ROSATO CONSTRUCTION LTD.
(District of Mission Subdivision Application 89-113)

HYDROGEOLOGIC EVALUATION IN REGARD TO DISPOSAL OF WASTEWATER AND STORM WATER ON A PROPOSED SUBDIVISION AT 32952 DEWDNEY TRUNK ROAD IN THE DISTRICT OF MISSION

PACIFIC HYDROLOGY CONSULTANTS LTD.
DECEMBER 21, 1989

E. LIVINGSTON, P. Eng.
A. BADRY

PACIFIC HYDROLOGY CONSULTANTS LTD.

CONSULTING GROUNDWATER GEOLOGISTS

204 - 1929 WEST BROADWAY
VANCOUVER, B.C. V6J 1Z3
TELEPHONE: (604) 738-9232

December 21, 1989

Rosato Construction Ltd.
32173 Buffalo Drive
MISSION, B. C. V2V 4P5

Attention: Mr. Paul Rosatone

Subject: **Hydrogeologic Evaluation in Regard to Disposal of Wastewater and Storm Water on a Proposed Subdivision at 32952 Dewdney Trunk Road in the District of Mission**
District of Mission Subdivision Application 89-113

Dear Sir:

This letter is further to a discussion at the subject property between Paul Rosatone and E. Livingston, P. Eng., of Pacific Hydrology, on December 15, 1989.

1.0 INTRODUCTION

The purpose of this letter is to discuss our hydrogeologic evaluation concerning the Proposed Subdivision of a parcel of land at 32952 Dewdney Trunk Road in the District of Mission, legally described as Lot 5, Section 33, Twp. 17, Plan 78120, New Westminister District. The regional topographic

.../2

setting of the subject property is shown on Figure 1 in Appendix A; the local topography and the proposed lot layout 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 1:2,500 District of Mission topographic plan, Sheet No. 1733S.

2. Geological Survey of Canada Map 1485A, **Surficial Geology Mission British Columbia**; scale 1:50,000, 1980.

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 82-23, **Environmental and Engineering Applications of the Surficial Geology of the Fraser Lowland, British Columbia**; by John E. Armstrong, 1984, 54 pp.

5. **Design Manual Onsite Wastewater Treatment and Disposal Systems**; United States Environmental Protection Agency, October 1980, 392 pp.

6. B. C. Ministry of Health **Sewage Disposal Regulation** (B. C. Reg 411/85, O.C. 2398/85), Sept. 30/86, 17 pp.

7. Examination of two test pits, one dug on each of the two unoccupied lots of the proposed subdivision.

8. General hydrogeologic reconnaissance.

.../3

As required by the District of Mission, this letter-report addresses the following:

1. An investigation and interpretation of the soil and groundwater conditions to assess their suitability for disposal of surface storm water and wastewater from domestic systems.

2. Consideration as to whether the proposed subdivision layout is acceptable or whether revision is advisable.

3. An evaluation of the short and long term effects on adjacent properties of the disposal of storm water and wastewater from the proposed subdivision.

2.0 TOPOGRAPHY AND SURFICIAL GEOLOGY

The subject property is located in a very flat area in the drainage of Silverdale Creek. Drainage on the property is northward toward a west-flowing drainage ditch along the south side of Dewdney Trunk Road. This is part of an extensive almost flat area of about five square kilometres at elevation about 140 m (460 ft). Drainage in parts of the area is poor except where drainage ditches or other artifical drainage works have been constructed.

.../4

GSC Map 1485A, previously listed, shows that the subject area is underlain by a variety of sediments of glacial origin, including glaciofluvial deposits (glacial sediments deposited by streams) and glaciolacustrine deposits (glacial sediments deposited under lake conditions). The geologic map shows that there are patches of eolian deposits on top of the glacial sediments. This material, usually called loess, is windblown dust which was deposited at the end of the last glacial period before vegetation had become well established. The property in question is located on one of the areas of loess. The loess is only shown on the geologic map where it is believed to be more than one metre thick.

3.0 SITE INVESTIGATION

From a discussion at the property between Paul Rosatone and Ed Livingston, we understand that plans call for constructing a house on each of the two unoccupied lots and that the houses will be located fairly close to Dewdney Trunk Road. The septic tanks and disposal fields would be located in back of the houses.

The field investigation consisted of the inspection of two test pits dug by a backhoe at the approximate locations of disposal fields. The pits were dug on the day previous

.../5

to E. Livingston's visit and they had partially filled with water so the bottom part of the holes was not observed. However, it was clear from the spoil piles that the lower part of the holes was in clean grey quartz sand. The upper part of the test pits was in fine uniform sediment with an average grain size about 0.05 mm (0.002"), approximately at the border between sand and silt. This fine sediment is free of pebbles and is believed to be the loess mentioned previously.

