LANG ENGINEERING (1988) LTD.

SUITABILITY OF HYDROGEOLOGICAL CONDITIONS FOR SUBDIVISION OF A PARCEL OF LAND AT 8590 CEDAR VALLEY ROAD OPPOSITE EGGLESTONE AVENUE IN THE DISTRICT OF MISSION

PACIFIC HYDROLOGY CONSULTANTS LTD.

JANUARY 8, 1990

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

January 8, 1990

Lang Engineering (1988) Ltd.
204 - 2790 Gladwin Road
ABBOTSFORD, B. C. V2T 4S8

Attention: Mr. N.L. Lang, P. Eng.

Subject: **Suitability of Hydrogeological Conditions for Subdivision of a Parcel of Land at 8590 Cedar Valley Road Opposite Egglestone Avenue in the District of Mission**

Dear Sirs:

This letter is further to our (N. Lang, E. Livingston) telephone discussions of January 2, 3 and 8, and also to discussions onsite on January 5 between E. Livingston and S. Bentley, about the proposed subdivision of a parcel of land at 8590 Cedar Valley Road in the District of Mission.

1.0 INTRODUCTION

From the aforementioned telephone and onsite discussions and from E. Livingston's site visit of January 5, we understand that the situation concerning subdivision of the subject property is as follows:

1. The plan of the proposed residential subdivision at 8590 Cedar Valley Road is shown on a drawing by Lang Engineering (1988) Ltd., Job No. 89-436, titled "Conceptual Site Services for Proposed Sub-Division for Ken Tiderington on Cedar Valley Road Mission, B. C.".

.../2

2. Individual lots of the proposed subdivision vary in size from 0.36 to 0.50 hectares (0.9 to 1.2 acres).

3. The proposed 11 lot subdivision would use individual septic tank - tile drain field systems for wastewater disposal.

In addition to the conceptual plan of the subdivision and the site investigation of January 5, the following sources of information were considered in the preparation of this letter-report:

1. N.T.S. topographic map 92G/1f, **Mission**, of scale 1:25,000 and 1:2,500 scale District of Mission topographic plan, Sheet No. 1728N.

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

3. Geological Survey of Canada Bulletin322, **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 four test pits.

.../3

The regional topographic 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.

2.0 TOPOGRAPHY AND SURFICIAL GEOLOGY

The subject property is located on an extensive area of very low relief at elevation about 145 metres (475 ft). The drainage is northwestward into Silverdale Creek.

The property under discussion is covered with second-growth wetland forest composed largely of alder, cedar and birch trees. At the time of E. Livingston's field investigation on January 5, there was considerable standing and flowing water in the bush. There are several shallow overgrown drainage ditches on the property but this drainage is not effective

Geological Survey of Canada Map 1485A of the surficial geology shows the southern part of the subject property to be underlain by a complex of glaciolacustrine deposits (Sh) and recessional channel and floodplain deposits laid down by proglacial streams (Sa). The northern edge of the property is shown to be underlain by "Eolian deposits: SAt, windblown sand, silt and silt loam, 1 to 8 m thick". However, from an exposure in the road ditch along Cedar Valley Road near the south end of the property, it seems likley that the eolian deposits extend southward across the entire width of the property under discussion.

.../4

3.0 SITE INVESTIGATION

The site investigation consisted of traversing the parcel of land, followed by the digging of four test pits by a track-mounted excavator to a depth of $2\frac{1}{2}$ to 3 metres. The test pits, which rapidly began to fill with water, were inspected and then backfilled.

The sediments exposed in the four test pits generally confirm that conditions are as shown on GSC Map 1485A of the surficial geology. However, all of the pits showed very fine-grained eolian sediments, usually called loess, at surface; the loess varied in thickness from two metres in Pit 1 on proposed Lot 4 to three metres in Pit 4 on proposed Lot 10. In all pits, the sediment underlying the loess was a clean grey sand of medium grain size, probably a floodplain deposit of proglacial streams. The contact between the loess and the sand was generally sharp and distinct; however, thin beds of sand were observed to be present within the loess about one-half metre above the main contact. The grain size of the loess is approximately at the border between sand and silt; the average grain size is probably about 0.05 mm.

