Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

MEMORANDUM

To: J.C. Foweraker, Head
Groundwater Section
Water Management Branch

Date: May 23, 1986

Our File: 92 F/1, 92 F/8

Re: Groundwater - D.L. 117, Nanoose District

As requested by Mr. B. Hollingshead, Regional Water Manager, a preliminary review has been completed of groundwater conditions in the above area. Numerous licenced springs occur north of the B.C. Hydro right-of-way on D.L. 117. Comments have been requested on the likelihood of the recharge zone for these springs being situated on D.L. 117 where logging is currently being proposed. This memorandum summarizes probable groundwater conditions and movement on D.L. 117 based on analysis of available well records and geologic reports on file and an examination of air photographs covering the area.

Geology

Available geologic mapping (Fyles, 1963) and Halstead (1963) indicates that the greater portion of D.L. 117 is underlain by a marine veneer complex generally less than 5 feet in thickness and comprised of varied stony gravel, gravel, sand, silt, clay and stony loam overlying bedrock. Below the 200 foot elevation these deposits overlie ground moraine deposits of till with lenses of gravel, sand and silt and deposits of sand and gravel of the Quadra Sediments (Fyles, 1963). Wells completed close to the Island Highway (Figure 1) indicate the unconsolidated deposits are up to 200 feet in thickness at this locality. Available terrain analysis mapping (Ministry of Environment) indicates the greater portion of D.L. 117 to be underlain by sandy colluvial and sandy morainal deposits. Below the 400 foot elevation, gravelly and sandy marine and morainal deposits are indicated. Examination of air photographs covering D.L. 117 indicates that the unconsolidated deposits occurring upslope of the B.C. Hydro right-of-way could be relatively thick (several tens of feet) except along the southeastern boundary of D.L. 117 where bedrock is exposed (Figure 1).

A north-south geologic cross-section depicting the probable stratigraphic relationships within the unconsolidated deposits is shown in Figure 2. Well records indicate the unconsolidated deposits comprise interbedded sand, silt, clay and glacial till.

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Groundwater Conditions

Groundwater occurs primarily within the permeable sand and gravel deposits. Available well records in D.L. 117 are summarized in Table 1. Depending upon ground elevations, reported water levels range from 25 to 77 feet below ground for wells completed up to depths of 170 feet. Spring discharges are for the most part located upslope of the existing wells indicating that spring discharges are likely derived from shallow aquifer materials at higher elevations. Two possibilities may exist:

1. The aquifer materials upslope of the springs must be relatively extensive throughout D.L. 113 or,

2. Groundwater discharge from the bedrock is feeding the springs.

Based on air photograph examination of the area upslope of the springs it is likely that the former is true although some discharge from the bedrock may also be feeding the springs. Test drilling above the springs would be required to verify the situation. It would appear likely therefore that a major portion of D.L. 117 upslope of the springs contributes to the recharge of these sources of supply. Additional work that would provide information on the extent of the recharge area for the springs would be:

(a) field checking and mapping of geologic exposures in D.L. 117
(b) water quality sampling of springs and wells
(c) an elevation survey of water levels in springs and wells to determine hydraulic gradients and flow directions

Predicting the effects of logging in D.L. 117 on the springs would be difficult to quantify. Suitable buffer strips are recommended adjacent to all water bodies and immediately upslope of the springs. Areas immediately upslope of the springs may be susceptible to slope failure.

References

Fyles, J.G. 1963. Surficial Geology of Horne Lake and Parksville Map - Areas, Vancouver Island, British Columbia. Geological Survey of Canada, Memoir 318.

Halstead, E.C. 1963. Surficial Geology, Nanaimo, British Columbia. Geological Survey of Canada, Map 27-1963.

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Ministry of Environment. Landforms Maps 92 F/1 and 92 F/8. British Columbia.

