

PROJECT NUMBER B730101

PRELIMINARY EVALUATION OF THE SUITABILITY
OF THREE PROPOSED SITES
FOR INSTALLATION AND OPERATION OF
PUMPED-TYPE EFFLUENT DISPOSAL FIELDS
TO SERVE EXPANSION OF
BRIDAL FALLS GOLF COURSE FACILITIES

Prepared for
BRIDAL FALLS GOLF & COUNTRY CLUB
53191 Bridal Falls Road
POPKUM, B.C. V0X 1X0

Prepared by
PACIFIC HYDROLOGY CONSULTANTS LTD.
201 - 1537 West 8th Avenue
VANCOUVER, B.C. V6J 1T5

MAY 23, 1997

PACIFIC HYDROLOGY CONSULTANTS LTD. Consulting Hydrogeologists

Suite 201, 1537 West 8th Avenue, VANCOUVER, B.C. V6J 1T5
Telephone: (604) 730-6990 Facsimile: (604) 730-6931

Project No. B730101

May 23, 1997

Bridal Falls Golf & Country Club
53191 Bridal Falls Road
POPKUM, B.C. V0X 1X0

Attention: Mr. Marvin Gaukel

Subject: Preliminary Evaluation of the Suitability of Three Proposed Sites for Installation and Operation of Pumped-Type Effluent Disposal Fields to Serve Expansion of the Bridal Falls Golf Course Facilities

Dear Sir:

1.0 INTRODUCTION

The purpose of this letter is to discuss the results of our preliminary evaluation of hydrogeologic conditions at three proposed sites being considered for installation of pumped-type effluent disposal fields to serve enlarged facilities at the Bridal Falls Golf & Country Club (BFGCC), located a short distance east of the Agassiz-Rosedale Highway and Trans-Canada Highway Interchange, between Bridal Falls Road and the Trans-Canada Highway.

The letter is further to telephone discussions between Norman Gaukel, President of BFGCC, and Ann Badry, P. Geo., Hydrogeologist/Manager of Pacific Hydrology Consultants Ltd. (PHCL) and, in particular, it is further to onsite discussions on May 12, 1997 between Norman Gaukel and Ed Livingston, P. Eng, of PHCL. From these discussions and from a brief telephone discussion between Livingston and Mr. Richard G. McDermid, Planning Technician, Regional District of Fraser-Cheam (RDFC), we understand the following:

1. The existing BFGCC facilities consist of a nine-hole golf course, a driving range and a club house. The present source of water for domestic use is a small perennial creek on the mountainside south of the golf course. Plans call for extension of the Popkum water system to the Club for the supply of domestic water.
2. The sewage system for the existing club house consists of a septic tank discharging by gravity to a disposal field located under the driving range. This system has been trouble-free.

3. BFGCC plans to close the driving range and use this area for parking recreational vehicles which would connect to the water and electric power supplies. The R.V. parking area would cover the existing disposal field, which would be abandoned.
4. The expanded site facilities would be served by three new sewage disposal systems discharging either treated effluent or septic tank effluent to disposal fields located approximately as shown on Figure 2 in Appendix A.
5. For approval of the changes outlined above, RDFC requires an examination and assessment of the suitability of conditions for installation and operation of effluent disposal facilities at the proposed sites.

Background information about site soils, geology and hydrogeology is contained in the following:

1. A letter-report prepared by PHCL for BFGCC and dated February 26, 1992, on the subject "Suitability of Conditions for Onsite Wastewater Disposal for a Proposed Golf Course Clubhouse Near the Trans-Canada Highway Turnoff to Agassiz".
2. A second letter-report prepared by PHCL for BFGCC dated August 14, 1992, on the subject "Evaluation of Potential Impacts to Surface Water Drainage and Groundwater from Golf Course Runoff".
3. A letter prepared by PHCL to BFGCC dated September 24, 1992, on the subject "Amendment to Pacific Hydrology's Letter-Report of August 14, 1992 on the subject 'Evaluation of Potential Impacts to Surface Water Drainage and Groundwater from Golf Course Runoff'".

The following published documents were also considered in the preparation of this letter-report:

1. N.T.S. Map 92 H/4, **Chilliwack**, of scale 1:50,000, with 40 m contours.
2. Geological Survey Map 1487A West Half, **Surficial Geology Chilliwack**, of scale 1:50,000.
3. Geological Survey of Canada Bulletin 322, **Post-Vashon Wisconsin Glaciation, Fraser Lowland, British Columbia**, by J.E. Armstrong, 1981, 34 pp.
4. Geological Survey of Canada Paper 83-23, **Environmental and Engineering Applications of the Surficial Geology of the Fraser Lowland**, by John E. Armstrong, 54 pp.
5. B.C. Ministry of Environment Manual 5, **Soil Constraints for Septic Tank Effluent Absorption**, by P.F. Epp, P.Ag., Surveys and Resource Mapping Branch, February 1984, 90 pp.