Prominent rusty mottling was observed in the loess in all pits, indicating that the loess has been repeatedly saturated, probably on an annual basis. It was certainly saturated at the time of this investigation.

The loess is overlain by a thin black peaty soil which is probably not more than 0.30 metres thick. Roots penetrate less than one-half metre into the loess.

The test pit logs are attached in Appendix B. The approximate (unsurveyed) locations of the test pits are shown on Figure 2 in Appendix A.

.../5

4.0 GROUNDWATER HYDROLOGY

Groundwater in this area of low relief is recharged locally. Most recharge probably takes place during the winter and early spring when evapotranspiration is very low and precipitation is fairly high. Most precipitation during the growing season is probably intercepted by plants and returned to the atmosphere.

Groundwater flow in the shallow groundwater flow system existing in the sand and loess is generally northward and northwestward toward Silverdale Creek. Flow is more or less continuous because of the size of the flow system, the low gradient and the low permeability of the sediments. However, because of intermittent recharge, we expect that there may be a considerable water table fluctuation with the low in late summer or early fall.

5.0 GROUND DISPOSAL WASTEWATER

Conditions as they were at the time of the field inspection on January 5 are not suitable for the operation of conventional septic tank disposal field systems. The water table is clearly too close to surface for at least part of the year.

It may be possible to lower the water table by constructing a drainage system in the permeable sand underlying the fine-grained loess. We guess that drains constructed in the loess would not be effective because of the low permeability of the material. Another problem may be the lack of surface drainage deep enough to service subsurface

drainage on the property. This could be checked by carrying out a topographic survey of the property; such a survey might show that the drainage ditch along Cedar Valley Road is sufficiently deep to drain the property or even part of the property.

It may be possible to use alternate wastewater disposal facilities on the property: for example, properly designed mounds. Mounds should be constructed on top of the natural soil to get the benefit of changes which take place in the soil and which tend to improve the quality of effluent.

In any case, whether conventional or alternate type facilities are used, pollution of groundwater is not likely to occur. Properly operated facilities would contribute a small amount of nitrate to groundwater but, upon entering the groundwater, the effluent would become highly diluted. As far as we know, groundwater is not being used for domestic purposes in this area and, in any case, the amount added by such facilities is not considered to be significant.

6.0 SUMMARY

1. The subsurface conditions on the proposed subdivision of a parcel of land at 8590 Cedar Valley Road were investigated by digging four test pits.

2. Geologic conditions are as shown on the surficial geologic map of the area (GSC Map 1485A). Below a thin black soil, there is two to three metres of loess over clean, medium grain sand.

.../7

3. The loess exposed in the test pits showed prominent rusty mottling caused by intermittent - probably seasonal - saturation.

4. The water table on the subject property was at or very near surface at the time of inspection on January 5, 1990.

5. Under existing conditions, conventional septic tank - tile drain field disposal systems will not operate properly.

6. It may be possible to install drainage facilities which would be effective in maintaining a low water table so that conventional drain fields could be used; otherwise, under prevailing conditions, only alternate disposal facilities could be used on this property.

7. Wastewater disposal facilities which are properly designed, constructed and operated will not cause groundwater pollution.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

