = Less than MDC
- '---' = Not analyzed
- Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- Organic analyses are not corrected for surrogate recoveries except for Isotope Dilution methods.

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ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026932

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.6	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	209	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	41.9	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	2.47	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	2.47	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	26.9	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026932 comment : SITE #M

ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026933

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.8	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	448	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	125	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	< 0.02	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	< 0.02	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	70.7	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026933 comment : SITE #N

ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026934

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.7	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	982	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	229	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	< 0.02	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	< 0.02	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	103	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026934 comment : SITE #O

ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026935

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.1	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	282	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	33.6	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.05	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.03	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.016	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	21.4	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026935 comment : SITE #P

ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026936

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.7	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	162	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	13.1	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.28	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.28	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	21.0	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026936 comment : SITE #Q

ANALYTICAL REPORT
Form 11032602

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026937

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.5	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	409	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	52.2	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.71	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.70	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.007	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	47.7	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026937 comment : SITE #R

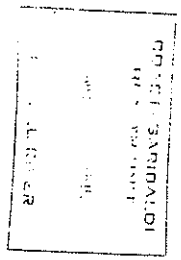
ZENON ENVIRONMENTAL LABORATORIES
Certificate of Analysis

Reported To :

HEALTH- COAST GARIBALDI(11) Client Code HB

COAST GARIBALDI HEALTH UNIT
4313 B ALBERTA AVENUE
POWELL RIVER, BC
V8A 5G7

Submitted By : DAN GLOVER
FAX : DAN GLOVER
Phone : 485-2874



Requisition Forms :

	Zenon ID
Form 11032603 received on 22-SEP-1995 completed on 26-OCT-1995 containing sample(s)	95026938
	95026939
	95026940
	95026941
	95026942
	95026943

From sampling site NOSITE SAVARY ISLAND WATER STUDY 1995

Remarks :

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- 'MDC' = Minimum Detectable Concentration
- '<' = Less than MDC
- '---' = Not analyzed
- Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- Organic analyses are not corrected for surrogate recoveries except for Isotope Dilution methods.

Methods used by Zenon are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 17th Edition, published by the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the B.C. Ministry of Environment.

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026938

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.0	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	308	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	47.0	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	4.04	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	4.04	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	39.0	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026938 comment : SITE #S

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026939

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	5.8	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	358	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	87.6	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.77	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.77	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	46.4	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026939 comment : SITE #T

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026940

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.0	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	677	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	101	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.73	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.68	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.049	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	60.0	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026940 comment : SITE #U

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026941

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.3	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	104	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	16.9	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.14	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.14	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	7.77	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026941 comment : SITE #V

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026942

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.6	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	187	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	29.5	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	1.18	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	1.17	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.011	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	23.5	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026942 comment : SITE #W

ANALYTICAL REPORT
Form 11032603

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

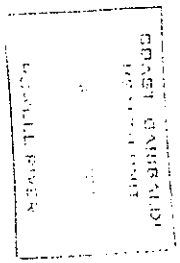
Zenon ID : 95026943

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	5.4	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	247	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	66.0	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	< 0.02	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	< 0.02	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	37.1	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026943 comment : SITE #X

ZENON ENVIRONMENTAL LABORATORIES
Certificate of Analysis



Reported To :

HEALTH- COAST GARIBALDI(11) Client Code HB

COAST GARIBALDI HEALTH UNIT
4313 B ALBERTA AVENUE
POWELL RIVER, BC
V8A 5G7

Submitted By : DAN GLOVER
FAX : DAN GLOVER
Phone : 485-2874

Requisition Forms :

	Zenon ID
Form 11032604 received on 22-SEP-1995 completed on 26-OCT-1995 containing sample(s)	95026917
	95026918
	95026919

From sampling site NOSITE SAVARY ISLAND WATER STUDY 1995

Remarks :

- All results are blank corrected except for Hi-Res MS data.
- 'MDC' = Minimum Detectable Concentration
- '<' = Less than MDC
- '---' = Not analyzed
- Solids results are based on dry weight except Volatile Organics, TPH and Biota Analyses.
- Organic analyses are not corrected for surrogate recoveries except for Isotope Dilution methods.

Methods used by Zenon are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 17th Edition, published by the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the B.C. Ministry of Environment.

ANALYTICAL REPORT
Form 11032604

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026917

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.1	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	1970	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	556	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	1.66	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	1.65	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	0.015	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	291	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026917 comment : SITE #Y

ANALYTICAL REPORT
Form 11032604

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026918

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	7.1	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	247	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	48.8	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	0.10	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	0.10	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	31.3	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026918 comment : SITE #Z

ANALYTICAL REPORT
Form 11032604

Sampling site : NOSITE SAVARY ISLAND WATER STUDY 1995
Submitted by : DAN GLOVER

Zenon ID : 95026919

Sparcode	Parameter		Unit	MDC	Media	Workroute
00041220	pH	6.7	pH units	0.1	02/01	Automated pH Meter
00111160	Specific Conductance	324	uS/cm	1	02/01	Cond.Meter Siebold
11041330	Chloride Dissolved	62.8	mg/L	0.5	02/01	Auto. mercuric thiocyan.
11091350	Nitro NO3+NO2 D	1.45	mg/L	0.02	02/01	Auto. Cadmium Reduction
1110CALC	Nitrogen NO3 Diss(N)	1.45	mg/L		--/--	Calculated Result
11111354	Nitrogen NO2 Diss(N)	< 0.005	mg/L	0.005	02/01	Auto. Diazotization
Na_D0031	Sodium Dissolved	32.6	mg/L	0.01	02/01	ICAP 61E Analysis

Sample State : Fresh Water
Sampled on : 95/09/20 00:00

Sample 95026919 comment : SITE #AA

Appendix VI

Salinity Field Tests - Spilsbury, 1932 and 1987

SAVARY WATER

by A.J. Spilsbury

Salinity?

Some people had always claimed that certain wells had a "brackish" taste and stained pots, etc., and had even been the cause of serious foaming when used in the boiler of the old steam logging donkey. But how much is enough?

I therefore developed a very simple salinity tester which served the purpose nicely. I used the electrical conductivity method. A pair of 1" x 1" square electrodes separated 1" immersed in the test sample and connected to a battery and galvanometer. Pure fresh water is an insulator and will pass no current. I found by experimentation that by adding one drop of sea water to one gallon of pure water, a measurable reading was produced on the galvanometer. I kept adding drop by drop and established a reference scale. Knowing the salinity of sea-water on this coast, and also the number of drops that go to make a gallon, it was not difficult to establish the parts per million total salinity for any sample. This just takes an hour or two to set it up. Incidentally the water temperature will affect the reading (conductivity increases with temperature), so use a thermometer during testing. The results of this survey were quite enlightening. No wonder the old steam donkey foamed!