4.0 GROUNDWATER HYDROLOGY

The groundwater hydrology of the subject area is controlled by the very flat topography, the permeability of the underlying sand, the precipitation and the drainage ditch along Dewdney Trunk Road. Precipitation falling on the area percolates slowly downward through the silty upper layer into the clean sand and then moves more or less horizontally to the drainage ditch. Some water moves downward below the sand to join a major flow system which discharges into the Fraser River. However, for the discussion in this report with respect to the disposal of wastewater and storm water, we are only concerned with that portion of the flow system which discharges into the deep drainage ditch along the Road.

.../6

The depth to the water table on the property in question depends on the amount of water flowing through the sand. This depends on the precipitation and the amount of water reaching the aquifer. In winter months, when precipitation is high and is not intercepted by plants, the amount of water flowing toward the drainage ditch is considerable so the water table is high. In summer months, the water table drops. This repeated saturation and partial drying of the near-surface material causes colour mottling in the zone in which intermittent saturation occurs.

The groundwater hydrology of the area can be modified by improving the drainage on the property. This can be done by several conventional methods used to drain agricultural land. One modern method which may be suitable is the installation of subsurface drains composed of slotted corrugated polypropylene pipe (Big O). Such drains can be installed to a depth of two metres, or perhaps more, by a special type of "plow" pulled by a tractor; they can be run to the deep ditch along the Road. Advice on depth, spacing, etc., should be obtained from someone familiar with agricultural drainage problems.

.../7

5.0 WASTEWATER DISPOSAL FACILITIES

Our investigation of soil and groundwater conditions on the subject property has shown that a conventional wastewater disposal field constructed at present ground level would not conform with the regulations for such facilities because the water table is less than 1.2 m (4 ft) below surface during part of the year. Under these conditions, there are several alternative courses of action:

1. Improve the drainage to lower the water table and use conventional facilities.

2. Place enough fill to bring houses and drain fields high enough so that a conventional system can be used.

3. Construct a proper mound-type field at the back of the property with a sump and effluent pump and a conventional septic tank. These facilities are described in **Design Manual Onsite Wastewater Treatment and Disposal Systems**, previously listed.

6.0 STORM WATER DISPOSAL

Under the prevailing conditions at the subject property, where the water table is already close to surface and where there is a deep drainage ditch along the road, storm water from roofs and paved areas should be piped directly to the ditch.

.../8

7.0 SUMMARY

1. The subject property is located in the drainage of Silverdale Creek in a very flat area underlain by a variety of glacial sediments.

2. On the subject property, the glacial sediments are glaciofluvial in origin and consist of a clean sand which is overlain by fine uniform sediment believed to be loess.

3. The groundwater hydrology of the area of the proposed subdivision is controlled by the very flat topography, the permeability of the underlying sand, the precipitation and the drainage ditch along Dewdney Trunk Road.

4. The distance to the water table depends on the amount of water flowing through the sand; therefore, the water table is high in winter months during times of high precipitation and low in summer months when no recharge is taking place from precipitation and when evapotranspiration losses are high. The repeated cyclic saturation and drying produces prominent colour mottling in the soil.

5. The upper limit of saturation indicated by the mottling in the sediments exposed in the test pits shows clearly that the water table is less than 1.2 m (4 ft) above surface for part of the year. To use conventional facilities, either the drainage can be improved to lower the water table or fill can be added to raise houses and drain fields high enough. Alternatively, mound-type facilities could be constructed at the backs of the proposed lots.

.../9

8.0 RECOMMENDATIONS

1. Whichever alternative for wastewater disposal is followed, ensure that the undisturbed soil is left in place beneath the disposal field.

2. Convey storm water from roofs and paved areas directly to the ditch.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

