REGIONAL GROUNDWATER POTENTIAL
FOR
SUPPLYING IRRIGATION WATER: 1986

ALBERNI VALLEY

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Ministry of Agriculture and Food
June 1986

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGEMENTS

The author wishes to acknowledge the support, the use of groundwater data and the technical assistance provided by the staff of the Groundwater Section of the Water Management Branch, Ministry of Environment. Special thanks to the staff of the Coal Inventory Section of the Geological Branch, Ministry of Energy, Mines and Petroleum Resources for their support and the use of geological data.

1. INTRODUCTION

The Ministry of Agriculture and Food in conjunction with the Agricultural Land Commission are involved in a detailed assessment of the agricultural capability of the east coast of Vancouver Island. An analysis of the hydrological data was identified as an important requirement in the above assessment with groundwater being a major component.

This report and accompanying maps provides a discussion and analysis of developed and potential aquifers, for the Alberni Valley area (Figure 1), based on presently available groundwater and geologic data. The map sheets which cover the study area include 92F.017, 026, 027, 035, 036, 037, 045 and 046 (1:20,000 scale). These map sheets are identified as Figures 2, 3, 4, 5, 6, 7, 8 and 9.

The hydrogeological information, thematically presented on the map sheets, are based on the tabulated data from approximately 200 water well records, water well location maps (both on file with the Groundwater Section, Ministry of Environment), published surficial and bedrock geology maps and reports (Fyles, 1963; Leaming, 1968; Muller, 1963; Muller and Carson, 1969; Muller and Jeletzky, 1970; and Muller 1977), terrain maps (Ministry of Environment, British Columbia) and soil maps and reports (Ministry of Agriculture and Food and Ministry of Environment, British Columbia).

Tabulated data from water well records (e.g., aquifer characteristics, depth to bedrock, etc.) and coal exploration test holes (depth to bedrock, thickness of overburden, etc.) were transferred to water well location maps (scale 1:12,000) which were used as a working base. Surficial geology/-terrain units and glacial features (e.g., delta kames) which were considered hydrogeologically significant in terms of groundwater potential were