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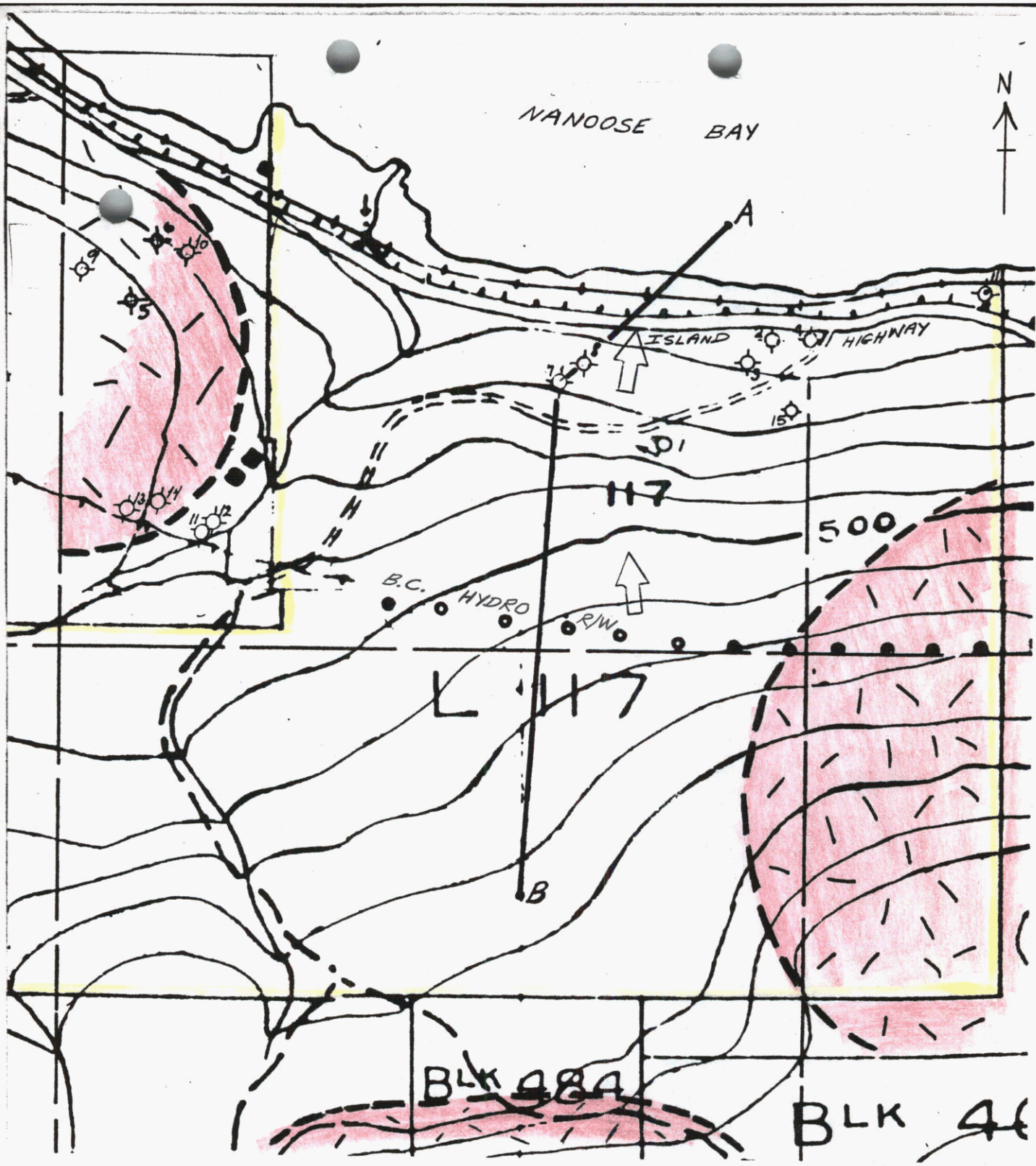
387-9464

