

MEMORANDUM

TO Dr. J. C. Foweraker, Head

Groundwater Section

Hydrology Division

FROM

A. P. Kohut

Senior Geological Engineer
Groundwater Section

July 12,

1977

SUBJECT Water and Drainage Problems, Webster Property,
Farhill Road, Metchosin, B.C.

OUR FILE...0239013

YOUR FILE.....

Further to the request of the Director of the Geotechnical and Materials Branch, Ministry of Highways & Public Works, a review was conducted of the subsurface information obtained during recent test drilling on the above area. A geologic cross section was prepared from the available bore-hole data (Figure 1) utilizing horizontal control obtained from Saanich Highways District Plan 24-138 and elevation data provided by D. Lister. Water level measurements were obtained on May 9, 1977 to analyze the hydraulic head distribution from installed piezometers. Each piezometer was tested for response (see Mr. Chwojka's memorandum of May 10, 1977 attached).

Although local variations are evident in the stratigraphy encountered in the test holes, the general succession of unconsolidated materials is comprised of 20 to 45 feet of sand and gravel overlying 15 to 40 feet of dense gray-brown fine to medium-grained sand, underlain by glacial till and/or stiff blue-gray silty clay. A silty clay and sandy silt unit varying from 19 to 38 feet in thickness is present in test holes 77-2, 77-3 and 77-4, but does not occur upslope in test hole 1. Test hole 77-4, moreover, intersected 24 feet of very dense gravel between the overlying silty clay and underlying glacial till. The silty clay unit and underlying gravel unit in test hole 77-4 was not noted previously in any of the exposures along the sea-facing cliff (Kohut, 1976). A very hard stony clay observed in the cliff exposures was noted immediately below the surficial sands and gravels. It is not known whether this material is equivalent to the silty clay encountered in the test holes or is in fact the underlying till material. If it represents the latter, this suggests the till surface may be highly irregular.

Static water-level data for May 9, 1977 plotted in Figure 1 indicates the water-table surface slopes under a natural gradient of 13 feet in 700 feet (1.9×10^{-2}) between test holes 77-1 and 77-2. Variable depth piezometers in test holes 77-3 and 77-4, moreover, show a decrease in head with depth. Of significance is the hydraulic head, within the confined sand and gravel unit (77-4), which is 12 feet lower than the head in the overlying water-table aquifer. Piezometer response tests show that all piezometers are functioning.

Results of the test drilling and water-level measurements indicate a water-table aquifer comprised of sand and gravel underlies the region in which the gravel pits are situated, and also the area downslope where the Webster

Dr. C. Foweraker, Head

July 12, 1977

residence is situated. The natural gradient of the water-table is generally towards the southeast. The magnitude of the gradient component between test holes 77-1 and 77-2 is in the order of 1.9×10^{-2} , suggesting natural groundwater flow moves from the upland towards the southeast. In summary, this additional subsurface data confirms the natural hydrogeologic situation identified during the previous surficial study.

The new data, however, does not prove conclusively that excavation of the gravel pits is the major cause of seasonally higher water-table conditions downslope in some areas. Continuous long-term water-level monitoring is required to assess the effect of the gravel pits on groundwater recharge. One possible solution for dewatering the water-table aquifer locally as discussed earlier in correspondence from the Ministry of Highways, would be to construct a vertical drain connecting the surficial aquifer and the underlying confined aquifer since there is a difference in the hydraulic head between these two aquifers. This could, however, cause decreased slope stability on the lower sea cliff opposite the lower aquifer or interfere with licensed springs nearby to the south. Additional drilling and pump testing (aquifer testing) would be required to assess the practicality of this solution.



A. P. Kohut
Senior Geological Engineer
Water Investigations Branch

APK/bmg

Reference:

Kohut, A. P. (1976), Memorandum dated April 29, 1976, File 0239013, Water Investigations Branch.

MEMORANDUM

TO: A. P. Kohut
 Senior Geological Engineer
 Groundwater Section
 Hydrology Division
 Water Investigations Branch

FROM: F. R. Chwojka
 Engineering Assistant
 Groundwater Section

May 10 1977

SUBJECT: Albert Head

OUR FILE 0239013
 YOUR FILE

As requested by you I collected the following data on May 9, 1977 for the five Highways Department test holes:

<u>Hole #</u>	<u>Distance to Water</u>	<u>Time to Return to Original Distance to Water</u>
TH 77-1	88.68'	5 min.
TH 77-2	28.48'	1 min.
TH 77-3 12' pipe	9.60'	½ min.
TH 77-3 25' pipe	11.44'	1½ min.
TH 77-4 25' pipe	7.93'	3 min.
TH 77-4 70' pipe	20.25'	15 min.
TH 77-5	94.54'	5 min.

Pictures of Webster's bank, the bluff to the east and the one to the west will be ready on May 11, 1977.