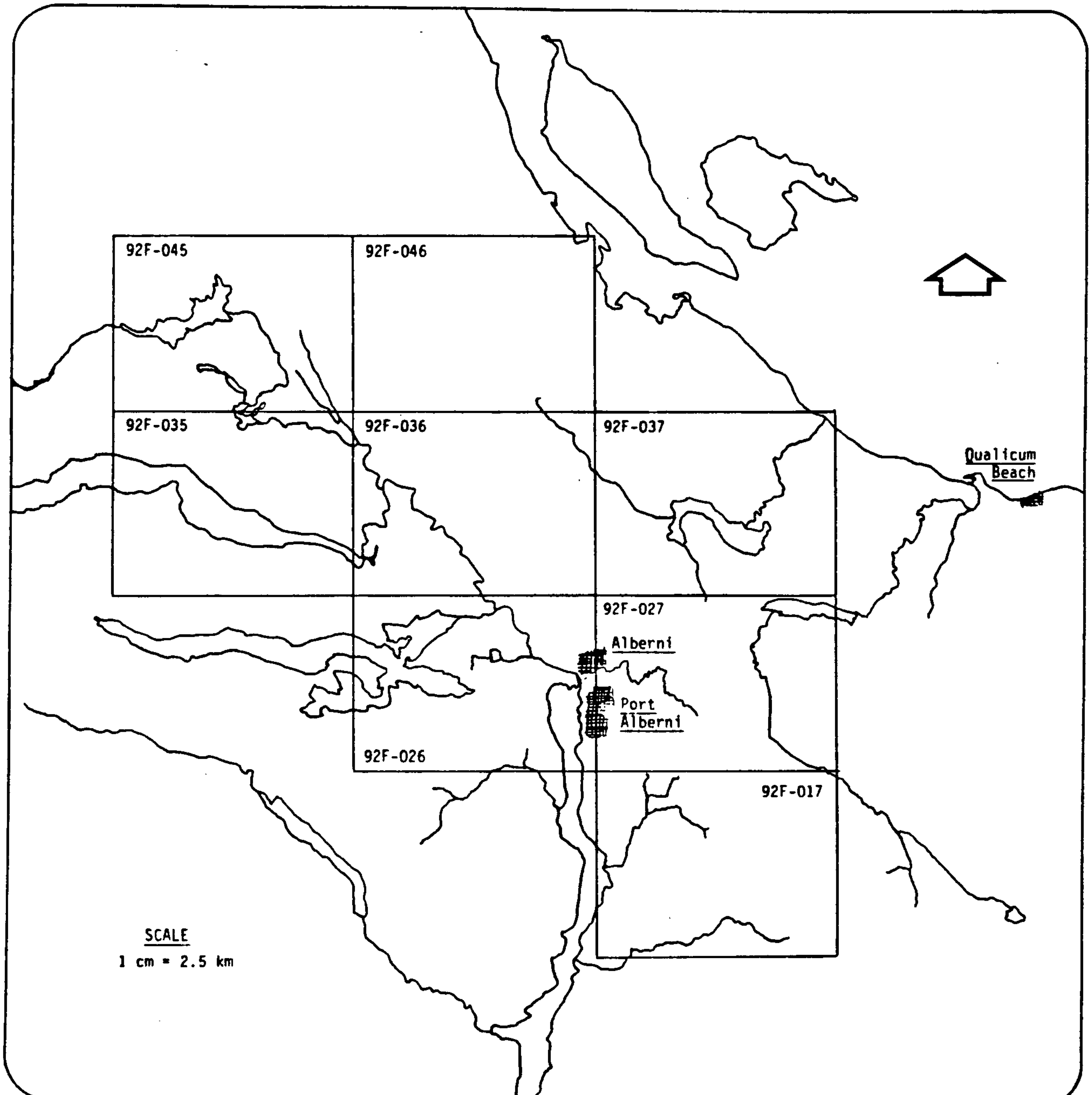


Figure 1 Index Map of Study Area

transferred to these same maps. A synthesis of this data was then transferred to the final 1:20,000 scale base maps.

2. PHYSIOGRAPHY

The major geomorphic features of the study area are the result of structural, erosional and depositional processes. Folding and faulting of the bedrock, erosion and repeated glaciation, isostatic and eustatic changes of sea level have all contributed to the physiographic features of the Alberni Valley. Alberni Valley is a northwest-trending intermontane valley 40 kilometres long and averaging 8 kilometres wide. The valley rises gradually from sea level at the head of Alberni Inlet to 450 metres above sea level at its northwestern end. The valley is bordered on the north east by a steep and almost straight mountain face. The south western margin of the valley is a more gently rising mountain slope cut by westward-trending steep walled valleys (Fyles, 1963).

3. BEDROCK GEOLOGY

According to Muller (1977), Vancouver Island is the main component of the Insular Belt, the westernmost major tectonic subdivision of the Canadian Cordillera. The study area contains Paleozoic rocks (a volcanic and a greywacke-argillite formation of the Sicker Group), Lower Mesozoic rocks (volcanic and limestone-calcareous shale formations of the Vancouver Group), Middle Mesozoic rocks (a volcanic formation of the Bonanza Subgroup and stocks of granitoid rocks of the Island Intrusions) and Upper Mesozoic rocks consisting of upward fining sequences of conglomerate, sandstone, shale coal of non-marine or near deltaic origin, succeeded by marine sandstone, shale or thin bedded and graded shale-siltstone sequences from the Nanaimo Group. The Alberni Valley is principally underlain by the Nanaimo Group.

4. UNCONSOLIDATED DEPOSITS

Most of the unconsolidated material, found in the study area may be attributed to the regimen and wasting of glacial ice during the Late Pleistocene. The known unconsolidated deposits are either from the Fraser Glaciation or the post glacial Period. Till is a dominant component of the unconsolidated deposits and may locally exceed 30 metres in thickness. In places, these tills are underlain by gravel, sand, silt and other tills. No evidence has been brought forth, indicating when in the geologic-climatic time period these sub-till materials were deposited. Fyles (1963) mapped no unconsolidated deposits older than 18,000 years before present.

A stratigraphic framework of unconsolidated sediments and a chronology of Late Pleistocene environments for Vancouver Island, is shown in Figure 10.

5. GROUNDWATER POTENTIAL

5.1 Bedrock

Groundwater within the bedrock can be found in fractures, along bedding plane partings, in the inter-flow zones of lava, in the inter-granular openings in the rock, and in the case of limestone, in the channels formed by the dissolution of the rock by water. Water wells drilled on Vancouver Island, indicate fractures, bedding plane partings and solution channels are probably the main sources of groundwater from the bedrock. Seventy wells were reported to be constructed in bedrock. Thirty-one in granitic rocks of the Island Intrusives and 24 in the sedimentary rocks of the Nanaimo Group. The remaining wells were reported to be constructed in volcanic or metamorphic rock types with a few completed in bedrock where the type of bedrock was not reported.

YEARS BEFORE PRESENT (Not to Scale)	CLIMATIC UNITS	GEOLOGIC UNITS	ENVIRONMENT	STRATIGRAPHY
Present -				
5,000 -	HOLOCENE	SALISH SEDIMENTS	FLUVIAL	Gravel, sand, silt, clay, peat; alluvial fan deposits; blocks and rubble; peat and muck
10,000 -		CAPILANO SEDIMENTS	MARINE AND GLACIO-MARINE GLACIO-LACUSTRINE	Silt, clay, stony clay, sandy gravel generally underlain by clay; stony gravel, stony loam Sand and gravel, laminated silty and clay
15,000 -	FRASER GLACIATION	VASHON DRIFT	GLACIO-FLUVIAL GLACIAL	Gravel, sand and silty forming ice-contact deltas Grey till, sand to clayey texture
Limit of Stratigraphic Classification by Fyles (1963) in the Alberni Area				
20,000 -		QUADRA SAND	GLACIO-FLUVIAL	Sand, gravel and silt
25,000 -				
30,000 -	OLYMPIA NON-GLACIAL INTERVAL	COWICHAN HEAD FORMATION	FLUVIAL ESTURINE MARINE	Silt, gravel, sand, peat, peaty soil, and driftwood Clay, stony clay, silt containing marine shells, local basal laminated clay and silt
60,000 -				
	SALMON SPRINGS GLACIATION	DASHWOOD DRIFT	GLACIO-MARINE GLACIAL	Grey till, silty to sandy texture contains silty and gravel lenses
? -				
	PUYALLUP NON-GLACIAL INTERVAL	MAPLEGUARD SEDIMENTS	FLUVIAL LACUSTRINE	Sand, silt, minor clay and gravel

