



October 20, 1993

Mr. John Rennie
33975 Carlin Lane
ABBOTSFORD, B.C. V2L 2L3

Subject: Certification of a Water Supply Well on Upper Sumas Mountain Road

Dear Mr. Rennie:

Enclosed herewith are the certification forms covering certification of a well on Upper Sumas Mountain Road.

The driller's record of well construction, the results of the pumping test and the water quality analysis show the following:

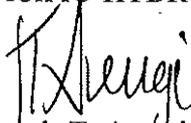
1. The well is constructed in a productive fractured bedrock aquifer which is protected by 3.9 m (13 ft) of till and more than 76 m (250 ft) of impermeable bedrock.
2. The capacity of the well is estimated at 9 to 14 L/min (2 to 3 igpm), as evidenced by stability in drawdown achieved over the last 100 minutes of the pump test.
3. The groundwater represented by analysis of a sample collected from the well towards the end of the pumping test indicates that the water, which is classified as a sodium/bicarbonate water, is soft, moderately mineralized and free of coliform bacteria. The water is of good quality for domestic consumption and meets requirements of Federal and Provincial Drinking Water Standards with the exception of iron. Iron is an aesthetic, non-health related parameter, which, at concentrations greater than 0.3 mg/L, can cause staining in plumbing fixtures and clothing. Iron is readily treated by commercially available domestic-sized treatment units.
4. We note the water has an elevated sodium level of 95 mg/L. Although this value is well within the recommended level of 200 mg/L, at levels greater than 20 mg/L, it maybe of concern to consumers on a sodium-restricted diet.
5. The nearest well to the well under discussion is a bedrock well drilled to 88 m (290 ft) and located about 400 m east of the subject well. Our experience with fractured bedrock aquifers is that water-bearing fractures rarely extend to distances as great as 400 m; therefore, we do not anticipate any significant mutual interference.



We trust that this letter and the enclosed certification documents fulfil your requirements. However, please do not hesitate to contact us if you have any questions about this letter or the enclosures, or if we can be of further assistance with this matter.

Yours truly,

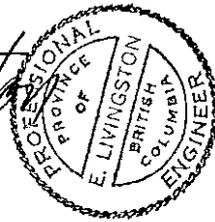
PACIFIC HYDROLOGY CONSULTANTS LTD.



Joseph T. Arengi, M.Sc.
Hydrogeologist



Ed Livingston, P. Eng.



Enclosures

SCHEDULE "A"

PRIVATE WELL CERTIFICATION

PURSUANT TO SCHEDULE "A" of the Subdivision and Development Control Bylaw, which requires that each lot to be created and/or each existing lot forming part of the proposed development can be serviced with potable water in accordance with the requirements of the Bylaw for the development of:

LEGAL DESCRIPTION: Lot 1, Plan 68042, Legal Subdivision 16, Sec. 8, Twp. 20, N.W.L.D.

PROJECT NO.: _____

I certify that a quantity of not less than 2,500 litres per day has been proven for each existing or proposed lot in the development.

I certify that each well within the subdivision has been tested and is capable of continuously providing water at a rate of 9 litres/min. for a four hour period.

I certify that water quality tests have been conducted and that the "B.C. Drinking Water Standards, 1982" can be met for each existing or proposed lot in the development.

Ed Livingston

Certified By (Name of Professional Engineer)

Pacific Hydrology Consultants Ltd

Address

2550 Boundary Rd. Burnaby B.C.



PROFESSIONAL
SEAL

See attachments as required pursuant to clause 2.2.18 of Schedule "A".

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SCHEDULE "A"

WELL PUMP TEST - FIELD TEST

OWNER'S NAME: Mr. John Rennie

WELL NO. 1

APPLICATION NO.:

DATE: October 6, 1993

LOCATION: Upper Sumas Mountain Road

SHEET 1 OF 2

TEST NO. 1

Drawdown Recovery

Rdg #	Time From Start (min)	Depth To Water (ft)	Drawdown (ft)	Flow Measurement Data			Comments
				(min)	(Imp G)	igpm	
1	0	1.8					Static level: start
2	1	3.2	1.4				pump
3	2	4.6	2.8				
4	3	6.3	4.5				
5	4	7.3	5.5				
6	5	8.1	6.3			6.5	
7	7	10.0	8.2				
8	9	11.9	10.1				
9	11	13.9	12.1				
10	13	15.7	13.9				
11	15	17.7	15.9			6.5	
12	20	23.0	21.2				
13	25	27.9	26.1				Valve shut slightly.
14	30	32.3	30.5			3.5	