Here are a few readings taken from my notes, January 1932.

(1)	H.M.Keefer	Lot 7 Block 8	90 part per million
(2)	P.H.Barnet	Lot 40 Blk 8	15 p.p.m. (2nd row)
(3)	A. W. Spilsbury	10 11	166 "
(4)	"	(second row)	18 "
(5)	E. J. Herchmer	5 11	213 "
(6)	A. L. McKillop	3 11	234 "
(7)	G.W.Ashworth	(E. of Blair R.)	120 "
(8)	Keefer's log cabin	"	160 "
(9)	Maj.Stevens	"	268 "
(10)	Picketts	"	230 "
(11)	"	first test hole	400+ (closer to beach)

Salinity Tests at Savary Island.

April 1987

Using LYNCH [illegible] DS Meter 532M1

Location.	Range.	Reading.	PPM.		Comments.
Distilled water.	x10	1.0	0.4		Tapwater.
Powell River.	x10	26.0	12		Tap water.
Campbell.	x100	200.0	100	.01	Deep well.
Rickard.	x100	200.0	100	.01	"
F.Turnbull.	x100	140.0	70	.007	"
Baxter.	x100	110.0	55	.005	"
Whittall.	x100	250.0	125	.0125	Shallow well.
Mattesion.	x100	350.0	175 Est.		"
Kirkrod.	x1000	Off the scale.			"

Appendix VII

Bacteriological Water Quality Sample Results

PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8
Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :95WW021171
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :99U1357 - 99U1357
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-2B2-L17
City/Area :
Source :Well
Type :Private Supply

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

Test	Result	Units
1. Total Coliform (Membrane Filtration) ESTIMATED COUNT	EST 76	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

NOTE: RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8
Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :95WW021169
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL R

Site Information
Code/Name :99U1355 - 99U1355
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-2B7-L2
City/Area :
Source :Well
Type :Private Supply

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

Test	Result	Units
1. Total Coliform (Membrane Filtration)	L1	TC Count/100m
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100m

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

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Minister Responsible
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PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 27

Requisition :95WW021166
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :99U1352 - 99U1352
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-2B11-L4
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 27

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 500	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	2	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

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B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-607

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 26

Requisition :95WW021156
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL

Site Information
Code/Name :99U1342 - 99U1342
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,"TUPPER" 95-2B10L26
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 26

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 4	TC Count/100
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

THE B.C. CENTRE FOR DISEASE CONTROL
The Province's centre of expertise in communicable disease control and provider of specialty health support services.
MEDINET

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PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 26

Requisition :**95WW021150**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1336 - 99U1336**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-3B2-L12
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 26

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 40	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

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B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 27

Requisition :**95WW021155**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1341 - 99U1341**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-6B22-L12
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 27

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 300	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

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B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021172**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1358 - 99U1358**
Site Desc :PRIVATE,SAVARY ISL SURVEY,95-6B24-L15
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 270	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

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PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

Requisition :**95WW021174**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV

Site Information
Code/Name :**99U1360 - 99U1360**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-6B25-L1
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

	Test	Result	Units
1.	Total Coliform (Membrane Filtration)	L1	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

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Specimen was 24 hours in transit

Ministry of Health and Minister Responsible for Seniors

PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

Requisition :**95WW021154**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1340 - 99U1340**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-6B26-L32
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

Test	Result	Units
1. Total Coliform (Membrane Filtration) OG:OVERGROWN WITH COLIFORM PRESENT	O/G	TC Count/100ml
2. Fecal Coliform (Membrane Filtration)	2	FC Count/100ml

3. OG RESULT INDICATES CONFLUENT BACTERIAL GROWTH ON MEMBRANE PREVENTING ACCURATE COLIFORM DETERMINATION. RE-SAMPLE FOR MPN TESTING BY INDICATING "OG REPEAT" ON REQUISITION.

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Specimen was 24 hours in transit

Ministry of Health and Minister Responsible for Seniors

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828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021173**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1359 - 99U1359**
Site Desc :SAVARY ISL SURVEY,95-6B25-INDIAN SPRING
City/Area : Type :
Source :[SPRING]

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

Test	Result	Units
1. Total Coliform (Membrane Filtration)	1	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

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Specimen was 24 hours in transit

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Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

Requisition :**95WW021168**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Site Information
Code/Name :**99U1354 - 99U1354**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-6B30-L12
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform

EHO :DAN GLOVER
:Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

	Test	Result	Units
1.	Total Coliform (Membrane Filtration)	L1	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	L1	FC Count/100ml

L:LESS THAN

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Specimen was 24 hours in transit

Ministry of Health and Minister Responsible for Seniors

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Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021162**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Site Information
Code/Name :**99U1348 - 99U1348**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-6B31-L21
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform

EHO :DAN GLOVER
:Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 101	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

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Specimen was 24 hours in transit

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Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :**95WW021148**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1334 - 99U1334**
Site Desc :PRIVATE WELL,SAVARY ISL.SURVEY,95-7-PB-L5
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

Test	Result	Units
1. Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 167	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

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Phone Number :

Printed :1995 SEP 26

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :**95WW021160**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1346 - 99U1346**
Site Desc :PRIVATE,SAVARY ISL SURVEY,95-6B32-L14
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 26

Test	Result	Units
1. Total Coliform (Membrane Filtration)	56	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

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ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021163**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information

Code/Name :**99U1349 - 99U1349**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B8-L17
City/Area : Type :Private Supply
Source :Well

Specimen

Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration)	L1	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	L1	FC Count/100ml

L:LESS THAN

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ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 26

Requisition :**95WW021153**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information

Code/Name :**99U1339 - 99U1339**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B8-L13
City/Area : Type :Private Supply
Source :Well

Specimen

Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 26

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 1000	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

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Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :95WW021167
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :99U1353 - 99U1353
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B9-L13
City/Area :
Source :Well
Type :Private Supply

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

Test	Result	Units
1. Total Coliform (Membrane Filtration) OG:OVERGROWN WITH COLIFORM PRESENT	OG	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. OG RESULT INDICATES CONFLUENT BACTERIAL GROWTH ON MEMBRANE PREVENTING ACCURATE COLIFORM DETERMINATION. RE-SAMPLE FOR MPN TESTING BY INDICATING "OG REPEAT" ON REQUISITION.