FIGURE 10: CLIMATIC, GEOLOGIC UNITS, STRATIGRAPHY AND LATE PLEISTOCENE ENVIRONMENTS OF THE STUDY AREA after Clague (1981, 1977 & 1976) Alley & Chatwin (1979), Armstrong et al (1965) & Halstead (1966)

The possibility of obtaining adequate supplies of groundwater for irrigation purposes are generally considered to be poor and although a few bedrock wells (constructed in the sandstone and granitic rock types) in the study area have been reported to yield between 1 and 9 L/s (nine litres per second is significant when considering irrigation requirements), long duration pumping tests would be required to verify if bedrock aquifers are capable of a sustained high withdrawal rate.

Examples of bedrock aquifers capable of yielding sufficient supplies of groundwater for irrigation purposes can be found in the Mill Bay and Saanich regions of southern Vancouver Island where well yields up to 16 L/s have been obtained. It is not known if comparable high yielding bedrock aquifers exist in the study area. Though possible, identification of such aquifers would require detailed geologic mapping as well as test drilling. These procedures can be both time-consuming and expensive. Currently, however, the reported highest producing wells in the Alberni Valley are constructed in bedrock.

5.2 Unconsolidated Deposits

Most of the groundwater used on Vancouver Island comes from unconsolidated deposits which receive water from infiltration of either precipitation or surface water sources. The amount of water obtainable from these materials, depends on the permeability of the aquifer material, the thickness and extent of the aquifer, the rate of aquifer recharge and on well construction.

The unconsolidated deposits which are hydrogeologically significant in terms of groundwater potential for irrigation purposes are primarily comprised of sand and/or gravel. Though there is a paucity of well log information available in the study area (approximately half are shallow dug wells), suitable geologic deposits indicate the potential availability of groundwater for irrigation purposes. Surficial geology maps indicate extensive deposits of sand and/or gravel found at surface. The few wells constructed into these deposits report aquifer thicknesses greater than 7 metres and yields greater than 3 L/s. Often these yields can be increased in productivity by more efficiently developing the wells. Based on similar unconsolidated geologic environments on the east coast of Vancouver Island, it is probable that high yielding sand and/or gravel aquifers exist in the Alberni study area. The deposits which fall into this category are listed and discussed below.

1) The shore, deltaic, fluvial and alluvial deposits of the Salish Sediments. These deposits range up to 10 metres in thickness in the Somass Valley. The target for groundwater exploration would be the fluvial deposits near present day stream channels and deltas. These would include the valleys of the Somass, Sproat, Stamp and Ash Rivers. Other target areas would include the alluvial fan deposits located on the north-east side of the Alberni Valley. These alluvial fans were not included in the mapping for this report. For further information on these and other deposits mentioned in this report refer to Fyle's (1963) study on the Surficial Geology of Horne Lake and Parksville Map-Areas, Vancouver Island, British Columbia 92 F/7, 92 F/8.

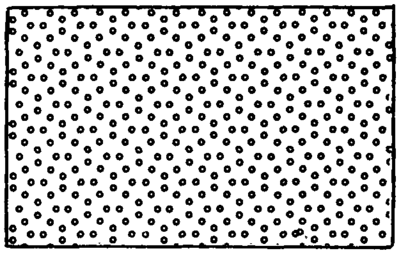
2) Terraced fluvial deposits which include deltaic, channel, floodplain and alluvial fan deposits of the Capilano Sediments. These deposits range up to 10 metres in thickness, 800 metres in width and by 2400 metres in length. These fluvial deposits would be target areas for groundwater exploration. Major examples of these fluvial deposits can be found along the Somass, Sproat, lower Stamp and lower Ash Rivers with minor examples located near Rogers and Cherry Creeks. Well washed, gravelly, seashore deposits are of limited extent in the Alberni Valley.

