

MR. H. J. VOSBURGH

INVESTIGATION OF SOIL AND GROUNDWATER CONDITIONS ON
A PROPOSED SUBDIVISION AT 34648 DANN AVENUE, HATZIC, B. C.
DISTRICT OF MISSION SUBDIVISION APPLICATION S89-07

PACIFIC HYDROLOGY CONSULTANTS LTD.

APRIL 18, 1989

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May 18, 1989

Mr. H. J. Vosburgh
34648 Dann Avenue
MISSION, B. C. V2V 6B2

Subject: Investigation of Soil and Groundwater Conditions on
a Proposed Subdivision at 34648 Dann Avenue,
Hatzic, B. C.
District of Mission Subdivision Application S89-07

Dear Mr. Vosburgh:

This letter is further to a telephone discussion on May 10 (Vosburgh, Badry) and to discussions onsite (Vosburgh, Livingston) on May 11 and 13 about drainage conditions on a parcel of land at 34648 Dann Avenue in Hatzic, which you propose to subdivide.

1.0 INTRODUCTION

The purpose of this letter-report is to discuss the results of the investigation which we carried out to evaluate the soil and groundwater conditions on the subject property, as required by the District of Mission as part of the

subdivision approval process. The specific issues which the District of Mission has requested be addressed are the following:

1. A review of subsoil conditions to assess their suitability for disposal of surface stormwater and domestic effluent.
2. A recommendation as to whether the proposed subdivision layout is acceptable or whether revision is necessary.
3. Short or long-term effects on adjacent properties.

The legal description of the proposed subdivision is Remainder of Lot 30, D. L. 6, Group 3, N.W.D., Plan 25655. The regional topographic setting of the subject property is shown on Figure 1 in Appendix A. The proposed lot layout of the Subdivision is shown on Figure 2.

Preparation of this letter-report is based on the following:

1. N.T.S. topographic Map 92G/1f, **Mission**, of scale 1:25,000 and a draft plan at an approximate scale of 1:1000.
2. Geological Survey of Canada Map 1485A, **Surficial Geology Mission British Columbia**, of scale 1:50,000, published in 1980.
3. Water Well Location Map Sheet 18 of Lower Fraser Valley, of scale 1" = 1000 ft (1:12,000); prepared by Groundwater Section of B. C. Ministry of Environment.
4. A letter-report by Hardy Associates (1978) Ltd., dated May 8, 1981 and addressed to Mr. James Vosburgh, that deals with drainage on a proposed four-lot subdivision of the northern part of the property covered by the present report.

5. Examination of three test pits dug on the southern part of the property which is proposed to be subdivided into five lots. The pits were dug on May 19 and examined on May 20.
6. Reconnaissance of general hydrogeological conditions in the subject area.
7. **Design Manual Onsite Wastewater Treatment and Disposal Systems**, published by U. S. Environmental Protection Agency, October 1980, 392 pp.

From discussions between J. Vosburgh and E. Livingston, we understand that the situation with respect to drainage on the subject property is as follows:

1. The northern part of the property proposed for subdivision has been subdivided into four lots with a cul-de-sac on the southwest corner. The Hardy Associates Report of May 8, 1981 was prepared to deal with stormwater drainage on this subdivision; wastewater disposal was not discussed.
2. The plan is to subdivide the southern part of the property into five lots, approximately as shown on the enclosed sketch map (Figure 2, Appendix A). The lot with the house will be retained by the Vosburgh's.
3. Access for all of the lots is from Dann Avenue which will be extended along the west boundary of the subject parcels so as to reach all of the lots. For this reason, an house on the proposed southernmost lot will be constructed on the northern part of the lot, not far from the Vosburgh's House.