2.0 FIELD INVESTIGATION

On May 12, 1997, Ed Livingston visited the BFGCC property. During the visit, a wheel-mounted backhoe was used to dig test pits at the three proposed field sites to permit an examination of subsurface conditions. The lithology of sediments exposed in each pit was logged; the lithologs of the pits are included in Appendix B. The approximate locations of the pits are shown on Figure 2 in Appendix A.

Test Pits 1-97 and 2-97, which are located on No. 4 fairway, were excavated in landslide rubble which has only a thin cover of sod and very thin soil. *Test Pit 1-97* was dug in compact undisturbed material consisting of many large angular fragments of black argillite in a matrix of moist black silty soil and small angular rock fragments. The fine soil portion of the matrix was quite silty and somewhat plastic. *Test Pit 2-97*, which was dug at a site about 25 m north of Test Pit 1-97, encountered the same type of sediment as 1-97; however, the sediment in 2-97 seemed to be less compact, perhaps as a result of disturbance during landscaping of the fairway. Mr. Gaukel stated that the No. 4 fairway may be further landscaped by building up the north side with a metre or more of imported sand and gravel which would probably cover the site of Test Pit 2-97 but would not extend over the area of Pit 1-97. The thickness of the rubble in this area is unknown but we estimate that it is more than ten metres, with an estimated water table of at least ten metres below surface.

Test Pit No. 3-97 was also excavated in landslide debris, but the debris, which was much finer and without the large angular fragments present at the sites of Test Pits 1-97 and 2-97, consisted of small angular black argillite fragments in a brownish soil matrix which was quite plastic. The area of Test Pit 3-97 was an agricultural field in the past so the 0.4 m thick brown loam soil has probably been disturbed by cultivation.

The digging of *Test Pit No. 4-97* encountered the debris fan which overlies the landslide rubble. The debris fan consists of sloping alternating layers of more and less permeable sediments, the permeable layers being very fine gravel of black argillite grains. The fine loam material at the bottom of the pit showed some rusty staining but this staining does not seem to be mottling.

3.0 SURFICIAL GEOLOGY

The surficial geology of the lower (northern) part of the subject area is discussed in the previously listed PHCL report of February 1992, which states that the lower part of the property is on a fan, probably best described as a debris fan because of its relatively steep slope. As noted above, the digging of test pits during the present investigation shows that the fan is deposited over landslide rubble which extends northward for several hundred metres beyond the subject property. The landslide can properly be called a rock fall caused by collapse of the very steep slope of black argillite. There is some evidence that this slope collapse and subsequent debris flow occurred about 10,000 years ago, at the end of the last glacial episode in the Fraser Valley area. The debris fan on which the BFGCC club-house, the driving range and part of the golf course are located, was deposited since the rock fall. During this time, weathering and depositional processes have filled the openings in the very coarse upper part of the rubble with fine sediment to form the compact material exposed in three of the test pits.

Experience with landslide rubble in the area north of the subject property, shows that it is moderately permeable. Because the deposit is massive rather than layered, the direction of groundwater movement in the unsaturated zone above the water table, is essentially vertical. When water in the unsaturated zone reaches the water table, it becomes part of the groundwater flow which is controlled by the gradient and hydraulic conductivity. Water movement in the fan is generally down-slope because the fan is made up of sloping layers and lenses of contrasting hydraulic conductivity in which water tends to flow through the coarse layers but also "leaks" down through the finer-grained layers.

4.0 WASTEWATER DISPOSAL

Based on our knowledge of hydrogeologic conditions, it is our opinion that the three proposed sites are suitable for the construction and operation of properly designed and constructed effluent disposal fields. The design of the individual fields will depend, of course, on the actual permeability of the undisturbed materials as shown by standard perc tests. The proposed pump-type fields are certainly preferable under the soil and geological conditions shown by the test pits. Use of such effluent disposal facilities which are properly designed, constructed and operated will not have negative impacts on groundwater or surface water in the area.