3) The glaciofluvial deposits which include hummocky, knob and kettle, ridged, esker, kame terrace and kame delta deposits of the Vashon Drift. These deposits are usually found resting on the ground moraine deposits of the Vashon Drift. All of the above are target area for groundwater exploration. An esker-channel complex about 11 kilometres long exists in the Ash River/Stamp Falls region. Eskers range up to 15 metres high and two and one-half kilometres long. One aquifer associated with an esker currently supplies a dairy farm operation in the Valley. Gravels with ice-contact topography form an irregular belt up to .8 kilometres wide from the outlet of Great Lake to Stamp Falls. The majority of these deposits (mainly delta and terrace kames) lie between 85 and 95 metres in elevation. Other small kame terraces occur between Stirling Arm and the head of Alberni Inlet between 80 and 85 metres above sea level. There are also isolated gravelly and sandy deposits along the valley sides of the Somass and Stamp Rivers. These deposits range up to 25 metres in thickness and would be target areas for groundwater exploration. Lenses of sand and/or gravel are associated with the ground moraine deposits of the Vashon Drift. Though these lenses are potential aquifers their location and viability must be confirmed by drilling, which can be both time consuming and expensive.

4) As stated, earlier unconsolidated sand and/or gravel deposits older than the Vashon tills are known to exist in the study area but at present (to the author's knowledge) they have not been mapped or identified.

6. EXTENT OF DEVELOPED AND POTENTIAL AQUIFERS

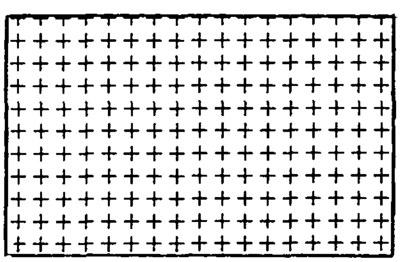
The following is a description and the limitations of each component shown on the 1:20,000 scale base maps (Figures 2-9).



POTENTIAL UNCONSOLIDATED UNCONFINED AQUIFERS: These areas outline the surficial extent of unconsolidated deposits primarily comprised of sand and/or gravels. They outline areas where there is a high probability of locating water-bearing sand and/or gravel aquifers but does not imply the existence of water-bearing sand and/or gravel aquifers. In some areas for example the sand and gravel deposits may be very thin and dry throughout their entire thickness.

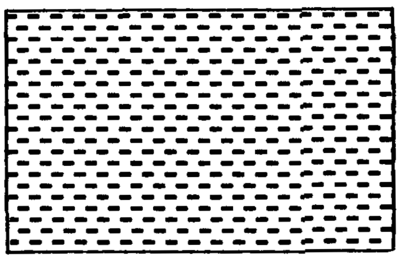
These areas outline potential unconfined aquifers at surface, it does not show distribution at depth. This is especially relevant to any sand and/or gravel deposits which may underlie younger deposits (eg. marine clays or Vashon till) in the region.

The surficial geology units which make up these areas were transferred first from 1:63,360 and 1:50,000 scale mapping to 1:12,000 scale water well location maps, and then to 1:20,000 scale cadastral maps. Minor boundary errors may exist therefore on the larger scale mapping.



DEVELOPED UNCONSOLIDATED AQUIFERS: These areas outline where sand and/or gravel aquifers (greater than 0.3 metres in thickness) have been identified at depth based on water well lithology records. These aquifers may be either confined or unconfined.

The boundaries of these areas were arbitrarily set at a 100 metre radius from a data point (water well) which identified a sand and/or gravel aquifer greater than 0.5 metres in thickness. Where two wells, located within 400 metres of each other, show similar lithologies and the geomorphology of the area was homogeneous, the boundaries were extended to include the area between the two wells.



LOW PERMEABLE UNCONSOLIDATED DEPOSITS: These areas outline where the unconsolidated deposits at surface (predominantly tills, silts and/or clays) are generally unsuitable as aquifer materials due their low permeability. However suitable aquifer materials may and do exist at depth as evidenced throughout these areas where site specific data are available. Where ground moraine deposits have been mapped in these areas, locally there may be sand and/or gravel deposits found at surface or in lenses at depth. Also, older geologic units that are potential aquifers may be overlain by the marine and moraine deposits. Productive aquifers may be found in these older geologic units. The boundaries were also transferred from Fyles (1963) surficial geology maps (1:63,360 scale) and Ministry of Environment terrain maps (1:50,000 scale). Minor boundary errors therefore may exist on the larger scale mapping.

BEDROCK AQUIFERS: These areas identify where bedrock is located at or near ground surface and/or where well logs indicate bedrock aquifers. The boundaries for these areas were also arbitrarily set at 100 metre radium from a data point (e.g., bedrock well or rock outcrop). This distance was extended to 400 metres between data points if water well lithology and the surface morphology so warranted.

▲	Water wells where yields greater than 3 L/s have been reported. When found in known developed unconsolidated aquifer regions, these areas show the highest potential for obtaining groundwater supplies to meet irrigation requirements.
△	Water wells where yields between 1 and 3 L/s are reported. These areas also show high potential for obtaining irrigation supplies of groundwater.

7. WATER QUALITY

The concentration and composition of dissolved constituents in a water determine its quality for irrigation use. Three of the characteristics of an irrigation water that appear to be the most important in determining its quality are the total concentrations of soluble salts, the relative proportion of sodium to other cations and the concentrations of boron and other elements that may be toxic.