4. There is no sanitary sewer or stormwater drain in the subject area. Effluent disposal is by septic tank and drain field. Stormwater along Dann Avenue flows into rock pits.
5. There is an old dug well on the steep slope on the southernmost lot (9) of the proposed subdivision. This well, which flows year-round at surface, formerly supplied water to the Vosburgh House. It is still in existence and discharges water through a buried pipe to a sump at the foot of the slope. Other short subsurface drains also discharge into the sump, from which water flows through perforated Big-O pipe south to the lot boundary, then east along the boundary about half way to the corner. The purpose of the perforated pipe is to dispose of the water in the gravel along the boundary.
6. Between the old well and the sump, there is a distinct permanently waterlogged area which is covered with skunk cabbage. The grass-covered area around the waterlogged area is well drained and shows no signs of waterlogging.
7. A gradual increase in the discharge of water from the old well and the waterlogged area has been observed as the residential development of the area has taken place.
8. An easement has been obtained for a stormwater drain from the southeast corner of the subject property south along the boundary of that property immediately east (Lot 3, Plan 10316) of the southeast corner of the proposed subdivision, to the drainage ditch along the Lougheed Highway (Figure 2, Appendix A). The plan is to extend this easement northwestward along the boundary of the proposed lots to the south end of the extension of Dann Avenue. Drainage from the dug well or the sump can be tied to this stormwater drain if necessary.

Recharge from precipitation is intermittent, occurring mostly in late winter and early spring but, because of the long path of flow and low permeability of the subsurface, discharge is continuous. This explains why the old dug well was a dependable year-round source of water.

At the subject property, we are only concerned with shallow groundwater either originating from precipitation on, or from wastewater discharged into the ground in a drain field. After the precipitation or wastewater enters the ground, it moves down through the soil under conditions of unsaturated flow. The fate of the recharge water, whether it is precipitation or wastewater from drain fields, is controlled by the rate of flow. Considering that a drain is planned to convey stormwater from the subject property to the drainage ditch along the Lougheed Highway, in this report we are only concerned with the feasibility of onsite disposal of effluent.

4.0 WASTEWATER DISPOSAL

The digging of a total of six test pits on the subject property by a backhoe is the basis for evaluating the suitability of the property for the use of onsite domestic wastewater disposal systems. Three of these test pits were

excavated in 1981 for a study carried out by Hardy Associates (1978) Ltd. partly to assess the feasibility of using rock pits for stormwater disposal. We have accepted the descriptions of the soil conditions in these pits and we have informed Hardy Associates that we are doing so. Three additional test pits were dug for the investigation covered by this report. The locations of all of the test pits are shown on Figure 2 in Appendix A and the descriptions of the soil profiles are contained in Appendix B.

Test pits one to five show that there is a minimum of 1.6 m (5.2 ft) of unsaturated sediment on the upper part of the property where the wastewater disposal facilities for eight of the lots would be located; therefore such facilities, which are located in a recharge area for local groundwater flow, are expected to perform satisfactorily assuming that they are properly constructed and maintained.

Conditions on the large south lot (9), as shown by Test Pit 6, are quite different. We understand that, because of access, a house on this lot must be located at the north end of the lot. Since there would then be little area remaining at the north end, the disposal field would probably be located on the south part of the lot. As shown on Figure 2 in Appendix A, Test Pit 6 on the lower lot is located in an area of lawn east of the drainage sump and at a slightly higher elevation. At the time we inspected the pit, it had

been open and undisturbed since the previous day; therefore, the water level in the Pit, which was at a depth of 1.4 m (4.6 ft) below surface is believed to represent the water table elevation. However, colour mottling extended above the water level up to about 0.9 m (3.0 ft) below surface indicating that water has repeatedly risen to this level in the past. It was not possible to see the material below the water level but an inspection of the spoil from the Pit indicates that it is probably a very silty grey gravel or perhaps a gravelly till. The experience with the dug well indicates that water is probably discharging from it.

There is strong evidence that the shallow groundwater is local:

1. No drainage problems are reported on the three residential properties adjacent to the south boundary of the subject property.
2. No groundwater discharge occurs in the road ditch along the Highway below the subject property although discharge occurs along the C.P.R. Track at much lower elevation.
3. A cut bank, almost two metres high, at the southeast corner of the subject property is completely dry.
4. The soak-away system which drains water from the sump has worked well although there are signs now that it may be clogged.

Considering that the lower part of the slope is in the discharge zone for both local and regional groundwater flow, local occurrences of shallow groundwater within the heterogeneous ice contact sediments is not unexpected.