SCHEDULE "A"

WELL PUMP TEST - FIELD TEST

OWNER'S NAME: Mr. John Rennie

WELL NO. 1

APPLICATION NO.:

DATE: October 6, 1993

LOCATION: Upper Sumas Mountain Road

SHEET 2 OF 2

TEST NO. 1

Drawdown Recovery

Rdg #	Time From Start (min)	Depth To Water (ft)	Drawdown (ft)	Flow Measurement Data			Comments
				(min)	(Imp G)	igpm	
15	35	37.7	35.9				
16	40	42.4	40.6			3.5	
17	50	50.2	48.4				
18	75	66.5	64.7				
19	100	79.8	78.0			3.0	Valve shut slightly
20	150	83.5	81.7				
21	200	84.2	82.4			2.5	
22	250	84.3	82.5				
23	300	84.4	82.6			2.5	
24	350	84.3	82.5			2.5	
25	400	84.3	82.5			2.5	
26	450	84.3	82.5				Stop pump.

SCHEDULE "A"

WELL PUMP TEST - FIELD TEST

OWNER'S NAME: Mr. John Rennie

WELL NO.: 1

APPLICATION NO.:

DATE: October 6, 1993

LOCATION: Upper Sumas Mountain Road

SHEET 1 OF

TEST NO. 1

Drawdown Recovery

Rdg #	Time From Start t (min)	Time From Stop t' (min)	Ratio t/t'	Depth To Water (ft)	Drawdown (ft)	Comments
1	450	0		84.3	82.5	Stop pump.
2	451	1	451.00	82.8	81.0	
3	452	2	226.00	80.8	79.0	
4	453	3	151.00	79.3	77.5	
5	454	4	113.50	77.7	75.9	
6	455	5	91.00	76.1	74.3	
7	457	7	65.29	72.8	71.0	
8	459	9	51.00	69.8	68.0	
9	461	11	41.91	66.6	64.8	
10	463	13	35.62	63.4	61.6	
11	465	15	31.00	60.3	58.5	
12	470	20	23.50	51.7	49.9	
13	475	25	19.00	43.7	41.9	
14	480	30	16.00	37.1	35.3	

F-6
(modified)

PUMP TEST SUMMARY

OWNER'S NAME: John Rennie WELL NO. 1
 APPLICATION NO.: _____ DATE: Oct. 19, 1993
 LOCATION: Upper Simas Mtn. Road; Lot 1 SHEET _____ OF _____
Plan 68042, Sec. 8, Twp. 20, N.W. 1/4 D. TEST NO. _____

WELL COMPLETION DATA		SCREEN DESIGN (mark one)		DESCRIPTION OF AQUIFER
Depth <u>90</u> (m)	<input checked="" type="checkbox"/> Open Hole	<input type="checkbox"/> Slotted Casing	<u>Fractured</u>	
Diameter <u>150</u> (mm)	<input type="checkbox"/> Screen	<input type="checkbox"/> Gravel Pack	<u>Bedrock</u>	
Static Water Level <u>1.6</u> (m)	<input type="checkbox"/> Other _____	Screen interval _____ m to _____ m		

PUMP TEST
 Start: Date 6/10/93 Time 10:00 a.m.
hr/day hr/min

Pump Type: Electric submersible Jet Air Lift
 Other? Describe _____

Test Pump Set at 88 m below ground

Water level sounded by: Electric tape Air bubbler Steel tape
 Other? Describe _____

Flow measured by: Container & watch Flow meter
 Orifice & tube Other? Describe _____

TEST
 Constant rate of yield 11.37-29.6 Lpm Test duration 7.5 hours
 Initial non-pumping level 1.6 m
 Drawdown in well at end of test 22.8 m
 Recommended pumping rate 9.0 Lpm

WATER SAMPLES TAKEN DURING TEST

Chemical Analysis Yes No
 Bacterial Analysis Yes No

Water Temperature _____ °C
 Any particular gas smells noted NO
 Comments on clarity of water Clear
 Other _____



A & H Construction Ltd.