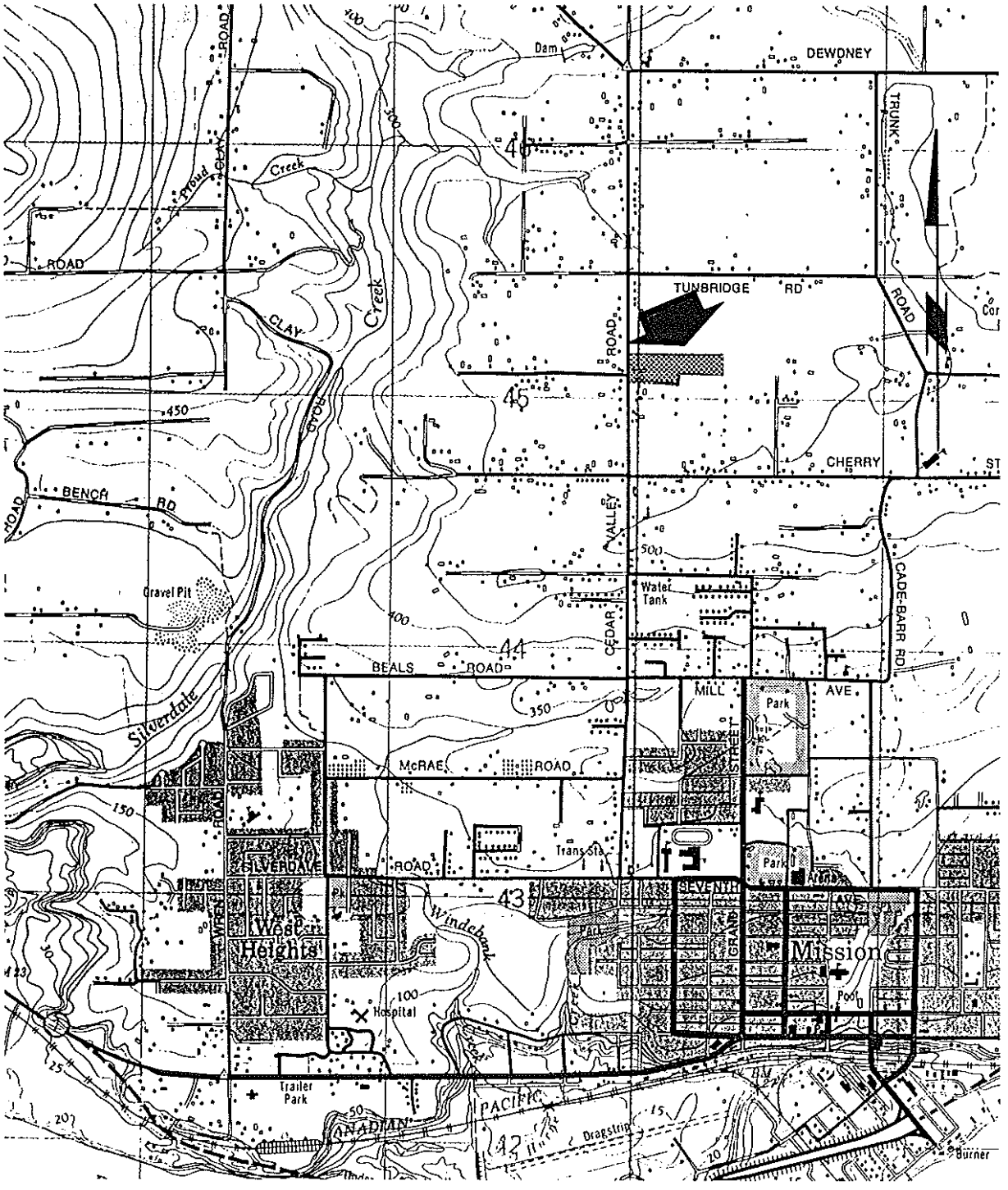
E. Livingston, P. Eng.