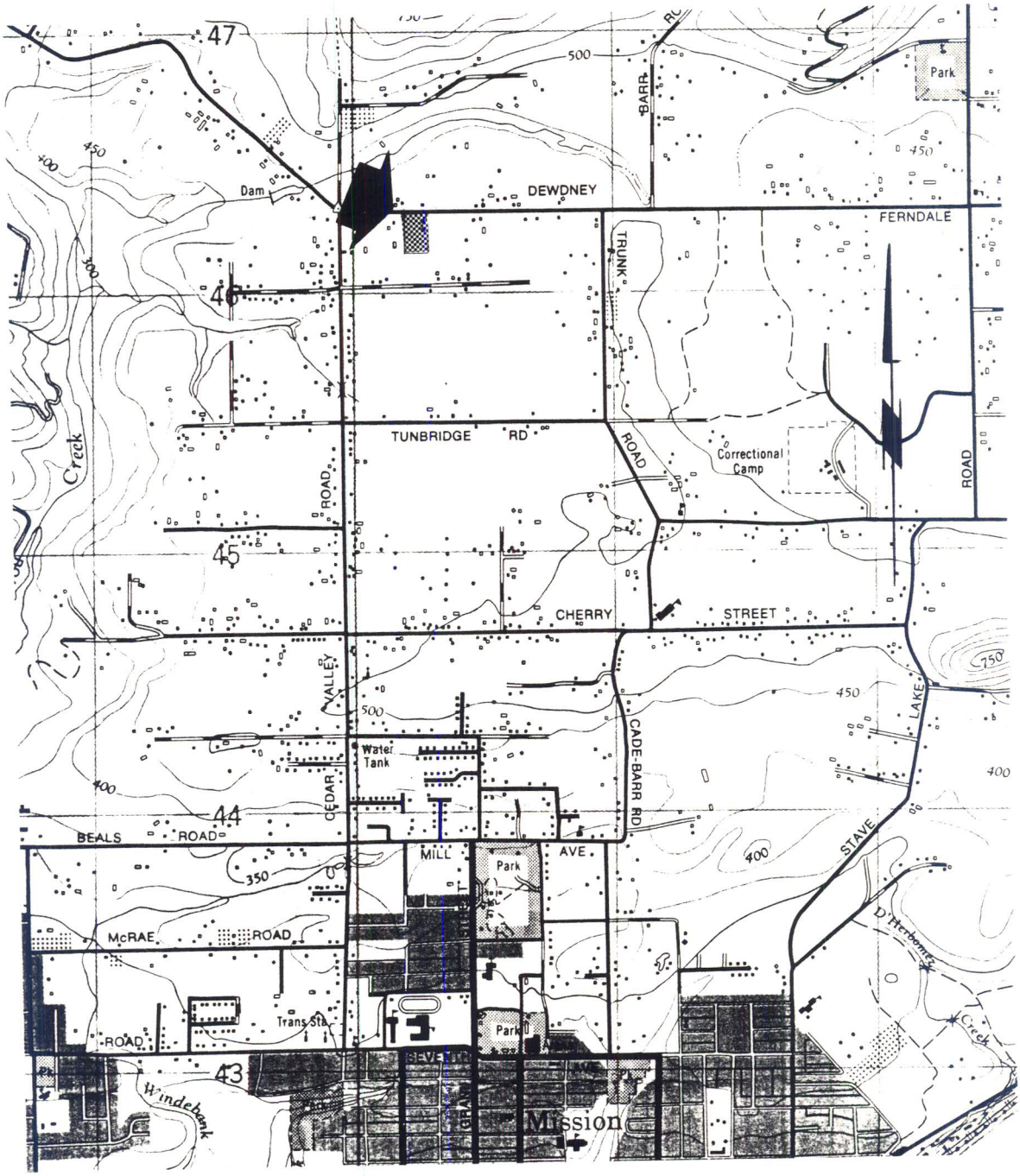
E. Livingston, P. Eng.