"Specializing in Water Wells, Soil Sampling, Exploration"

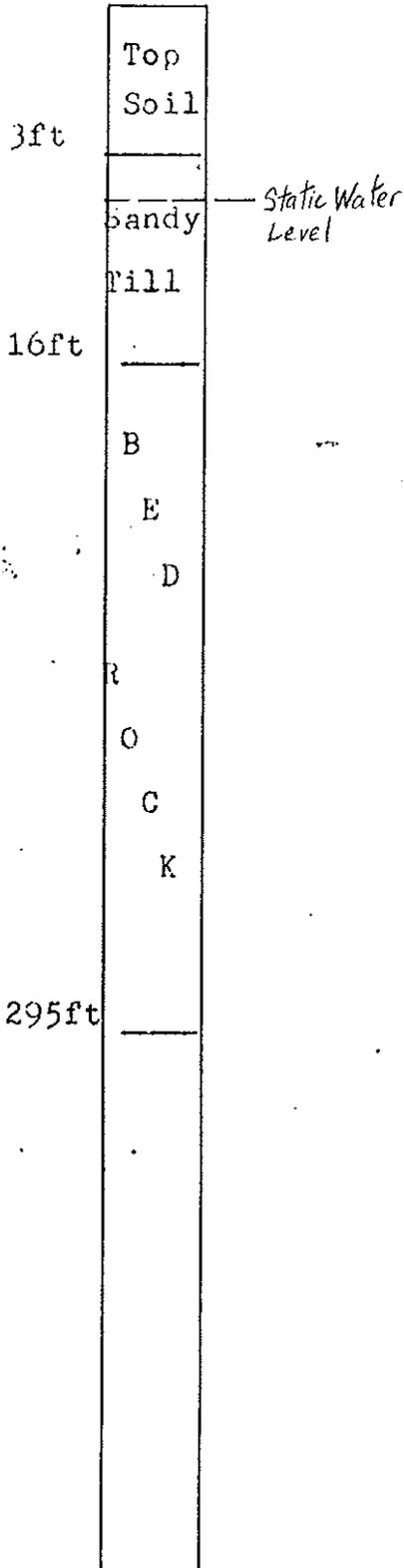
TELEPHONE
(604) 853-2513

WTN 108219

1681 SALTON RD.,
P.O. BOX 38,
ABBOTSFORD, B.C.
V2S 4N7

INVOICE No; 1595

LOG OF WELL



TO Mr. John Kennie,
ADDRESS 33975 Carlin Lane, Abbotsford, B.C.
WELL DRILLED AT Sumas Mt. Rd
WELL COMPLETED September 21/93 INVOICE DATE September 22, 1993.

Machine Hours at	per Hour	
279	\$22.00	6,138.00
Feet of Drilling at	per Foot	
16	\$30.00	480.00
Feet of Drilling & Casing at	per Foot	
Feet of Casing at	per Foot	
Feet of Casing at	per Foot	
Drive Shoes at	each	86.00
Feet of Screen		
Installation of Screen		
Pump Testing	Hours at	per Hour
Surging and Baling	Hours at	per Hour
Other Charges:		
Moving on Site and Setting Up		
Blasting		
Other 2hrs Developing well @ \$100.00		200.00
Sub total		6,904.00
G.S. Tax 7%		483.28
Room and Board		
Travelling and Tolls		

TOTAL INVOICE PRICE \$7,387.28

Notations Well producing approx. 2
gals.per.minute.
Static water level very near
the surface approx. 10ft.

INVOICE

- Account due on presentation of this invoice. -
Interest at 1½% per Month (18% per Annum) on all accounts overdue 30 days.

Postel

NORWEST LABS

Norwest Labs



"We Solve Problems"

203 - 20771 Langley By-Pass
Langley, B.C. V3A 5E8
Phone (604) 530-4344
Fax: (604) 534-9996

Date: October 12/93

Work Order No.: 4482

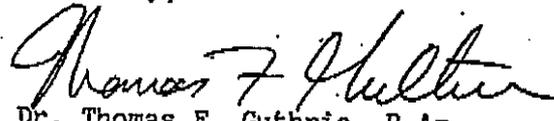
Source of Sample:

Domestic Well Water from #1595 Sumas Mountain Road.