The total concentration of soluble salts can be expressed in terms of its electrical conductivity and is often expressed as micromhos/cm at 25°C. The higher the concentration of soluble salts and minerals the higher the conductivity. There was only one laboratory analyses of groundwaters from a bedrock aquifer in the China Creek region. Based on electrical conductivity these waters fall into the medium salinity hazards class (Richards, 1969).

According to Richards (1969):

"Medium salinity water can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control."

A salty taste in the groundwater was recorded on 3 water well records. This implies a high chloride reading of greater than 350 mg/L (Anderson, 1973). Though this reading may or may not indicate a high level of total dissolved solids, the sodium absorbtion ratio and the conductivity reading are likely to be high. Two wells were completed in shale and one in granite. Water quality analyses would be required to verify comments on salty tasting groundwaters and if so, to determine if these groundwaters are within acceptable limits for irrigation use. A sulphur smell was reported from the groundwater of one well.

The relative proportion of sodium to other cations (usually calcium and magnesium) in groundwaters may make some waters undesirable for some crops. This relationship is usually expressed as the sodium absorption ratio (SAR) where $SAR = Na^{+}/\sqrt{(Ca^{++}+Mg^{++})/2}$ and can be used for identifying the suitability of groundwaters for irrigation purposes. The formula applies where all concentrations are expressed in epm. Applying the SAR formula to eight laboratory analyses revealed the sodium hazard level as being low in the groundwaters of the unconsolidated aquifers. Applying the SAR formula to the one laboratory analyses of groundwaters from bedrock aquifers revealed the sodium hazard level as being low.

According to Richards (1969):

> "Low sodium water can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium sensitive crops such as stone-fruit trees may accumulate injurious concentrations of sodium."

Another important characteristic of irrigation waters are concentrations of boron and other elements that may be toxic. Though high levels of toxic elements such as boron have been recorded locally elsewhere on

Vancouver Island, it is not known if high levels of toxic elements are present in the study area, especially in the bedrock groundwaters.

More analyses (from wells completed in both unconsolidated materials and bedrock) would provide a more complete understanding of natural water quality in the study area.

8. CONCLUSIONS

On a regional basis, there is a potential for locating groundwater supplies capable of meeting irrigation requirements in the valley region of the study area. The largest groundwater reserves in the area are probably contained in recent alluvial deposits, terraced fluvial and deltaic deposits, and possibly other sediments beneath the Vashon Drift.

Though there is a paucity of well log information available for much of the study area, suitable geologic deposits indicate the potential availability of groundwater for irrigation purposes. Even where water well log information is available, most water well logs reported yields from sand and/or gravel aquifers at less than 2 L/s. This is usually the result of the immediate needs of the water user. A single family home only requires a well yield of 0.2 L/s. A more efficient development of the same aquifer will often yield higher productivity.

Natural water quality is expected to be acceptable from the groundwaters of unconsolidated deposits. Not enough data is available on the water quality of bedrock or unconsolidated aquifers but comments from a dozen water well logs indicate the need for more water quality analyses.

This report is regional in scope and identifies areas which have the potential to supply irrigation water. It does not provide a quantitative assessment of water availability for a site specific location. To provide such an assessment, more accurate delineation of aquifer boundaries and estimation of groundwater recharge, movement, aquifer parameters and withdrawal would be required on a site specific basis.