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Specimen was 24 hours in transit

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828 West 10th Avenue
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Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :95WW021151
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :99U1337 - 99U1337
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B-10-L26
City/Area :
Source :Well
Type :Private Supply

Specimen
Treatment :
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

Test	Result	Units
1. Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 15	TC Count/100ml
2. Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

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Specimen was 24 hours in transit

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Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

Requisition :**95WW021149**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1335 - 99U1335**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B10A-L15
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

	Test	Result	Units
1.	Total Coliform (Membrane Filtration)	L1	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	L1	FC Count/100ml

L:LESS THAN

Copies of this report sent to:

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Specimen was 24 hours in transit

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ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 26

Requisition :**95WW021152**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1338 - 99U1338**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B-13-L18
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment : Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 26

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 120	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

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Specimen was 24 hours in transit

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828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :95WW021158
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information

Code/Name :**99U1344 - 99U1344**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B15-L21
City/Area :
Type :Private Supply
Source :Well

Specimen

Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform

EHO :DAN GLOVER
:Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 500	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	8	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

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Specimen was 24 hours in transit

Ministry of Health and Minister Responsible for Seniors

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Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 27

Requisition :95WW021161
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information

Code/Name :**99U1347 - 99U1347**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B16-NEILSEN SPRING
City/Area :
Type :Private Supply
Source :Well

Specimen

Treatment :UNTREATED
Ph Level :
Chlorine Level :ppm
Nature :WATER
Exams Req :Total Coliform

EHO :DAN GLOVER
:Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 27

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 800	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

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Specimen was 24 hours in transit

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ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021165**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1351 - 99U1351**
Site Desc :PRIVATE WELL,SAVARY ISLAND SURVEY,95-716-L39
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 20	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

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Specimen was 24 hours in transit

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ENVIRONMENTAL BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

Requisition :**95WW021157**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1343 - 99U1343**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B20-L10
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 830	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration)	6	FC Count/100ml
3.	EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.		

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.

Specimen was 24 hours in transit

Ministry of
Health and
Minister Responsible
for Seniors

PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :**95WW021170**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1356 - 99U1356**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B20-L16
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 23	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

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ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 25

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Requisition :**95WW021164**
Submitter Ref :

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1350 - 99U1350**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B23-L3
City/Area :
Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED
Nature :WATER
Ph Level :
Chlorine Level :ppm
Exams Req :Total Coliform
:Fecal Coliform

EHO :DAN GLOVER

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 25

	Test	Result	Units
1.	Total Coliform (Membrane Filtration) EST:ESTIMATED COUNT	EST 170	TC Count/100ml
2.	Fecal Coliform (Membrane Filtration) L:LESS THAN	L1	FC Count/100ml

3. EST RESULT INDICATES HIGH COLONY DENSITY ON MEMBRANE PREVENTING ACCURATE COLIFORM COUNTING.

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

**Our new centralized report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.**

Specimen was 24 hours in transit

Ministry of
Health and
Minister Responsible
for Seniors

PROVINCIAL LABORATORY
B.C. CENTRE FOR DISEASE CONTROL
828 West 10th Avenue
Vancouver, B.C. V5Z 1L8

Fax: (604)660-6073

ENVIRONMENTAL
BACTERIOLOGY
Phone Number :

Printed :1995 SEP 22

Requisition :**95WW021159**
Submitter Ref :

COAST GARIBALDI HU (POWELL RIVER)
4313B ALBERTA AVE
POWELL RIVER, BC V8A 5G7

Specimen Submitter

:COAST GARIBALDI HU (POWELL RIV*

Site Information
Code/Name :**99U1345 - 99U1345**
Site Desc :PRIVATE WELL,SAVARY ISL SURVEY,95-7B23-L3
City/Area : Type :Private Supply
Source :Well

Specimen
Treatment :UNTREATED Ph Level : Chlorine Level :ppm
Nature :WATER Exams Req :Total Coliform

EHO :DAN GLOVER :Fecal Coliform

Collected :1995 SEP 20
Received :1995 SEP 21

RESULTS

Reported on 1995 SEP 22

Test	Result	Units
1. Total Coliform (Membrane Filtration)	L1	TC Count/100ml
2. Fecal Coliform (Membrane Filtration)	L1	FC Count/100ml

L:LESS THAN

Copies of this report sent to:

1) COAST GARIBALDI HU (GIBSONS), GIBSONS

Our new centralised report enquiry line is now available at 660-5100.
Please use this new number for ALL Provincial Laboratory result enquiries.

Specimen was 24 hours in transit

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

.cKINNEY, DOREEN

2466 BELLEVUE AVENUE
WEST VANCOUVER, BC
V7V 1E2

Comments:

CERTIFICATE A9517065

(MIP) - McKINNEY, DOREEN

Project:
P.O. #

Samples submitted to our lab in Vancouver, BC.
This report was printed on 16-MAY-95.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
221	1	Water sample

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	
615	1	Sodium (Na) mg/L Total	AAs	0.1	1
688	1	Total Coliform (Cfu/100ml)	EC MEDIUM	N/A	1
689	1	Fecal Coliform (Cfu/100ml)	EC MEDIUM	N/A	1

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: McKINNEY, DOREEN

2466 BELLEVUE AVENUE
WEST VANCOUVER, BC
V7V 1E2

Project :
Comments:

Page Numb
Total Page
Certificate
Invoice No
P.O. Numb
Account

CERTIFICATE OF ANALYSIS A9517065

PARAMETER DESCRIPTIONS	SAMPLE (WHAT IS, WELL								
Sample preparation code	221	---	---	---	---	---	---	---	---
Sample preparation code	---	---	---	---	---	---	---	---	---
Na mg/L Total	15.0								
Tot. Coliform Cfu/100mL	0								
Fec. Colifrm Cfu/100mL	0								

CERTIFICATION: RCLH

Appendix VIII

Assumptions and Calculations of Groundwater Consumption Estimates

Assumptions and Calculations of Groundwater Consumption Estimates

1. Average Annual Daily Consumption

$$= \frac{((\text{Ave. Days Usage/Yr.}) \times (\text{Ave. Daily Consumption}) \times (\text{No. of Properties}))}{365 \text{ days}}$$

Based on following assumptions and adjustments:

1. Proportion of drilled wells (Main Aquifer) to shallow wells (Shallow Aquifers);
2. Adjustments made to data where obviously skewed to high or low end (based on local knowledge; e.g. On DL 1377, data from Lot 5 in Parcel B area averaged with results of Block 7 data).