5.0 SUMMARY AND CONCLUSIONS

1. Hydrogeologic conditions at the site of the proposed field in the area of Test Pit 4-97 are very similar to those at the existing field, whose operation has been trouble-free.
2. The proposed site of the effluent disposal field on fairway No. 4 may be in compact landslide rubble or on imported fill brought in for landscaping. In our opinion, either location would be feasible, but additional site specific investigation, including standard perc tests, are required with the field properly designed to deal with unusual local conditions.
3. When the area of the existing wastewater disposal field is required for R.V. parking and is abandoned, it can be satisfactorily replaced by the proposed pumped-type disposal facilities.
4. As far as groundwater hydrology and surface water are concerned, properly designed, constructed and operated fields at the proposed sites will not have a negative impact on groundwater quality.

6.0 CLOSURE

This letter and attachments have been prepared to provide a preliminary evaluation of hydrogeologic conditions with respect to three proposed sites for the construction and operation of pumped-type effluent disposal fields to serve enlarged facilities at Bridal Falls Golf & Country Club.

We trust that this letter is adequate for present purposes and that it satisfies requirements of Regional District of Fraser-Cheam. However, please do not hesitate to contact us for further clarification of any aspect of the contents of the letter or if we can provide further assistance at this time.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

Ed Livingston

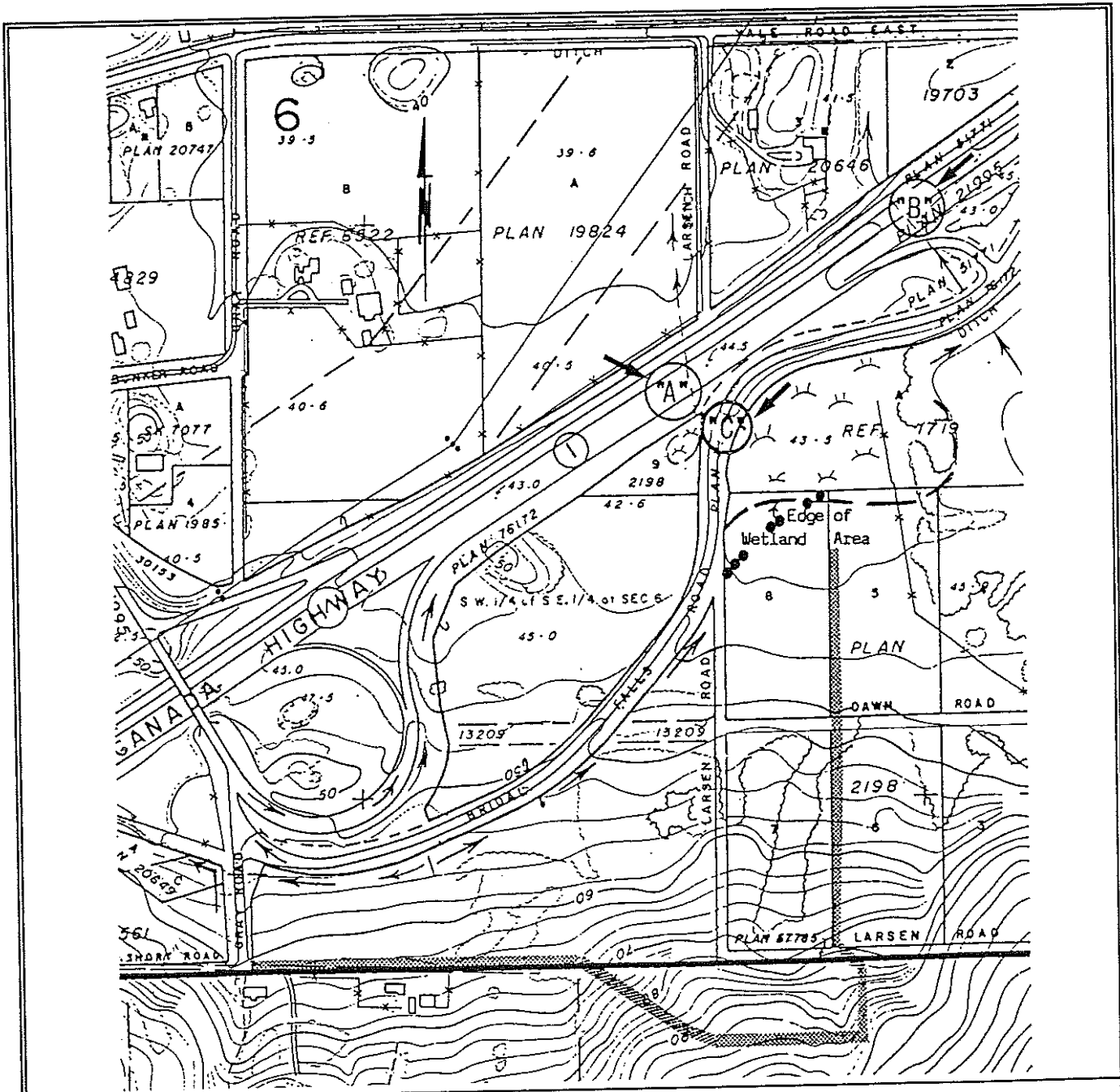
Ed Livingston, P. Eng.
Associate Consultant