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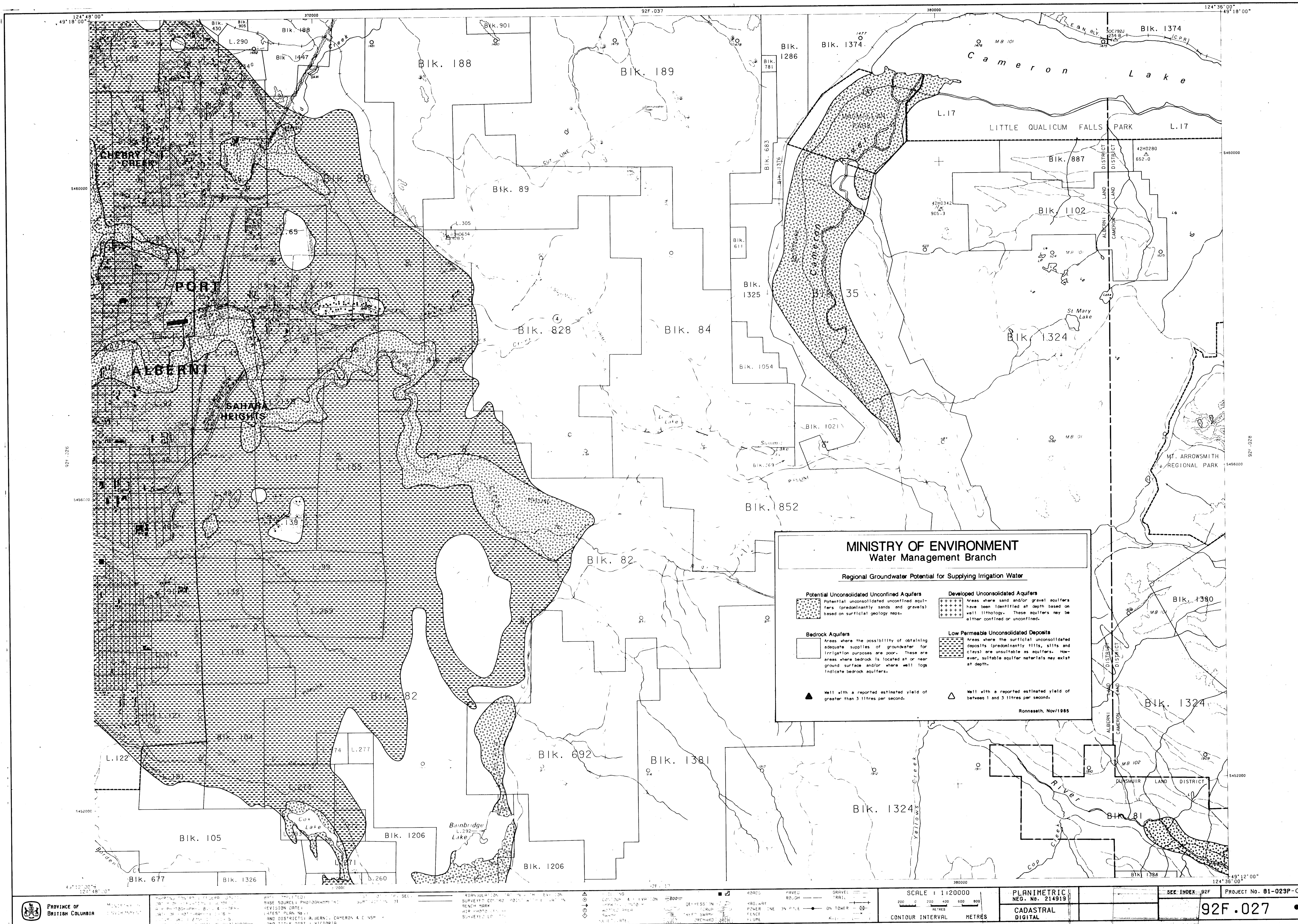
MINISTRY OF ENVIRONMENT
Water Management Branch
REGIONAL GROUNDWATER POTENTIAL FOR SUPPLYING IRRIGATION WATER
Potential unconsolidated unconfined aquifers (predominantly sands and gravels) based on surficial geology maps (Fyles, 1963).
Areas where sand and/or gravel aquifers have been identified at depth based on well log lithology. These aquifers may be either confined or unconfined.
Areas where the surficial unconsolidated deposits (predominantly tills, silts and clays) are unsuitable as aquifers. However, suitable aquifer materials may exist at depth.
Areas where the possibility of obtaining adequate supplies of groundwater for irrigation purposes are poor. These are areas where bedrock is located at or near ground surface and/or where well logs indicate bedrock aquifers.
Well with a reported estimated yield of greater than 3 litres per second.
Well with a reported estimated yield of between 1 and 3 litres per second.
Abandoned channel. Fluvial or glaciofluvial deposits having groundwater potential may be associated with these features.
Limit of surficial geology mapping.
Ronneseth, November, 1984.
BEAUFORT
North Tumblewater Creek
Tumblewater
Tumblewater Meadows
Sundew Lake
Cowie
Smith
Cougar
Wilfred
Rosewall Creek
Qualicum
Chef Creek
Fanny Bay
Blk.1330
Blk.916
Blk.504
Blk.617
Blk.1346
Blk.187
Blk.1328
92F.056
92F.036
92F.045
92F.047
PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENVIRONMENT
MAPPING CONTROL: FEDERAL GOV'T.
DATUM OF ELEVATIONS: GEODETIC
AIR PHOTOGRAPHY: B.C.,FED.
DATE OF PHOTOGRAPHY: 1976-81
U.T.M. GRID: ZONE 10 (1975)
SHORELINE: HIGH WATER MARK
BASE COMPLETED: MARCH [redacted]
BASE SOURCE: PHOTOGRA[redacted]
REVISION DATE:
LAND DISTRICTS: [redacted]
LAND TITLE DIST.: [redacted]
AIR PHOTO CENTRE
BUILDING
CONTOURS AND ELEVATION
APPROX. CONTOUR
SWAMP
DEPRESSION
TREED SWAMP
ROADS PAVED
GRAVEL
ROUGH
TRAIL
RAILWAY
ABAND.
POWER LINE
FENCE
FLUME
SCALE : 1:20000
METRES
CONTOUR INTERVAL METRES
PLANIMETRIC DIGITAL
CADASTRAL DIGITAL
SEE INDEX 92F
PROJECT No. 83-035PC
92F.046