CERTIFICATION OF POTABILITY

Norwest Soil Research Inc. certifies that the above mentioned water sample number 4482-1 supplied by A & H Construction Ltd. meets the chemical and bacteriological requirements specified by the 1989 Guidelines for Canadian Drinking Water Quality for the constituents tested.

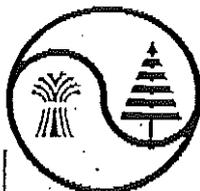
Sincerely,


Dr. Thomas F. Guthrie, P.Ag.
Laboratory Manager

Note: all reports are the confidential property of our clients. Publication of statements, conclusions or extracts from or regarding our reports is not permitted without our written approval. Any liability attached thereto is limited to the fee charged.

NORWEST LABS

"Keeping B.C. Growing"

WATER ANALYSIS REPORT

SAMPLE SUBMITTED BY:

A & H CONSTRUCTION LTD.
 BOX 38, 1681 SALTON ROAD
 ABBOTSFORD, B.C.
 V2S 4N7
 Attn:

WORK ORDER NUMBER : 4482
 SAMPLE NUMBER : 4482-1
 SAMPLE RECEIVED : 10/06/93
 ANALYSIS COMPLETED : 10/12/93
 SAMPLE RETAINED FOR : 30 DAYS

SAMPLE IDENTIFICATION : RENNIE WATER #1595 SUMAS MOUNTAIN RD.

ANALYTICAL RESULTS

GUIDELINES FOR DRINKING WATER

pH	8.50 mg/l	pH values between 6.5 & 8.5 considered acceptable
Electrical Conductivity	0.46 ns/cm	Values above 1.0 ns/cm indicate increasing salt content
Total Dissolved Solids	350.0 mg/l	Objective level 500 mg/l; higher values indicate high salts
Total Suspended Solids	37.0 mg/l	Values above 250 mg/l indicate increasing levels of sediment
Ammonium-N	0.0 mg/l	Acceptable values below 0.5 mg/l; objective level below 0.01 mg/l
Potassium	2.7 mg/l	No acceptable level set; values normally 0.5 to 10 mg/l
Calcium	9.00 mg/l	Below 200 mg/l acceptable; objective level below 75 mg/l
Magnesium	2.50 mg/l	Below 150 mg/l acceptable; objective level below 50 mg/l
Sodium	95.00 mg/l	Below 300 mg/l acceptable; over 20 mg/l high for low sodium diets
Iron	0.40 mg/l	>0.3 mg/l may cause staining & deposits; objective limit 0.05 mg/l
Copper	0.01 mg/l	Below 1.0 mg/l acceptable; objective limit below 0.01 mg/l
Zinc	0.12 mg/l	Below 5.0 mg/l acceptable; objective limit below 1.0 mg/l
Manganese	0.00 mg/l	Below 0.05 mg/l acceptable; objective limit below 0.01 mg/l
Phosphate-P	0.00 mg/l	No acceptable limit set; objective below 0.01 mg/l
Sulphate-S	3.00 mg/l	Below 500 mg/l acceptable; objective limit below 250 mg/l
Nitrate-N	0.00 mg/l	Below 10 mg/l acceptable; high values may indicate contamination
Chloride	7.90 mg/l	Below 250 mg/l acceptable
Fluoride	1.29 mg/l	Values up to 1.2 mg/l desirable; under 1.5 mg/l acceptable
Boron	1.00 mg/l	Below 5.0 mg/l acceptable
Carbonate	3.00 mg/l	Presence indicates alkaline water
Bicarbonate	264.00 mg/l	Presence indicates moderately alkaline water
Hardness (CaCO ₃ equiv)	32.8 mg/l	Soft waters are less than 75mg/l; hard waters above 150 mg/l
Total coliforms	0 /100ml	Below 3/100 ml acceptable
Fecal coliforms	0 /100ml	Below 1/100 ml acceptable

Results quoted as zero indicate concentrations below the following detection limits:

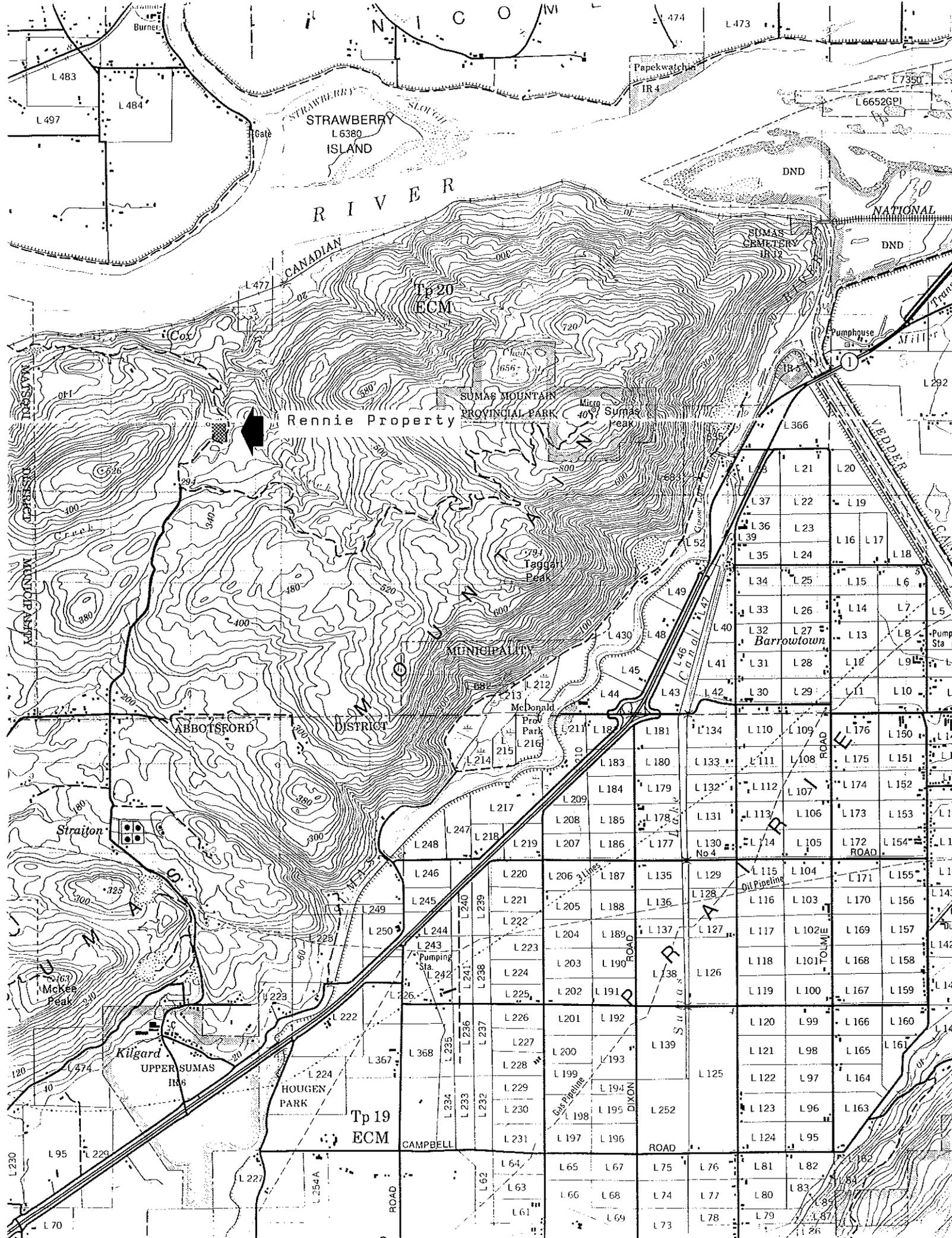
Less than 0.01 mg/l Fe, Cu, Zn, Mn, B

Less than 0.10 mg/l Cl, F, SO₄-SLess than 0.05 mg/l Na, Ca, Mg, K, PO₄-P, NH₄-N, NO₃-N

Less than 1 mg/l TDS, TSS, carbonate & bicarbonate

NORWEST SOIL RESEARCH INC. 203-20771 LANGLEY BY-PASS, LANGLEY, B.C. V3A 5E8





N I C O M I

STRAWBERRY ISLAND
L 6380

R I V E R

CANADIAN

Tp 20
ECM

SUMAS MOUNTAIN
PROVINCIAL PARK

Rennie Property

Sumas Peak
794

MUNICIPALITY

ABBOTSFORD DISTRICT

Kilgard
UPPER SUMAS
IR 66

Tp 19
ECM

CAMPBELL

DND

SUMAS CEMETERY
IR 12

NATIONAL

DND

Pumphouse

IR 5

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