Attachments - *Appendix A - Area Location and Test Pit Location Maps*
Appendix B - Test Pit Lithologs

APPENDIX A

AREA LOCATION AND TEST PIT LOCATION MAPS



Notes:

1. The scale of the base map is approximately 1:5,555; contour interval is two metres.
2.  outlines south boundary of BFGCC site (for test pit locations, see Figure 2); note that Figure is a reduced-scale of Figure 1 in PHCL's letter of September 24, 1992, which showed features of surface drainage.

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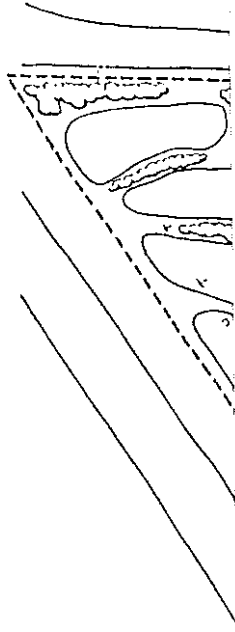
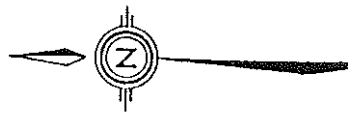
PROJECT:
BFGCC FACILITIES EXPANSION

LOCATION:
 East of the Agassiz-Rosedale Hwy and Trans-Canada Hwy Interchange, between Bridal Falls Road and Trans-Canada Hwy



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AREA LOCATION AND TOPOGRAPHY

DATE: 05/23/97	DRAWN BY: ab	FIGURE: 1
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Notes:

1. The base map is the "Master Concept Plan", of approximate scale 1:3100, which was included in PHCL's letter-report of August 14, 1992 concerning site drainage issues.
2.  indicates the approximate (unsurveyed) areas of respective existing and proposed septic fields.
3.  denotes approximate (unsurveyed) location of a test pit (for test pit details, see Appendix B).

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PROJECT:

BRIDAL FALLS GOLF & COUNTRY CLUB
FACILITIES EXPANSION

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SEPTIC FIELD AND TEST PIT LOCATIONS

LOCATION:

East of the Agassiz-Rosedale Hwy and Trans-Canada Hwy
Interchange between Bridal Falls Road and Trans-Canada Hwy

DATE:

05/22/97

DRAWN BY:

ab

FIGURE:

2

APPENDIX B

TEST PIT LITHOLOGS

BRIDAL FALLS GOLF & COUNTRY CLUB TEST PIT LITHOLOGS

General site location: A short distance east of the Agassiz-Rosedale Highway and Trans-Canada Highway interchange, between Bridal Falls Road and the Trans-Canada Highway.

Date of test pit digging: May 12, 1997.

Test Pit 1-97

Location: South side of No. 4 fairway.

Litholog:

0.0	-	0.05	m	sod and brown sand
0.05	-	1.3	m	landslide rubble of black argillite fragments, of average size \approx one cm (longitudinal cross-section) but with large pieces up to one metre, and boulders, in a moist, black, silty, sandy, clayey matrix.

Test Pit 2-97

Location: About 23 m north of Test Pit 1-97, on north side of No. 4 fairway.

Litholog:

0.0	-	0.05	m	sod and brown sand
0.05	-	0.25	m	brown fill from landscaping
0.25	-	0.35	m	black landslide rubble as in TP 1-97.

Test Pit 3-97

Location: On No. 1 fairway, about 90 m downslope (north) of Gray's house.

Litholog:

0.0	-	0.2	m	sod on sandy brown loam
0.2	-	0.4	m	brownish-grey loam with many angular fragments of black argillite
0.4	-	1.3	m	landslide rubble of small black argillite fragments, with moist, brownish-grey, quite fine grained and plastic matrix that can be rolled to a pencil; no boulders.

Test Pit 4-97

Location: About 50 m east of clubhouse and 15 m north of access road.

Litholog:

0.0	-	0.2	m	sod on dark grey soil
0.2	-	0.65	m	dark-grey silty loam with thin layers of very fine gravel of argillite grains
0.65	-	1.1	m	fine gravel of angular, black argillite grains; loose
1.1	-	1.6	m	dark brown to dark grey silty loam, somewhat plastic but cannot be rolled to a pencil; colours are not uniform but do not seem to be mottling.

Comments: Pit is in a debris fan with layers dipping downslope.