2. Average Peak Season (July-August) Daily Consumption

$$= \frac{((\text{Ave. Days Usage/Yr.-10 days}) \times (\text{Ave. Daily Consumption}) \times (\text{No. Properties}))}{365 \text{ days}}$$

Based on following assumptions and adjustments:

1. As above;
2. Reduction of Usage data by 10 days to compensate for expected none peak season use;
3. If average usage figure greater than 70 days, then 60 days used.

3. Average Peak Season (July-August) Per Capita Daily Consumption

$$= \frac{\text{(Ave. Peak Season Daily Consumption)}}{\text{(Ave. No. of People)} \times \text{(No. Properties)}}$$

Based on following assumptions and adjustments:

1. Average number of people using properties adjusted where necessary based on local knowledge.

4. Total Annual Consumption - Main Aquifer

= (Ave. Days Usage/Yr.)x(Ave. Consumption/Day)x(No. Prop. on Main Aquifer)

Based on following assumptions and adjustments:

1. Number of properties using Main Aquifer for source of groundwater (deep wells) adjusted based on local knowledge.

5. Average Annual Daily Consumption

= (Ave. Days Usage/Yr.)x(Ave. Consumption/Day)x(No. Prop. on Perched Aq.)

Based on following assumptions and adjustments:

1. Number of properties using shallow or perched aquifers for source of groundwater (shallow wells) adjusted based on local knowledge.

Appendix IX

Groundwater Consumption Statistics and Estimates - Litres

SAVARY ISLAND - Consumption Statistics and Estimates (Litres)

Legal D.L.	Legal Blk/Plan	Data No.	Water Source	No. Lots Develop.	Property Usage No. Pers.	Property Usage Days/Yr	Consumption Daily(litre/d)	Lots Using Main	Lots Using Perched	Consumption (Litres) Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1372	Blk. 1	1	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 2	2	Main Aquifer		1	180	500								
		3	Main Aquifer		2	90	568								
		4	Perched Aquifer		2	30	205								
		Estimated Averages:		12	3	100	364	4	8	1196	4364	121	145472	290944	436416
	Blk. 3	5	Catchment		3	130	[189]								
		6	Perched Aquifer		2	35	45								
		Estimated Averages:		9	3	50	136	0	3	56	273	10	0	20457	20457
	Blk. 4	7	Catchment		2	[30]	[71]								
		8	Catchment		2	[50]	[47]								
		9	Catchment		2	[60]	[47]								
		10	Catchment		1	[365]	[47]								
		11	Catchment		4	[21]	[47]								
		Estimated Averages:		7	2	0	0	0	0	0	0	0	0	0	0
	Blk. 5	-	-		-	-	-								
		Estimated Averages:		5	2	120	227	1	0	75	227	23	27276	0	27276
	Blk. 6	-	-		-	-	-								
		Estimated Averages:		8	3	90	136	1	2	101	409	17	12274	24548	36823
	Blk. 7	12	Main Aquifer		5	100	909								
		13	Perched Aquifer		4	100	682								
		14	Perched Aquifer		7	60	1364								
		15	Perched Aquifer		2	250	205								
		16	Perched Aquifer		3	100	227								
		Estimated Averages:		22	4	100	546	3	18	3139	11456	130	163656	981936	1145592
	Blk. 8	17	Perched Aquifer		1	60	227								
		18	Perched Aquifer		4	60	91								
		19	Perched Aquifer		4	80	364								
		20	Perched Aquifer		2	60	455								
		21	Perched Aquifer		4	60	455								
		22	Perched Aquifer		5	75	455								
		23	Perched Aquifer		4	60	682								
		24	Perched Aquifer		3	70	455								
		25	Perched Aquifer		2	90	455								
		Estimated Averages:		19	4	70	409	2	17	1491	7774	102	57280	486877	544156
	Blk. 9	-	-		-	-	-								
		Estimated Averages:		4	3	70	227	0	2	87	455	38	0	31822	31822
	Blk. 10	-	-		-	-	-								
		Estimated Averages:		4	3	70	227	1	0	44	227	19	15911	0	15911
	Blk. 11	26	Main Aquifer		3	75	546								
		27	Main Aquifer		4	120	682								
		Estimated Averages:		6	3	100	455	5	1	747	2728	152	227300	45460	272760

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Litres)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(litre/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1373	Blk. 1	28	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 2	29	Main Aquifer		3	45	455								
		30	Main Aquifer		4	60	909								
		31	Main Aquifer		6	60	909								
		32	Main Aquifer		6	75	1137								
		Estimated Averages:		8	4	70	909	8	0	1395	7274	227	509152	0	509152
	Blk. 3	33	Main Aquifer		5	80	909								
		34	Main Aquifer		5	70	1137								
		35	Main Aquifer		10	60	2728								
		36	Perched Aquifer		2	90	909								
		Estimated Averages:		6	5	75	1137	5	1	1401	6819	227	426188	85238	511425
	Pl.11433	37	Main Aquifer		6	50	1364								
		38	Perched Aquifer		6	50	68								
		Estimated Averages:		5	4	50	682	3	2	467	2273	114	102285	68190	170475
SSID	Lots 1-48	39	Main Aquifer		-	-	-								
		Estimated Averages:		14	-	-	-	14	0	1437	4639	93	524410	0	524410
	Lots 49-68 118-129	40	Main Aquifer		-	-	-								
		Estimated Averages:		7	-	-	-	3	0	267	895	18	97630	0	97630
	Lots 69-117	41	Main Aquifer		-	-	-								
		Estimated Averages:		24	-	-	-	22	0	1769	6148	123	645670	0	645670
	Lots 130-147 214-223	42	Main Aquifer		-	-	-								
		Estimated Averages:		16	-	-	-	16	0	2253	4891	98	822240	0	822240
	Lots 148-183	43	Main Aquifer		-	-	-								
		Estimated Averages:		18	-	-	-	17	0	3815	7938	159	1392640	0	1392640
	Lots 184-213	44	Main Aquifer		-	-	-								
		Estimated Averages:		14	-	-	-	13	0	1003	2475	49	366200	0	366200
	All Lots	-	Main Aquifer												
		Total Averages:		93	3	139	305	85	0	9859	25889	93	3598636	0	3598636
1375	-	45	Main Aquifer		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
1376	Blk. 22	46	Catchment		2	[365]	[71]								
		47	Main Aquifer		2	365	227								
		48	Perched Aquifer		2	365	182								
		Estimated Averages:		4	2	365	205	1	1	409	409	51	74668	74668	149336
	Blk. 23	49	Catchment		2	[365]	[24]								
		50	Main Aquifer		3	60	682								
		51	Perched Aquifer		2	7	45								
		Estimated Averages:		6	2	100	273	2	2	299	1091	91	54552	54552	109104

