

GROUNDWATER INVESTIGATION - CAMPBELL RIVER

The purpose of this investigation was to assess the feasibility of installation of an infiltration well along the Quinsam River southwest of Campbell River as one of 3 alternate sources of water supply for Campbell River. In the course of the work the writer found that an infiltration well at the proposed location, is not feasible but that chances are reasonably good that sufficient groundwater (present requirements 2 M.I.G.D. increasing to 5 M.I.G.D. in 1985) could be obtained from one or more wells in this area.

The writer spent September 6 and 7, 1961 in the field at Campbell River mapping along the Quinsam River and examining other exposures in the area. The area of interest is on the northern boundary of G.S.C. map 49-1959, Oyster River, Surficial Geology done by John G. Fyles in 1956-57.

Geology

The section of surficial deposits in this area according to Fyles is

Salish Sediments, shore, deltaic, and fluvial deposits including peak and valley alluvium and colluvium;

Capilano Sediments, terraced fluvial deposits and marine and glacio-marine deposits;

Vashon drift-outwash, eskers, terrace, and pitted terrace deposits, etc. Ground moraines.

Quadra sediments-Sand, minor gravel, silt, peat, etc..

The writer would add to this-pre-Quadra till clay etc.

Fyles' mapping shows the area in question to be underlain (from bottom) by Vashon drift overlain by various marine deposits of Capilano age with Salish river deposits over Vashon till in the Quinsam River valley. In one place at the extreme north end of the map he shows pre-Vashon deposits under the Salish river deposits. The relation of these deposits to the Quadra is unknown.

The section at the gravel pit on the Quinsam River at A (Reference 1000' to 1 inch topo map) is as follows:

Thin reddish beach (?) gravel (Geodetic elevation approximately 320)
3' stony clay, brown
6' compact sandy silt and silt, partly contorted, compact
about 1 1/2' compact brown till
about 100' fine sand with minor gravel and few silt interbeds
(down to river elevation 220 approximately)
compact blue grey stony till.

This gravel pit is not shown on Fyles' map so it may be that it was not in use at the time of his mapping. According to Fyles' section the till along the river is Vashon and all the overlying material is Capilano and Salish (?) deposits. The writer believes that the upper small remnant of till and associated stony clay is Vashon, the thick sand is Quadra, and the till at river level is pre-Vashon (Seymour?). Mapping along the river both upstream and down indicates that the section described above (except for the upper till and stony clay) has considerable lateral extent with certain lateral changes. The lower till to the north and south is in some places underlain by well bedded silty clay, over 50' thick in one place, and in other places the till is missing and the sand section is directly over the clay. In one place the upper part of the till contains numerous shell fragments and in several places contains contorted inclusions of bedded silt.

clays indicating that the till may be in part marine drift and that it over-rode and picked up underlying silty clay. The persistence of this section of sand over till and clay would seem to be more reasonable if one considers the sand to be Quadra interglacial sediments than the various type of marine veneer deposits (described as up to 30' thick) proposed on Fyles' map.

A number of very well formed drumlins occur at high elevations in areas of fine sand with a minor veneer of beach gravel. One of these in the map area is exposed in a road cut and the till core is overlain only by the thin beach gravel veneer. The writer believes that these drumlins of Vashon age are on top of the thick sand section tending to confirm the pre-Vashon age of the sand.

The age of this sand is of real importance in this case as the Quadra sand might be expected to have the lateral extent and thickness, necessary for a productive aquifer while the marine veneer deposits are often local in extent and may contain clay lenses detrimental in a good aquifer. Experience further south has shown that Quadra sand is often a very good aquifer. Several feet of permeable gravel was observed in most places along the sand-till contact.

An infiltration well to be drilled in the thick sand section exposed in the gravel pit along the river was proposed by Mr. Leach. In order to work, conditions must be such that the sand section exposed in the pit should extend some distance below the water level of the river. Only a few hundred feet downstream from the pit till is exposed along the river and the same condition exists on the next eastward bend upstream. The till is probably also present at the pit where loose sand has run down covering the bottom of the bank. For this reason an infiltration well is not feasible.

However, in most places where the till is seen along the river, particularly on the west side, water is found to be flowing out of the sand along the top of the till. This is probably normal discharge from the sand aquifer the larger flow on the west side being a result of the regional eastward slope of the topography. The larger flow on the west side may be partly a result of leakage through the sand from McIvor Lake which is an arm of John Hart Lake. This leakage is described in B.C. Power Commission Report No. GP 294 of June 1959 by G.C. Morgan.

On the writer's map the elevation of the contact between the Quadra (?) sand and the underlying impervious till and clay is indicated by orange numerals. This shows that this surface is quite irregular as might be expected.

Ground Water

Any attempt to evaluate the Quadra (?) sand east of the Quinsam River as an aquifer is highly speculative. This member is probably extensive east of the river but as far as the writer knows it is not well exposed east of the river unless the sand under the gravel in the pit near the hospital is part of this sand. Recharge of this sand is by rainfall and is probably impeded only by the stony clay associated with the Vashon till. This clay seems to occur locally in topographic lows and these are usually occupied by swamps. Even some of the water in these swamps may overflow laterally over the edge of the clay into the sand.

In any attempt to find a good ground water supply the Quinsam River valley should be avoided as the water is moving locally in that direction and the thickness of saturation close to the river must be less than it is some distance back from the river. A low place in the surface of the impervious material below the sand would give a greater saturated thickness than at a high but the data are insufficient to speculate on the location of such a low. For the above reasons it seems best to plan on drilling at least 5 holes and to start in a location most favourable to the location of the proposed reservoir and pipeline. Such a location is along the foot of the pronounced terrace at B. Here, if one assumes that this terrace is the result of marine erosion, part of the sand and overlying till and clay may have been removed and drilling depth to the bottom of the sand may be less