MINISTRY OF ENVIRONMENT
Water Management Branch
Regional Groundwater Potential for Supplying Irrigation Water
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Areas where the surficial unconsolidated deposits (predominantly tills, silts and clays) are unsuitable as aquifers. However, suitable aquifer materials may exist at depth.
Well with a reported estimated yield of greater than 3 litres per second.
Well with a reported estimated yield of between 1 and 3 litres per second.
Ronneseth, Nov/1985
Cameron Lake
LITTLE QUALICUM FALLS PARK
CHERRY CREEK
PORT ALBERNI
SAHARA HEIGHTS
MT. ARROWSMITH REGIONAL PARK
St Mary Lake
Cox Lake
Bainbridge Lake
Blk. 188
Blk. 189
Blk. 89
Blk. 828
Blk. 84
Blk. 852
Blk. 82
Blk. 1324
Blk. 1374
Blk. 887
Blk. 1102
Blk. 692
Blk. 1381
Blk. 105
Blk. 1206
Blk. 677
Blk. 1326
Blk. 1380
Blk. 35
ALBERNI LAND DISTRICT
CAMERON LAND DISTRICT
DUNSMUIR LAND DISTRICT
SCALE 1:20000
CONTOUR INTERVAL METRES
PLANIMETRIC
NEG. No. 214919
CADASTRAL
DIGITAL
PROVINCE OF BRITISH COLUMBIA
PROJECT No. 81-023P-C
92F.027