Attachments

APPENDIX A

AREA LOCATION MAP AND SITE PLAN

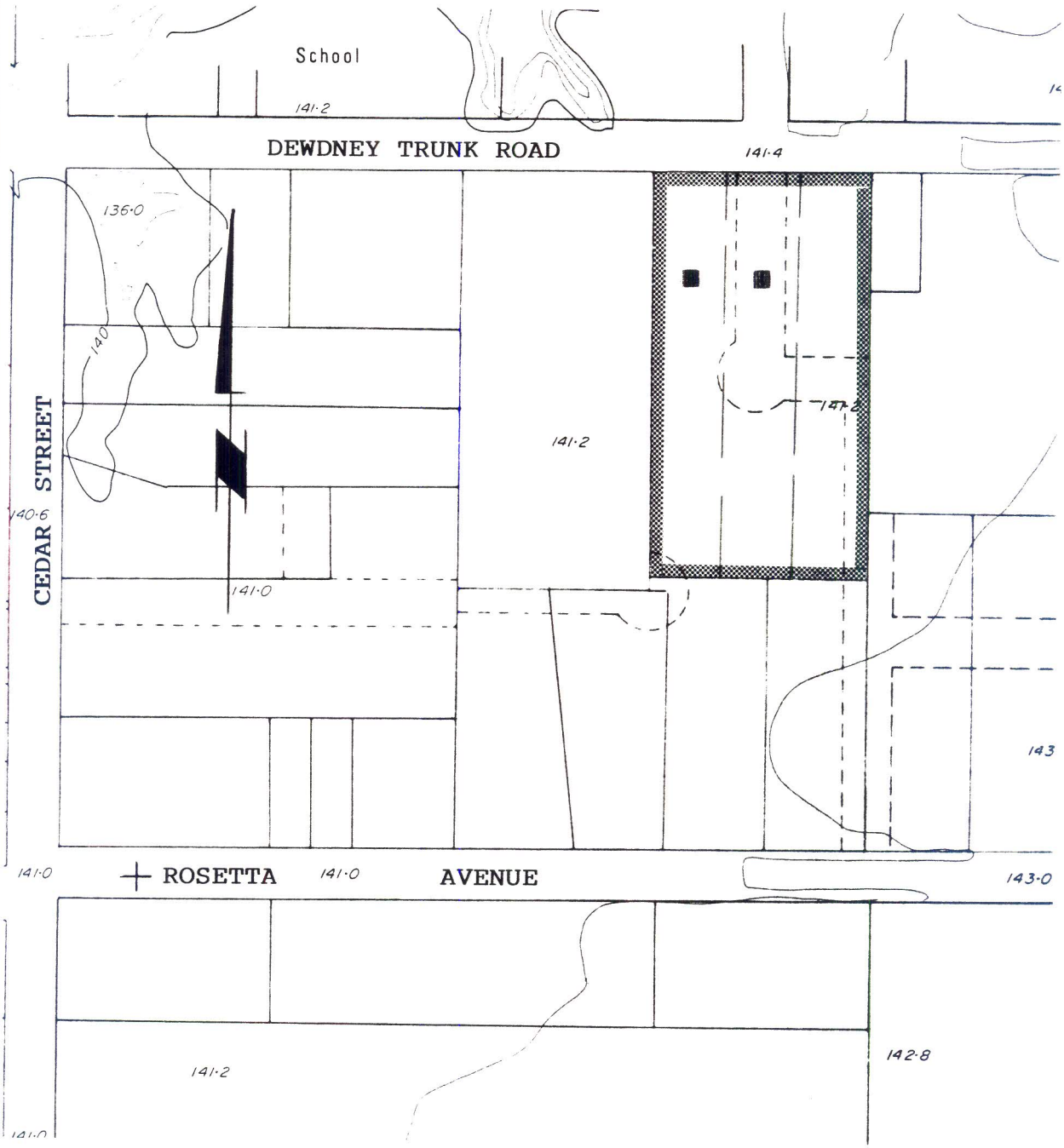
FIGURE 1	AREA LOCATION MAP - PROPOSED SUBDIVISION AT 32952 DEWDNEY TRUNK ROAD, DISTRICT OF MISSION



Notes:

1. The base map is 1:25,000 scale topographic map N.T.S. 92G/1f, **Mission;** contour interval is 50 ft.
2. ➧▒ indicates the location of the subject property.

FIGURE 2	TEST PIT LOCATIONS ON PROPOSED SUBDIVISION AT 32952 DEWDNEY TRUNK ROAD, DISTRICT OF MISSION



Notes:

1. The base map is 1:2,500 scale topographic plan Sheet No. 1733S of District of Mission; contour interval is two metres.
2. ▒▒▒▒ indicates boundary of subject property.
3. ■ marks the approximate (unsurveyed) location of a test pit.

APPENDIX B

TEST PIT LITHOLOGS

TEST PIT LITHOLOGS

Location of property: In the District of Mission on the south side of Dewdney Trunk Road (at 32952), east of Cedar Valley Road.

Legal description of property: Lot 5, Sec. 33, Twp. 17, Plan 78120, N.W.D.

Date of test pit digging: December 14, 1989.

Date of test pit examination: December 15, 1989.

Test Pit on Centre Lot

Total depth: 1.9 metres.

Distance to water: 0.85 metres.

Litholog:

0 - 1.3 m The upper part of the test pit, above the water, is silt with a uniform grain, approximately at the border between silt and sand (about 0.05 mm). It is free of pebbles and is probably weathered loess (windblown dust). The soil which is dark in colour does not form a uniform layer, perhaps because of disturbance in land clearing. There are black patches which may be organic. Prominent rusty and light tan mottling starts at about 0.4 metres.

1.3 - 1.9 m This zone was not observed in place but the material can be seen on the spoil pile to consist of uniform, medium grain quartz sand with rare pebbles. The sand has rusty patches; this may be mottling extending down into the sand.

Test Pit on West Lot

Total depth: 1.9 metres.

Distance to water: 1.05 metres.

Litholog:

0 - 1.4 m	silt as described in the hole on the centre lot; mottled below about 0.5 metres
1.4 - 1.9 m	sand as described in the pit on the centre lot.

Remarks: The ground elevation at this test pit is slightly higher than that at the test pit on the centre lot; therefore, the elevation of the water table at about 1.05 metres below surface is probably the same as that in the test pit on the centre lot.