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Litres)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(litre/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1376	Blk. 24	52	Catchment		0	[0]	[0]								
		Estimated Averages:		5	2	130	227	2	0	162	455	45	59098	0	59098
	Blk. 25	53	Catchment		1	[320]	[237]								
		54	Indian Springs		4	[30]	[237]								
		55	Indian Springs		4	[30]	[38]								
		56	Indian Springs		4	[60]	[33]								
		57	Main Aquifer		1	365	45								
		58	Main Aquifer		2	240	568								
		Estimated Averages:		9	2	160	364	3	0	478	1091	61	174566	0	174566
	Blk. 26	59	Indian Spring		4	[365]	[71]								
		60	Main Aquifer		2	365	55								
		Estimated Averages:		5	2	300	91	2	2	299	364	36	54552	54552	109104
	Blk. 27	61	Main Aquifer		2	365	60								
		62	Catchment		3	[365]	[94]								
		63	Catchment		2	[60]	[142]								
		Estimated Averages:		5	2	120	50	1	0	16	50	5	6000	0	6000
	Blk. 28	64	Indian Springs		4	[365]	[24]								
		65	Catchment		2	[210]	[710]								
		Estimated Averages:		8	3	50	182	2	0	50	242	10	18184	0	18184
	Blk. 29	66	Indian Springs		7	[40]	[47]								
		67	Main Aquifer		2	70	136								
		68	Main Aquifer		2	240	159								
		Estimated Averages:		4	2	150	159	2	0	131	318	40	47733	0	47733
	Blk. 30	69	Main Aquifer		0	[0]	[0]								
		70	Indian Springs		2	[60]	[24]								
		71	Main Aquifer		2	365	455								
		Estimated Averages:		6	3	200	364	2		399	727	40	145472	0	145472
	Blk. 31	72	Main Aquifer		4	30	23								
		Estimated Averages:		4	2	150	23	2		19	45	6	6819	0	6819
	Blk. 32	73	Main Aquifer		5	55	227								
		74	Main Aquifer		2	365	455								
		Estimated Averages:		4	3	100	295	3		243	886	74	88647	0	88647
	Blk. 33	75	Main Aquifer		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 34	76	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 35	77	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 36	78	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Litres)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(litre/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1377	Blk. 1-2	-	-		-	-	-								
		Estimated Averages:		5	3	120	364	0	5	598	1818	121	0	218208	218208
	Blk. 2A	-	-		0	0	0								
		Estimated Averages:		2	3	100	364	0	2	199	727	121	0	72736	72736
	Blk. 3A	78	Perched Aquifer		3	45	227								
		79	Perched Aquifer		4	50	455								
		80	Perched Aquifer		3	80	909								
		Estimated Averages:		7	3	60	546	0	7	628	3182	152	0	229118	229118
	Blk. 4	81	Perched Aquifer		6	30	455								
		Estimated Averages:		6	3	100	364	0	6	598	2182	121	0	218208	218208
	Blk. 5	82	Perched Aquifer		6	60	682								
		Estimated Averages:		4	3	100	455	0	4	498	1818	152	0	181840	181840
	Blk. 6	83	Perched Aquifer		3	60	45								
		84	Perched Aquifer		2	70	45								
		85	Perched Aquifer		3	40	114								
		86	Perched Aquifer		4	60	227								
		87	Perched Aquifer		2	60	227								
		88	Perched Aquifer		2	60	273								
		Estimated Averages:		22	3	60	159	0	22	575	2917	44	0	210025	210025
	Blk. 7 Parcel B	89	Main Aquifer		2	365	455								
		90	Perched Aquifer		4	60	364								
		Estimated Averages:		5	2	120	273	1	4	448	1364	136	32731	130925	163656
	Blk. 8A	-	-		-	-	-								
		Estimated Averages:		7	3	60	159	1	6	183	928	44	9547	57280	66826
	Blk. 9A	91	Main Aquifer		4	70	318								
		92	Perched Aquifer		2	365	182								
		93	Perched Aquifer		7	90	682								
		94	Perched Aquifer		4	120	682								
		95	Perched Aquifer		4	65	114								
		96	Perched Aquifer		4	70	227								
		97	Perched Aquifer		2	120	227								
		98	Perched Aquifer		2	50	318								
		99	Perched Aquifer		2	135	364								
		100	Perched Aquifer		4	60	455								
		101	Perched Aquifer		4	60	568								
		Estimated Averages:		23	3	100	364	0	23	2292	8365	121	0	836464	836464
	B.10A,3	102	Perched Aquifer		4	20	227								
		103	Perched Aquifer		5	60	682								
		104	Perched Aquifer		2	270	455								
		Estimated Averages:		11	3	110	455	0	11	1507	5001	152	0	550066	550066
	Blk. 11	-	-		-	-	-								
		Estimated Averages:		5	3	100	455	0	5	623	2273	152	0	227300	227300

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Litres)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(litre/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1377	Blk. 12	-	-		-	-	-								
		Estimated Averages:		4	3	60	182	0	4	120	606	51	0	43642	43642
	Blk. 8	105	Main Aquifer		2	30	23								
		106	Main Aquifer		2	120	45								
		107	Main Aquifer		2	40	9								
		108	Main Aquifer		4	60	455								
		109	Main Aquifer		2	60	45								
		110	Perched Aquifer		[N/A]	[N/A]	[0]								
		111	Perched Aquifer		4	30	45								
		112	Perched Aquifer		4	21	364								
		Estimated Averages:		14	3	50	136	6	6	224	1091	26	40914	40914	81828
	Blk. 9	113	Main Aquifer		2	60	136								
		114	Main Aquifer		3	45	136								
		115	Main Aquifer		5	80	318								
		116	Main Aquifer		2	365	455								
		117	Main Aquifer		4	70	364								
		Estimated Averages:		10	3	100	227	7	1	498	1818	61	159110	22730	181840
	Blk. 10	118	Indian Springs		5	[20]	[24]								
		119	Main Aquifer		2	365	45								
		120	Main Aquifer		2	365	636								
		121	Main Aquifer		2	365	273								
		Estimated Averages:		8	2	300	318	3	1	1046	1273	80	286398	95466	381864
	Blk. 13	122	Main Aquifer		0	0	0								
		Estimated Averages:		1	0	0	0	0	0	0	0	0	0	0	0
	Blk. 14	123	Catchment		1	[240]	[71]								
		124	Main Aquifer		4	60	23								
		Estimated Averages:		3	2	40	45	1	1	10	45	8	1818	1818	3637
	Blk. 15	125	Meadow Spring		3	[45]	[24]								
		126	Main Aquifer		2	60	182								
		127	Main Aquifer		2	20	45								
		128	Main Aquifer		4	25	182								
		129	Main Aquifer		4	50	227								
		130	Main Aquifer		5	45	455								
		131	Perched Aquifer		2	60	114								
		132	Perched Aquifer		2	180	682								
		Estimated Averages:		11	3	55	227	7	3	343	1705	52	87511	37505	125015