PROVINCE OF BRITISH COLUMBIA — MINISTRY OF ENVIRONMENT

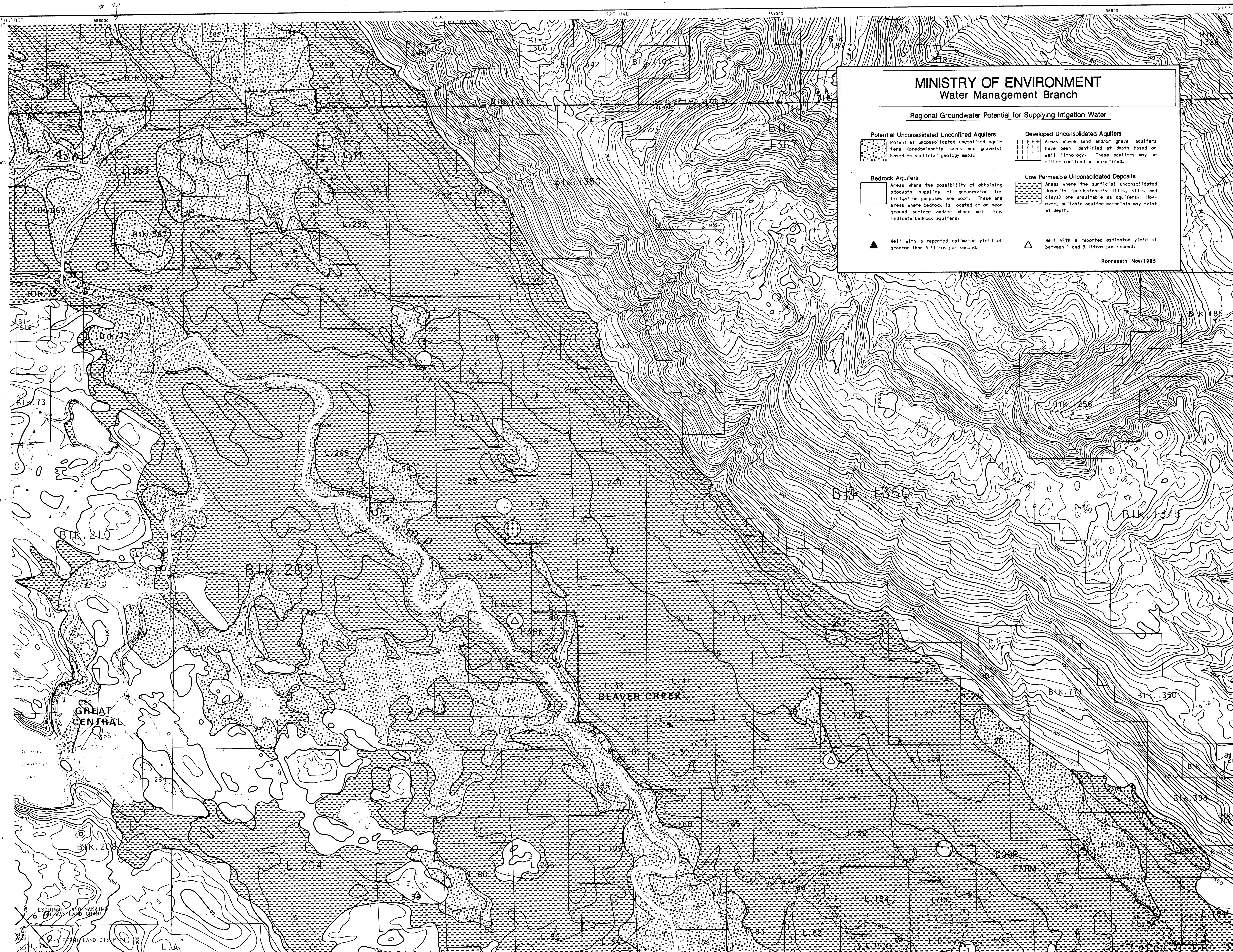
LAND DISTRICT: ... NOOTKA, NELSON & NEWCASTLE
LAND TITLE ...: VICTORIA

SCALE : 1:20000
CONTOUR INTERVAL METRES

PLANIMETRIC
NEG. No. 214907
CADASTRAL
DIGITAL

SEE INDEX 92F
PROJECT No. 81-023P-C

92F.045



Province of British Columbia

SCALE : 1:20000
200 0 200 400 600 800
METRES
CONTOUR INTERVAL 20 METRES

PLANIMETRIC
NEG. NO. 214914
CADASTRAL
DIGITAL
CONTOUR
SEE INDEX 92F
PROJECT No. 81-023P-C
92F.036

92 F . 036

Province of British Columbia

CONTOUR INTERVAL 20 METRES

CADASTRAL DIGITAL

CONTOUR SCRIBECOAT

SEE INDEX 92F

PROJECT No. 81-023P-C

92F.035


MINISTRY OF ENVIRONMENT
Water Management Branch
Regional Groundwater Potential for Supplying Irrigation Water
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Potential unconsolidated unconfined aquifers (predominantly sands and gravels) based on surficial geology maps.
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Well with a reported estimated yield of greater than 3 litres per second.
Well with a reported estimated yield of between 1 and 3 litres per second.
Ronneseth, Nov/1985
MT HANKIN
MT UNDERWOOD
PATLICANT MTN
DOUGLAS PK
MT McQUILLAN
KING SOLOMON BASIN
Alberni Inlet
China Creek
Franklin River
Henry Lake
Lizard Lake
Father and Son Lake
ALBERNI LAND DISTRICT
DUNSMUIR LAND DISTRICT
WESTERLY BOUNDARY ESQUIMALT AND NANAIMO RAILWAY LAND GRANT
Blk. 1206
Blk. 1381
Blk. 1326
Blk. 83
Blk. 1382
Blk. 821
Blk. 1288
Blk. 1318
Blk. 1287
Blk. 244
Blk. 550
Blk. 551
Blk. 328
SCALE 1:20000
CONTOUR INTERVAL METRES
PLANIMETRIC NEG. No. 214995
CADASTRAL DIGITAL
SEE INDEX 92F
PROJECT No. 81-023P-C
92F.017
PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENVIRONMENT

PROVINCE OF BRITISH COLUMBIA — MINISTRY OF ENVIRONMENT

MAPPING CONTROL: FEDERAL GOV'T
DATUM OF ELEVATIONS: GEODETIC
AIR PHOTOGRAPHY: B.C., FEDERAL
DATE OF PHOTOGRAPHY: 1976-81
U.T.M. GRID: ZONE 9 (1975)
SHORELINE: HIGH WATER MARK

BASE COMPLETED: MAY 1984
BASE SOURCE: PHOTOGRAMMETRIC
REVISION DATE:

LAND DISTRICTS: ALBERNI, CLAYOQOUT
LAND TITLE DIST.: VICTORIA

DIST. LOT AND TP. SEC.
SUBDIVISION LOT
AIR PHOTO CENTRE
BUILDING
CONTOURS AND ELEVATION 500
APPROX. CONTOUR
SWAMP
DEPRESSION
TREED SWAMP
ROADS PAVED / GRAVEL — ROUGH / TRAIL
RAILWAY — ABAND.
POWER LINE
FENCE
FLUME

SCALE : 1:20000
200 0 200 400 600 800
METRES
CONTOUR INTERVAL 20 METRES

PLANIMETRIC DIGITAL	CONTOUR	SEE INDEX 92F	PROJECT No. 83-035PC
CADASTRAL DIGITAL		92F.026	

PROVINCE OF BRITISH COLUMBIA	MINISTRY OF ENVIRONMENT	MAPPING CONTROL: FEDERAL GOVERNMENT DATUM OF ELEVATIONS: GEODETIC AIR PHOTOGRAPHY: B.C. AND FEDERAL DATE OF PHOTOGRAPHY: 1976, 81 U.T.M. GRID: ZONE 10 (1975) SHORELINE: HIGH WATER MARK	BASE COMPLETED: MARCH 1984 BASE SOURCE: PHOTOGRAMMETRIC REVISION DATE: LAND DISTRICTS: ALBERNI, CAMERON, AND NEWC[redacted] LAND TITLE DIST.: VICTORIA	DIST. LOT AND TP SEC SUBDIVISION AIR PHOTO CENTRE	BUILDING CONTOURS AND ELEVATION 500 APPROX. CONTOUR SWAMP DEPRESSION TREED SWAMP

ROADS PAVED / GRAVEL / ROUGH / TRAIL RAILWAY / ABAND. POWER LINE FENCE FLUME	SCALE : 1:20000 200 0 200 400 600 800 METRES CONTOUR INTERVAL METRES	PLANIMETRIC DIGITAL CADASTRAL DIGITAL	SEE INDEX 92F PROJECT No. 83-035PC 92F.037