5.0 CONCLUSIONS

From our investigation and understanding of the situation at the proposed subdivision at 34648 Dann Avenue in Hatzic, we conclude the following:

1. The northern part of the proposed subdivision is located on a terrace at elevation about 50 m (165 ft) above the Fraser River. The property slopes steeply southward down to a lower terrace at elevation about 23 m (75 ft).
2. Test pit excavations and groundwater phenomena indicate that the area is underlain by ice contact deposits. These deposits are overlain by about one metre of silt which is probably loess (windblown very fine sand and silt).
3. The upper terrace is a recharge area for a local groundwater flow system where water from precipitation moves downward, and the lower part of the terrace front is a groundwater discharge area where groundwater moves upward and discharges near the old dug well. Regional groundwater flows through permeable sediments underlying the lower terrace toward the discharge area in the Fraser River valley bottom.
4. Conditions are suitable for wastewater disposal fields on the upper terrace but a disposal field on the lower part of the large south lot of the proposed subdivision must be sited with care.
5. The proposed drain, which will carry stormwater from the proposed subdivision directly to existing drainage along Lougheed Highway, will prevent any impact to adjacent properties.

Mr. H. J. Vosburgh
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6.0 RECOMMENDATIONS

The following recommendations are made in regard to the use of onsite effluent disposal facilities on the proposed subdivision at 34648 Dann Avenue in Hatzic:

1. Ensure that all wastewater disposal facilities are constructed to the highest standard and are properly maintained.
2. To deal with the shallow groundwater conditions encountered on the lower part of Lot 9, locate the drain field east of Test Pit 6, close to the east boundary. Before installing the drain field, dig a test pit at the proposed site of the field to check for the presence of shallow groundwater and, if necessary, move the field a short distance upslope.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.