Fred Chwojka

Fred Chwojka
 Engineering Assistant

FRC/dmc



3619 Farhill Road, Metchosin, B.C.
East of A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
Further East on Upper end of Beach Trail
of A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
East of A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
East of A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
West of A. Webster's Property May 1977
Gravel Pit Development Complaint



3619 Farhill Road, Metchosin, B.C.
Further east on Beach trail from A.
Webster's Property May 1977
Gravel Pit Development Complaint



Webster Complaint - Fish pond on Webster property, licenced spring after being dug, January 1977



Webster Complaint - Dug spring, fish pond on Webster property, January 1977



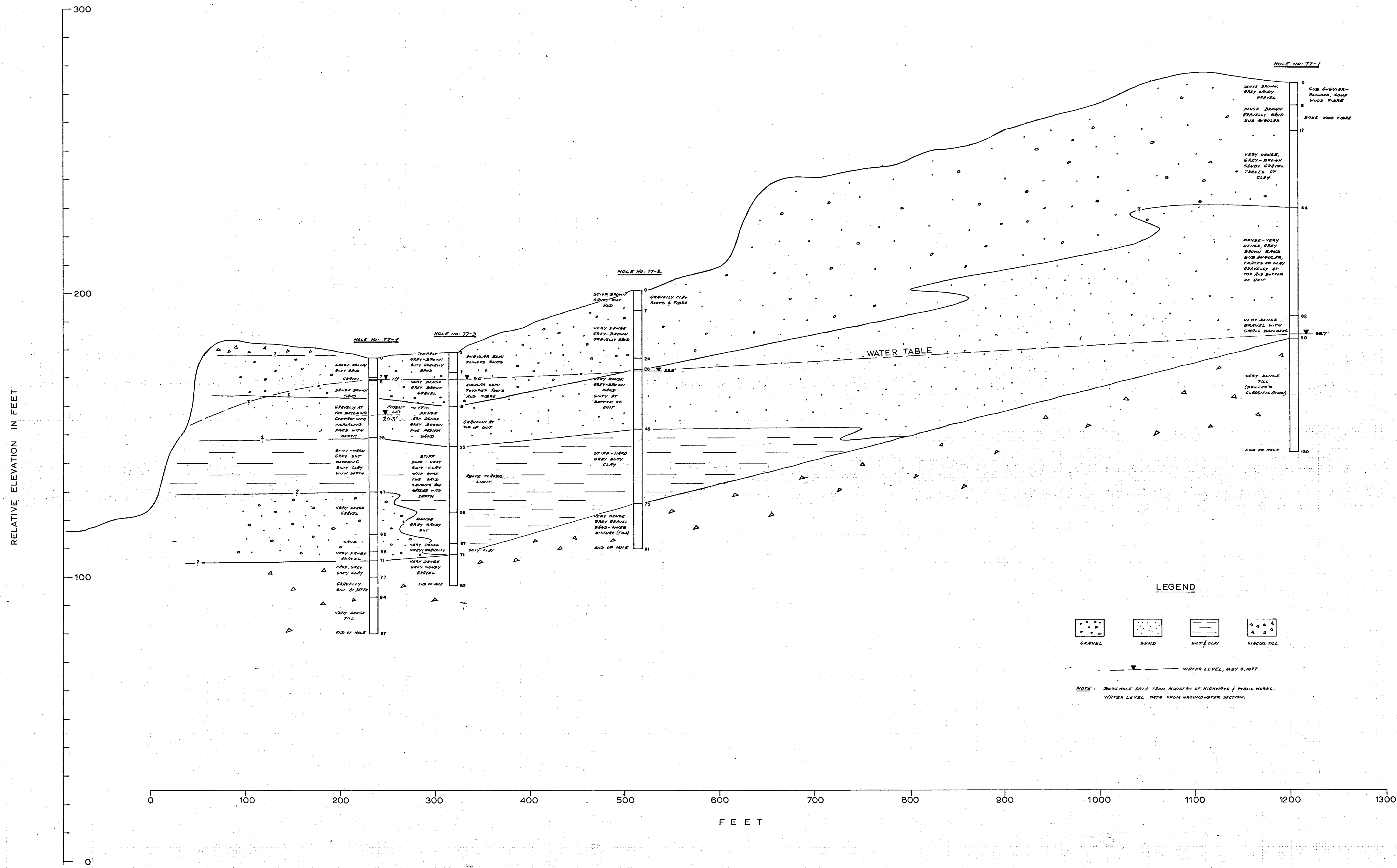
Webster Complaint - Asphalt driveway above low area on Webster Property, January 1977



Webster Complaint - Low area on Webster property that is boggy, January 1977



Webster Complaint - Spring on Burr property, January 1977



MINISTRY OF THE ENVIRONMENT
WATER INVESTIGATIONS BRANCH

TO ACCOMPANY REPORT ON
ALBERT HEAD
GEOLOGIC CROSS SECTION

SCALE VERT.	AS SHOWN	DATE
HOR.	AS SHOWN	JULY 1977
A.P. KOHUT		ENGINEER
FILE NO.	0239013	DWG NO. FIG. 1

F.C.H.