Attachments

APPENDIX A

AREA LOCATION AND SITE PLAN

FIGURE 1	AREA LOCATION MAP - PROPOSED SUBDIVISION AT 8590 CEDAR VALLEY ROAD IN THE DISTRICT OF MISSION

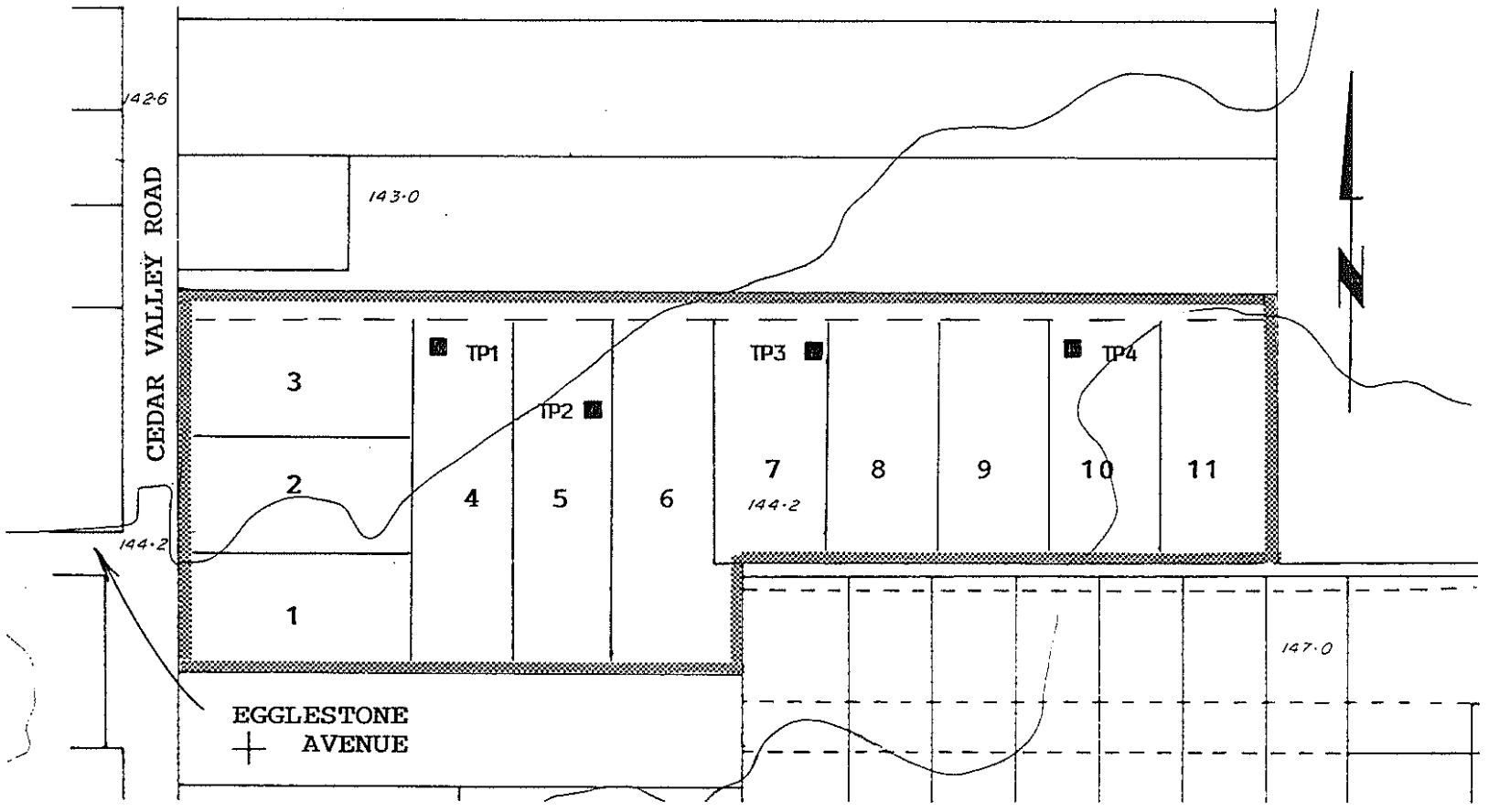


Notes:

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 8590 CEDAR VALLEY ROAD IN THE DISTRICT OF MISSION



Notes:

1. The base map is 1:2,500 scale topographic plan Sheet No. 1728N of District of Mission; contour interval is two metres.
2. ▒▒▒▒ indicates boundary of subject property.
3. ■ shows the approximate (unsurveyed) location of a test pit.

APPENDIX B

TEST PIT LITHOLOGS

Test Pit No. 3 on Proposed Lot 7

Total depth: 2.8 metres.

Litholog:

0 - 0.3 m	black muck soil
0.3 - 2.8 m	tan-coloured loess, all mottled but mottling is less distinct near surface; near the bottom, several thin interbeds of sand yielded water
below 2.8 m	grey, clean, medium grain sand.

Remarks: The pit partly filled with water in about $\frac{1}{2}$ hour.

Test Pit No. 4 on Proposed Lot 10

Total depth: 3.0 metres.

Litholog:

0 - 0.3 m	black muck soil
0.3 - 3.0 m	tan-coloured uniform loess with thin interbeds of sand near the bottom which yield water; this pit differs from the others in that there is a distinct zone, probably weathering, about one metre thick at the top of the loess
below 3.0 m	grey, clean, medium grain sand.

Remarks: The pit began to fill with water immediately but it was backfilled soon after digging.