E. Livingston, P. Eng.

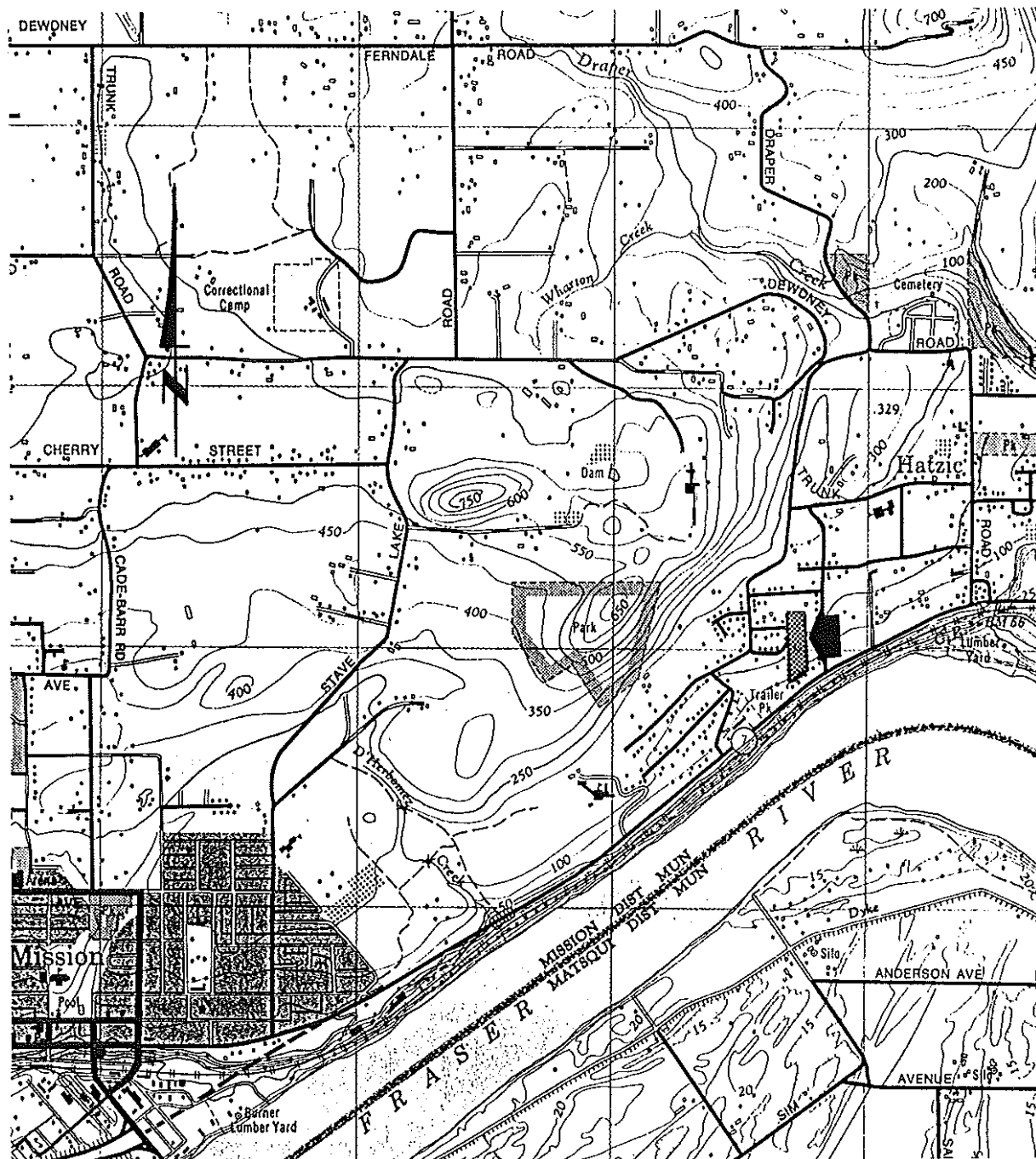
Attachments

APPENDIX A

AREA LOCATION MAP AND SITE PLAN

FIGURE 1

AREA LOCATION MAP - PROPOSED VOSBURGH SUBDIVISION
AT 34648 DANN AVENUE, HATZIC, B. C.



Notes:


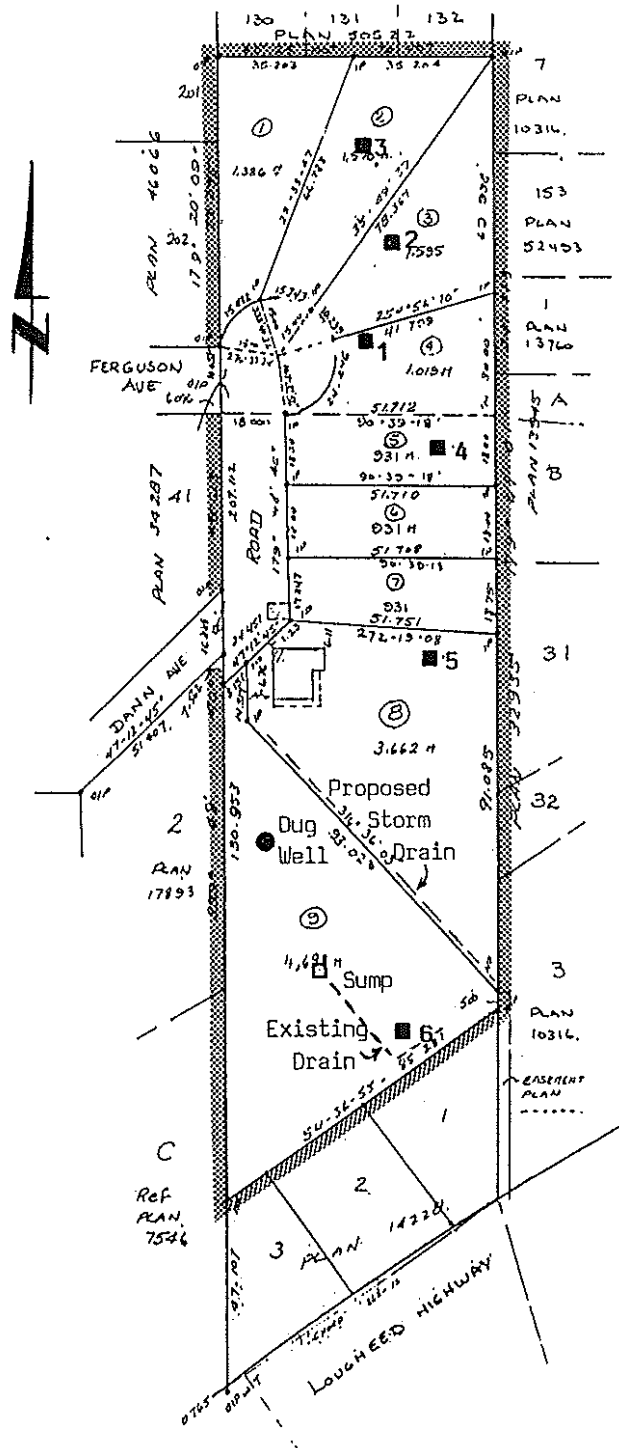


1. The base map is 1:25,000 scale topographic map N.T.S. 92G/1f, Mission; contour interval is 50 ft.
2.  Location of Vosburgh Property.

FIGURE 2

TEST PIT LOCATIONS ON VOSBURGH PROPERTY
AT 34648 DANN AVENUE, HATZIC, B. C.



Notes:

1. The base map is J.M.C. Wade & Associates Plan M-1664-89 reduced to approximate scale 1:1950.
2.  Boundary of proposed subdivision.
3.  1 Approximate (unsurveyed) location of a test pit (see Appendix B).

Test Pit Logs from a 1981 Report
by Hardy Associates (1978) Ltd.

TP 1

0	-	0.1 m	(0	-	0.3 ft)	topsoil
0.1	-	0.9 m	(0.3	-	3 ft)	silt - fine sandy, roots, loose - brown
0.9	-	1.5 m	(3	-	5 ft)	sand - medium, odd boulders - relatively clean, medium dense - rust brown to grey
1.5	-	1.8 m	(5	-	6 ft)	sand - medium, slightly silty, grey - rounded cobbles and boulders
1.8	-	2.4 m	(6	-	8 ft)	silt (till-like) - sandy, mottled grey brown - dense. Changes to dense silty sand.

TP 2

0	-	0.2 m	(0	-	0.6 ft)	topsoil
0.2	-	0.9 m	(0.6	-	3 ft)	silt - fine sandy (changes to sand), silty, fine, loose to medium dense
0.9	-	1.7 m	(3	-	5.5 ft)	sand - fine, silty, medium dense to dense
1.7	-	2.7 m	(5.5	-	9 ft)	silt - sandy, mottled grey brown to grey, dense to very dense layers of (laminated) silty very fine sand.

TP 3

0	-	2.4 m	(0	-	0.8 ft)	silt (topsoil) - organic, roots - black
2.4	-	1.1 m	(0.8	-	3.5 ft)	silt - fine sandy, roots - brown
1.1	-	3.4 m	(3.5	-	11.0 ft)	sand - fine, silty, cobbles - loose to medium dense - light brown - damp - grey and dense at depth, grey at 6 ft.

Logs of Test Pits Dug in May 1989
and Described by Pacific Hydrology Consultants Ltd.

TP 4

0	-	0.1 m	(0	-	0.3 ft)	dark organic soil, roots
0.1	-	0.6-0.7 m				
			(0.3	-	2.0-2.3 ft)	reddish-brown fine silt, a few sand grains, many roots
0.6	-	1.6 m	(2.0	-	5.2 ft)	tan-grey, medium grain sand, massive with a few pebbles, cobbles and boulders at bottom, appears to overlie silty gravel.

TP 5

0	-	0.1 m	(0	-	0.3 ft)	dark brown soil, roots
0.1	-	0.5 m	(0.3	-	1.6 ft)	medium brown silt, a few sand grains, many roots
0.5	-	1.6 m	(1.6	-	5.2 ft)	coarse loose gravel, sandy, light brown, no bedding, heterogeneous - probably ice contact
		at 1.6 m			(at 5.2 ft)	dark grey, moist, sandy, gravelly till.

TP 6

0	-	0.1 m	(0	-	0.3 ft)	dark grey-brown soil, roots
0.1	-	1.2 m	(0.3	-	3.9 ft)	dark brownish-grey silty clay, moist, plastic, rusty mottling below 0.9 m
1.2	-	1.4 m	(3.9	-	4.6 ft)	grey coarse loose sand, some rusty mottling; contact with overlying clay is sharp but irregular
		at 1.4 m			(at 4.6 ft)	standing water; spoil pile indicates that the bottom of the pit is in silty grey gravel or gravelly till.