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Litres)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(litre/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1377	Blk. 16	133	Catchment		5	[50]	[71]								
		134	Neilson Spring		4	[30]	[24]								
		135	Main Aquifer		5	50	45								
		136	Main Aquifer		2	120	91								
		137	Main Aquifer		2	60	91								
		138	Main Aquifer		2	160	182								
		139	Main Aquifer		4	50	318								
		140	Main Aquifer		2	40	455								
		141	Main Aquifer		4	70	546								
		Estimated Averages:		20	3	70	227	14	0	610	3182	53	222754	0	222754
	Blk. 17	142	Indian Springs		2	[60]	[19]								
		143	Main Aquifer		2	30	36								
		144	Main Aquifer		1	60	23								
		Estimated Averages:		6	3	45	45	1	1	11	53	3	2046	2046	4091
	Blk. 18	145	Indian Springs		3	[7]	[47]								
		146	Perched Aquifer		5	75	182								
		147	Perched Aquifer		4	70	45								
		Estimated Averages:		7	3	60	114	1	3	75	379	18	6819	20457	27276
	Blk. 19	-	Springs		2	[200]	[24]								
		Estimated Averages:		6	2	150	91	2	1	112	273	23	27276	13638	40914
	Blk. 20	148	Perched Aquifer		3	365	91								
		149	Main Aquifer		1	365	91								
		Estimated Averages:		4	1	200	91	2	1	149	273	68	36368	18184	54552
	Blk. 21	150	Perched Aquifer		4	30	68								
		151	Perched Aquifer		1	365	68								
		Estimated Averages:		3	2	140	68	0	3	78	205	34	0	28640	28640

	Whole Island		DL 1372	DL 1373	DL 1375	DL 1376	DL 1377
TOTAL AVERAGE ANNUAL GROUNDWATER CONSUMPTION PER DAY (Litres/Year/365 Days)	34,656		6,935	13,808	0	2,488	11,426
TOTAL AVERAGE PEAK SEASON GROUNDWATER CONSUMPTION PER DAY (Litres/July-August/60 Days)	118,371		27,912	43,351	0	5,629	41,478
AVERAGE PEAK SEASON PER CAPITA GROUNDWATER CONSUMPTION PER DAY (Litres/July-August/60 Days/ Per Person)	62		68	123	0	45	75
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE MAIN AQUIFER PER YEAR (Litres/Year)	7,173,778		649,781	4,886,415	0	724,291	913,291
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE PERCHED AQUIFER PER YEAR (Litres/Year)	5,476,453		1,882,044	153,428	0	183,772	3,257,209
TOTAL AVERAGE GROUNDWATER CONSUMPTION PER YEAR (Litres/Year)	12,650,231		2,531,825	5,039,842	0	908,064	4,170,500

Appendix X

Groundwater Consumption Statistics and Estimates - Imperial Gallons

SAVARY ISLAND - Consumption Statistics and Estimates (Imperial Gallons)

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Imperial Gallons)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(Imp.g/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1372	Blk. 1	1	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 2	2	Main Aquifer		1	180	110								
		3	Main Aquifer		2	90	125								
		4	Perched Aquifer		2	30	45								
		Estimated Averages:		12	3	100	80	4	8	263	960	27	32000	64000	96000
	Blk. 3	5	Catchment		3	130	[40]								
		6	Perched Aquifer		2	35	10								
		Estimated Averages:		9	3	50	30	0	3	12	60	2	0	4500	4500
	Blk. 4	7	Catchment		2	[30]	[15]								
		8	Catchment		2	[50]	[10]								
		9	Catchment		2	[60]	[10]								
		10	Catchment		1	[365]	[10]								
		11	Catchment		4	[21]	[10]								
		Estimated Averages:		7	2	0	0	0	0	0	0	0	0	0	0
	Blk. 5	-	-		-	-	-								
		Estimated Averages:		5	2	120	50	1	0	16	50	5	6000	0	6000
	Blk. 6	-	-		-	-	-								
		Estimated Averages:		8	3	90	30	1	2	22	90	4	2700	5400	8100
	Blk. 7	12	Main Aquifer		5	100	200								
		13	Perched Aquifer		4	100	150								
		14	Perched Aquifer		7	60	300								
		15	Perched Aquifer		2	250	45								
		16	Perched Aquifer		3	100	50								
		Estimated Averages:		22	4	100	120	3	18	690	2520	29	36000	216000	252000
	Blk. 8	17	Perched Aquifer		1	60	50								
		18	Perched Aquifer		4	60	20								
		19	Perched Aquifer		4	80	80								
		20	Perched Aquifer		2	60	100								
		21	Perched Aquifer		4	60	100								
		22	Perched Aquifer		5	75	100								
		23	Perched Aquifer		4	60	150								
		24	Perched Aquifer		3	70	100								
		25	Perched Aquifer		2	90	100								
		Estimated Averages:		19	4	70	90	2	17	328	1710	23	12600	107100	119700
	Blk. 9	-	-		-	-	-								
		Estimated Averages:		4	3	70	50	0	2	19	100	8	0	7000	7000
	Blk. 10	-	-		-	-	-								
		Estimated Averages:		4	3	70	50	1	0	10	50	4	3500	0	3500
	Blk. 11	26	Main Aquifer		3	75	120								
		27	Main Aquifer		4	120	150								
		Estimated Averages:		6	3	100	100	5	1	164	600	33	50000	10000	60000