APK/dma



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TO ACCOMPANY REPORT ON

GROUNDWATER CONDITIONS
D.L. 117 NANOOSE DISTRICT

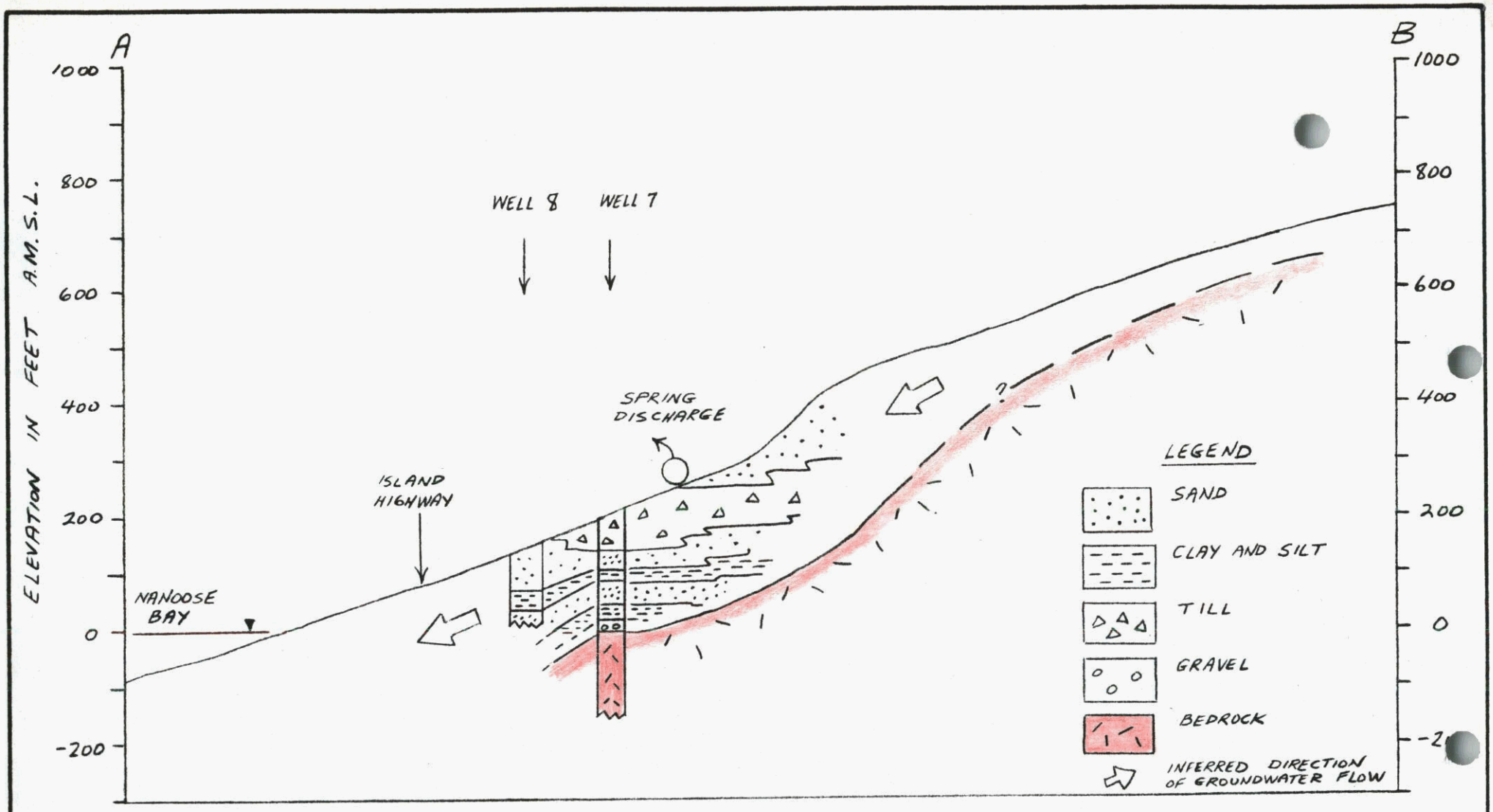
SCALE: VERT. –
HOR. 1" = 1000'

DATE MAY 1986

APK ENGINEER

FILE No. 92F/FB DWG No. FIG 1

VAN CAL 15712



GEOLOGIC CROSS SECTION LOOKING EAST THROUGH D.L. 117

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TO ACCOMPANY REPORT ON
GROUNDWATER CONDITIONS
D.L. 117 NANOOSE DISTRICT

SCALE: VERT. AS SHOWN
HOR. 1" = 500'

DATE
MAY 1986.

APK ENGINEER

FILE No. 92F1, F8 DWG. No. FIG. 2

VANCAL 8570

TABLE 1

Summary of Well Record Information
D.L. 117, Nanoose Land District

Well Record Number	Type	Date Completed	Depth (ft.)	Diameter	Water Level Below Ground (ft.)	Screened Interval (ft.)	Screen Opening Size (in.)	Reported Yield (gpm)	Comments
X13 Y4 #1	Spring	-	4	3 x 6 ft.	3	-	-	-	
#2	Drilled Well	1963	170	6 inch	77	-	-	-	Casing pulled
#3	Drilled Well	1966	49	-	25	44-49	10/100	5	Fine sand aquifer
#4	Drilled Well	1971	76	6 inch	40	70-75	15/1000	3	Sand aquifer
#7	Drilled Well	1978	350	6 inch	190	-	-	0.2	Bedrock at 200 feet
#8	Drilled Well	1978	118	6 inch	60	-	-	50	Sandy gravel aquifer
#15	Drilled Well	1981	145	6 inch	-	-	-	10	-