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Imperial Gallons)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(Imp.g/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1373	Blk. 1	28	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 2	29	Main Aquifer		3	45	100								
		30	Main Aquifer		4	60	200								
		31	Main Aquifer		6	60	200								
		32	Main Aquifer		6	75	250								
		Estimated Averages:		8	4	70	200	8	0	307	1600	50	112000	0	112000
	Blk. 3	33	Main Aquifer		5	80	200								
		34	Main Aquifer		5	70	250								
		35	Main Aquifer		10	60	600								
		36	Perched Aquifer		2	90	200								
		Estimated Averages:		6	5	75	250	5	1	308	1500	50	93750	18750	112500
	Pt.11433	37	Main Aquifer		6	50	300								
		38	Perched Aquifer		6	50	15								
		Estimated Averages:		5	4	50	150	3	2	103	500	25	22500	15000	37500
SSID	Lots 1-48	39	Main Aquifer		-	-	-								
		Estimated Averages:		14	-	-	-	14	0	316	1020	20	115356	0	115356
	Lots 49-68 118-129	40	Main Aquifer		-	-	-								
		Estimated Averages:		7	-	-	-	3	0	59	197	4	21476	0	21476
	Lots 69-117	41	Main Aquifer		-	-	-								
		Estimated Averages:		24	-	-	-	22	0	389	1352	27	142030	0	142030
	Lots 130-147 214-223	42	Main Aquifer		-	-	-								
		Estimated Averages:		16	-	-	-	16	0	496	1076	22	180871	0	180871
	Lots 148-183	43	Main Aquifer		-	-	-								
		Estimated Averages:		18	-	-	-	17	0	839	1746	35	285002	0	285002
	Lots 184-213	44	Main Aquifer		-	-	-								
		Estimated Averages:		14	-	-	-	13	0	221	544	11	80554	0	80554
	All Lots	-	Main Aquifer												
		Total Averages:		93	3	145	67	85	0	2261	5692	20	825294	0	825294
1375	-	45	Main Aquifer		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
1376	Blk. 22	46	Catchment		2	[365]	[15]								
		47	Main Aquifer		2	365	50								
		48	Perched Aquifer		2	365	40								
		Estimated Averages:		4	2	365	45	1	1	90	90	11	16425	16425	32850
	Blk. 23	49	Catchment		2	[365]	[5]								
		50	Main Aquifer		3	60	150								
		51	Perched Aquifer		2	7	10								
		Estimated Averages:		6	2	100	60	2	2	66	240	20	12000	12000	24000

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Imperial Gallons)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(Imp.g/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1376	Blk. 24	52	Catchment		0	[0]	[0]								
		Estimated Averages:		5	2	130	50	2	0	36	100	10	13000	0	13000
	Blk. 25	53	Catchment		1	[320]	[50]								
		54	Indian Springs		4	[30]	[50]								
		55	Indian Springs		4	[30]	[8]								
		56	Indian Springs		4	[60]	[7]								
		57	Main Aquifer		1	365	10								
		58	Main Aquifer		2	240	125								
		Estimated Averages:		9	2	160	80	3	0	105	240	13	38400	0	38400
	Blk. 26	59	Indian Spring		4	[365]	[15]								
		60	Main Aquifer		2	365	12								
		Estimated Averages:		5	2	300	20	2	2	66	80	8	12000	12000	24000
	Blk. 27	61	Main Aquifer		2	365	10								
		62	Catchment		3	[365]	[20]								
		63	Catchment		2	[60]	[30]								
		Estimated Averages:		5	2	120	20	1	0	7	20	2	2400	0	2400
	Blk. 28	64	Indian Springs		4	[365]	[5]								
		65	Catchment		2	[210]	[150]								
		Estimated Averages:		8	3	50	40	2	0	11	53	2	4000	0	4000
	Blk. 29	66	Indian Springs		7	[40]	[10]								
		67	Main Aquifer		2	70	30								
		68	Main Aquifer		2	240	35								
		Estimated Averages:		4	2	150	35	2	0	29	70	9	10500	0	10500
	Blk. 30	69	Main Aquifer		0	[0]	[0]								
		70	Indian Springs		2	[60]	[5]								
		71	Main Aquifer		2	365	100								
		Estimated Averages:		6	3	200	80	2		88	160	9	32000	0	32000
	Blk. 31	72	Main Aquifer		4	30	5								
		Estimated Averages:		4	2	150	5	2		4	10	1	1500	0	1500
	Blk. 32	73	Main Aquifer		5	55	50								
		74	Main Aquifer		2	365	100								
		Estimated Averages:		4	3	100	65	3		53	195	16	19500	0	19500
	Blk. 33	75	Main Aquifer		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 34	76	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 35	77	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0
	Blk. 36	78	-		0	0	0								
		Estimated Averages:		0	0	0	0	0	0	0	0	0	0	0	0

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Imperial Gallons)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(Imp.g/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1377	Blk. 1-2	-	-		-	-	-								
		Estimated Averages:		5	3	120	80	0	5	132	400	27	0	48000	48000
	Blk. 2A	-	-		0	0	0								
		Estimated Averages:		2	3	100	80	0	2	44	160	27	0	16000	16000
	Blk. 3A	78	Perched Aquifer		3	45	50								
		79	Perched Aquifer		4	50	100								
		80	Perched Aquifer		3	80	200								
		Estimated Averages:		7	3	60	120	0	7	138	700	33	0	50400	50400
	Blk. 4	81	Perched Aquifer		6	30	100								
		Estimated Averages:		6	3	100	80	0	6	132	480	27	0	48000	48000
	Blk. 5	82	Perched Aquifer		6	60	150								
		Estimated Averages:		4	3	100	100	0	4	110	400	33	0	40000	40000
	Blk. 6	83	Perched Aquifer		3	60	10								
		84	Perched Aquifer		2	70	10								
		85	Perched Aquifer		3	40	25								
		86	Perched Aquifer		4	60	50								
		87	Perched Aquifer		2	60	50								
		88	Perched Aquifer		2	60	60								
		Estimated Averages:		22	3	60	35	0	22	127	642	10	0	46200	46200
	Blk. 7 Parcel B	89	Main Aquifer		2	365	100								
		90	Perched Aquifer		4	60	80								
		Estimated Averages:		5	2	120	60	1	4	99	300	30	7200	28800	36000
	Blk. 8A	-	-		-	-	-								
		Estimated Averages:		7	3	60	35	1	6	40	204	10	2100	12600	14700
	Blk. 9A	91	Main Aquifer		4	70	70								
		92	Perched Aquifer		2	365	40								
		93	Perched Aquifer		7	90	150								
		94	Perched Aquifer		4	120	150								
		95	Perched Aquifer		4	65	25								
		96	Perched Aquifer		4	70	50								
		97	Perched Aquifer		2	120	50								
		98	Perched Aquifer		2	50	70								
		99	Perched Aquifer		2	135	80								
		100	Perched Aquifer		4	60	100								
		101	Perched Aquifer		4	60	125								
		Estimated Averages:		23	3	100	80	0	23	504	1840	27	0	184000	184000
	B.10A,3	102	Perched Aquifer		4	20	50								
		103	Perched Aquifer		5	60	150								
		104	Perched Aquifer		2	270	100								
		Estimated Averages:		11	3	110	100	0	11	332	1100	33	0	121000	121000
	Blk. 11	-	-		-	-	-								
		Estimated Averages:		5	3	100	100	0	5	137	500	33	0	50000	50000

Legal		Data	Water	No. Lots	Property Usage		Consumption	Lots Using	Lots Using	Consumption (Imperial Gallons)					
D.L.	Blk/Plan	No.	Source	Develop.	No. Pers.	Days/Yr	Daily(Imp.g/d)	Main	Perched	Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
1377	Blk. 12	-	-		-	-	-								
		Estimated Averages:		4	3	60	40	0	4	26	133	11	0	9600	9600
	Blk. 8	105	Main Aquifer		2	30	5								
		106	Main Aquifer		2	120	10								
		107	Main Aquifer		2	40	2								
		108	Main Aquifer		4	60	100								
		109	Main Aquifer		2	60	10								
		110	Perched Aquifer		[N/A]	[N/A]	[0]								
		111	Perched Aquifer		4	30	10								
		112	Perched Aquifer		4	21	80								
		Estimated Averages:		14	3	50	30	6	6	49	240	6	9000	9000	18000
	Blk. 9	113	Main Aquifer		2	60	30								
		114	Main Aquifer		3	45	30								
		115	Main Aquifer		5	80	70								
		116	Main Aquifer		2	365	100								
		117	Main Aquifer		4	70	80								
		Estimated Averages:		10	3	100	50	7	1	110	400	13	35000	5000	40000
	Blk. 10	118	Indian Springs		5	[20]	[5]								
		119	Main Aquifer		2	365	10								
		120	Main Aquifer		2	365	140								
		121	Main Aquifer		2	365	60								
		Estimated Averages:		8	2	300	70	3	1	230	280	18	63000	21000	84000
	Blk. 13	122	Main Aquifer		0	0	0								
		Estimated Averages:		1	0	0	0	0	0	0	0	0	0	0	0
	Blk. 14	123	Catchment		1	[240]	[15]								
		124	Main Aquifer		4	60	5								
		Estimated Averages:		3	2	40	10	1	1	2	10	2	400	400	800
	Blk. 15	125	Meadow Spring		3	[45]	[5]								
		126	Main Aquifer		2	60	40								
		127	Main Aquifer		2	20	10								
		128	Main Aquifer		4	25	40								
		129	Main Aquifer		4	50	50								
		130	Main Aquifer		5	45	100								
		131	Perched Aquifer		2	60	25								
		132	Perched Aquifer		2	180	150								
		Estimated Averages:		11	3	55	50	7	3	75	375	11	19250	8250	27500

Legal D.L.	Legal Blk/Plan	Data No.	Water Source	No. Lots Develop.	Property Usage No. Pers.	Property Usage Days/Yr	Consumption Daily(Imp.g/d)	Lots Using Main	Lots Using Perched	Consumption (Imperial Gallons) Daily/Yr.	Daily/Peak	Peak Per Cap.	Main/Yr.	Perched/Yr.	Total/Yr.
	Blk. 16	133	Catchment		5	[50]	[15]								
		134	Neilson Spring		4	[30]	[5]								
		135	Main Aquifer		5	50	10								
		136	Main Aquifer		2	120	20								
		137	Main Aquifer		2	60	20								
		138	Main Aquifer		2	160	40								
		139	Main Aquifer		4	50	70								
		140	Main Aquifer		2	40	100								
		141	Main Aquifer		4	70	120								
		Estimated Averages:		20	3	70	50	14	0	134	700	12	49000	0	49000
	Blk. 17	142	Indian Springs		2	[60]	[4]								
		143	Main Aquifer		2	30	8								
		144	Main Aquifer		1	60	5								
		Estimated Averages:		6	3	45	10	1	1	2	12	1	450	450	900
	Blk. 18	145	Indian Springs		3	[7]	[10]								
		146	Perched Aquifer		5	75	40								
		147	Perched Aquifer		4	70	10								
		Estimated Averages:		7	3	60	25	1	3	16	83	4	1500	4500	6000
	Blk. 19	-	Springs		2	[200]	[5]								
		Estimated Averages:		6	2	150	20	2	1	25	60	5	6000	3000	9000
	Blk. 20	148	Perched Aquifer		3	365	20								
		149	Main Aquifer		1	365	20								
		Estimated Averages:		4	1	200	20	2	1	33	60	15	8000	4000	12000
	Blk. 21	150	Perched Aquifer		4	30	15								
		151	Perched Aquifer		1	365	15								
		Estimated Averages:		3	2	140	15	0	3	17	45	8	0	6300	6300

	Whole Island		DL 1372	DL 1373	DL 1375	DL 1376	DL 1377
TOTAL AVERAGE ANNUAL GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./Year/365 Days)	7,624		1,525	3,037	0	547	2,513
TOTAL AVERAGE PEAK SEASON GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./July-August/60 Days)	26,039		6,140	9,536	0	1,238	9,124
AVERAGE PEAK SEASON PER CAPITA GROUNDWATER CONSUMPTION PER DAY (Imp. Gal./July-August/60 Days/ Per Person)	14		15	27	0	10	16
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE MAIN AQUIFER PER YEAR (Imp. Gal./Year)	1,556,700		142,935	1,053,540	0	159,325	200,900
TOTAL AVERAGE GROUNDWATER CONSUMPTION FROM THE PERCHED AQUIFER PER YEAR (Imp. Gal./Year)	1,204,675		414,000	33,750	0	40,425	716,500
TOTAL AVERAGE GROUNDWATER CONSUMPTION PER YEAR (Imp. Gal./Year)	2,761,375		556,935	1,087,290	0	199,750	917,400