HYDROGEOLOGIC EVALUATION
IN REGARD TO DISPOSAL OF WASTEWATER AND STORM WATER ON A PROPOSED SUBDIVISION BETWEEN TUNBRIDGE AVENUE AND THE SOUTH END OF HAMMOND STREET IN THE DISTRICT OF MISSION

(District of Mission Subdivision Application 90-56)

Prepared for

MR. & MRS. BERT HIMBEAULT
33113 Tunbridge Avenue
MISSION, B. C. V2V 5X4

Prepared by

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SEPTEMBER 10, 1990

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September 10, 1990

Mr. & Mrs. Bert Himbeault
33113 Tunbridge Avenue
MISSION, B. C. V2V 5X4

Subject: **Hydrogeologic Evaluation in Regard to Disposal of Wastewater and Storm Water on a Proposed Subdivision Between Tunbridge Avenue and the South End of Hammond Street in the District of Mission**
District of Mission Subdivision Application 90-56

Dear Mr. & Mrs. Himbeault:

This letter is further to recent telephone discussions and to a discussion onsite on August 31 between Mrs. B. Himbeault and Ed Livingston, P. Eng., of Pacific Hydrology, concerning investigation of hydrogeologic conditions on the proposed subdivision.

1.0 INTRODUCTION

The purpose of this letter is to discuss our hydrogeologic evaluation concerning the proposed subdivision of a parcel of land, between Tunbridge Avenue and the south end of Hammond Street in the District of Mission, legally described as $E\frac{1}{2}$ of Lot 9, Section 33, Township 17, Plan 1072, New Westminster District.

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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. On the sketch plan of the proposed subdivision provided by you (Mrs. B. Himbeault), only Lots A and B have letter designations. For reference to the descriptions in this report, letter designations have also been arbitrarily assigned to the other lots.

In preparation of this report, we have understood the following:

1. Plans call for the construction of a house on Lot B for the Himbeault's own use and the existing house on Lot A will be sold.

2. At some time in the future, some or all of the other six proposed lots may also be offered for sale.

3. A conventional wastewater disposal system, consisting of a septic tank and tile drain field, is proposed for each lot of the subdivision.

4. At some future time, the District of Mission plans to extend Hammond Street south to Tunbridge Avenue.

The following documents 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 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 83-23, **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.

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.

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2.0 SITE INVESTIGATION

The investigation of shallow subsurface conditions on the proposed Himbeault Subdivision consisted of the digging of seven test pits by a wheel backhoe to depths ranging from 1.7 to 1.95 metres (5.6 to 6.4 ft). The approximate (unsurveyed) locations of the test pits are shown on Figure 2 in Appendix A. The lithologs of the pits are contained in Appendix B.

In general, the test pits show:

1. In the northeastern part of the Property, where Lot B is located, about 0.4 m of reddish-brown sandy loam soil has developed on the parent materials which vary from sand to till.

2. In the poorly drained area in the south and southwestern part of the Property, a black organic soil overlies the sandy parent material in which a zone of colour mottling has developed due to the seasonal fluctuation of the water table.

3.0 TOPOGRAPHY AND GEOLOGY

The subject property lies partly on the west slope of a north-south trending low ridge. It extends west from the ridge into an area of very low relief which is rather poorly drained. Much of the property proposed for subdivision is covered with a dense growth of alders and brush. Part of proposed Lot B was recently cleared. Proposed Lot H and part of proposed Lot D are covered with bog vegetation.

G.S.C. Map 1485A of the surficial geology, at a scale 1:50,000, shows that the Himbeault Property is located in an area of complex surficial geology. The ridge in the northeastern part of the Property is a moraine made up of very sandy stony compact till. The west side of the ridge is overlapped by sand which is probably glacial outwash. The sand area is extensive and is bounded on the south by another ridge along Cherry Avenue, on the north by Draper Creek and on the west and northwest by Silverdale Creek. The test pits show that the till of the moraine weathers to a brown sandy loam with stones.

4.0 HYDROLOGY AND GROUNDWATER

Drainage in the area is northward to Silverdale and Draper Creeks. Recharge for groundwater is entirely local and is largely seasonal, with little water reaching the water table during the growing season when much of the precipitation is returned to the atmosphere by evapotranspiration. On the ridge along the eastern side of the Property, recharge water moves rapidly down to the compact sandy till. Because of the relatively permeable nature of the very sandy till, most of the water moves down into the till to form small groundwater flow systems which discharge into the sand at lower elevation. The sand underlying the western part of the Property is quite permeable but it is anisotropic with greater horizontal than vertical permeability. In spite of the permeable sand, much of the area is poorly drained. The poor drainage is caused by the very low gradient toward the creeks which drain the area. The material under the sand is apparently very slowly permeable so downward water movement is very slow. Under such conditions, there is considerable seasonal fluctuation of the water table in the sand. This causes the colour mottling which is seen in some of the test pits. The top of the mottled zone can be considered to represent the average annual shallowest water table.

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5.0 WASTEWATER DISPOSAL

This investigation of hydrogeologic conditions on the Himbeault Property shows that the conditions for construction of disposal fields are good along the eastern side of the Property on the slope of the ridge mentioned previously in the discussion about geology. However, conditions are quite unsuitable in the waterlogged boggy area on the southwest part of the Property - in particular, on Lot H and probably the eastern parts of Lots D, E, F and G. On the basis of the present investigation, it is not possible to determine a boundary between what is suitable and what is not. It may be possible by improving the drainage on the western part of the Property to achieve conditions on more of the Property such that wastewater disposal fields could be used. The problem is not the suitability of the soils or the effects on the surrounding area but, rather, the fact that the water table is too close to surface for at least part of each year; thus, during part of the year, the zone of unsaturated conditions is insufficient to allow treatment of the wastewater before it joins the shallow groundwater.

6.0 STORM WATER DISPOSAL

The amount of storm water from a single house on proposed Lot B will be insignificant and can be drained westward down the slope of the ridge. We presume that Hammond Street will be extended before the remaining lots of the Subdivision are developed. If so, storm water could then be conveyed to improved drainage which will be necessary for the street extension.

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7.0 SUMMARY AND CONCLUSIONS

1. There are two contrasting geologic and hydrologic conditions on the proposed Himbeault Subdivision. These are characterized by the ridge along the east side, which is underlain by relatively permeable till and is well drained, and the poorly drained bog on permeable sand in the western part of the Property.

2. Conditions for wastewater disposal facilities are favourable on the ridge and unsatisfactory in the bog.

3. It is not possible from the present investigation to establish a boundary between good and poor conditions for wastewater disposal.

4. Conditions in the poorly drained area could be improved by installation of drainage.

5. At present, storm water from proposed Lot B can be conveyed to the poorly drained area. If further development of the Subdivision takes place, storm water can be conveyed to drainage along the Hammond Street extension.

6. Proper disposal of wastewater and storm water from proposed Lot B are unlikely to have any negative impacts on adjoining properties, either in the short or long term.

Yours truly,
PACIFIC HYDROLOGY CONSULTANTS LTD.

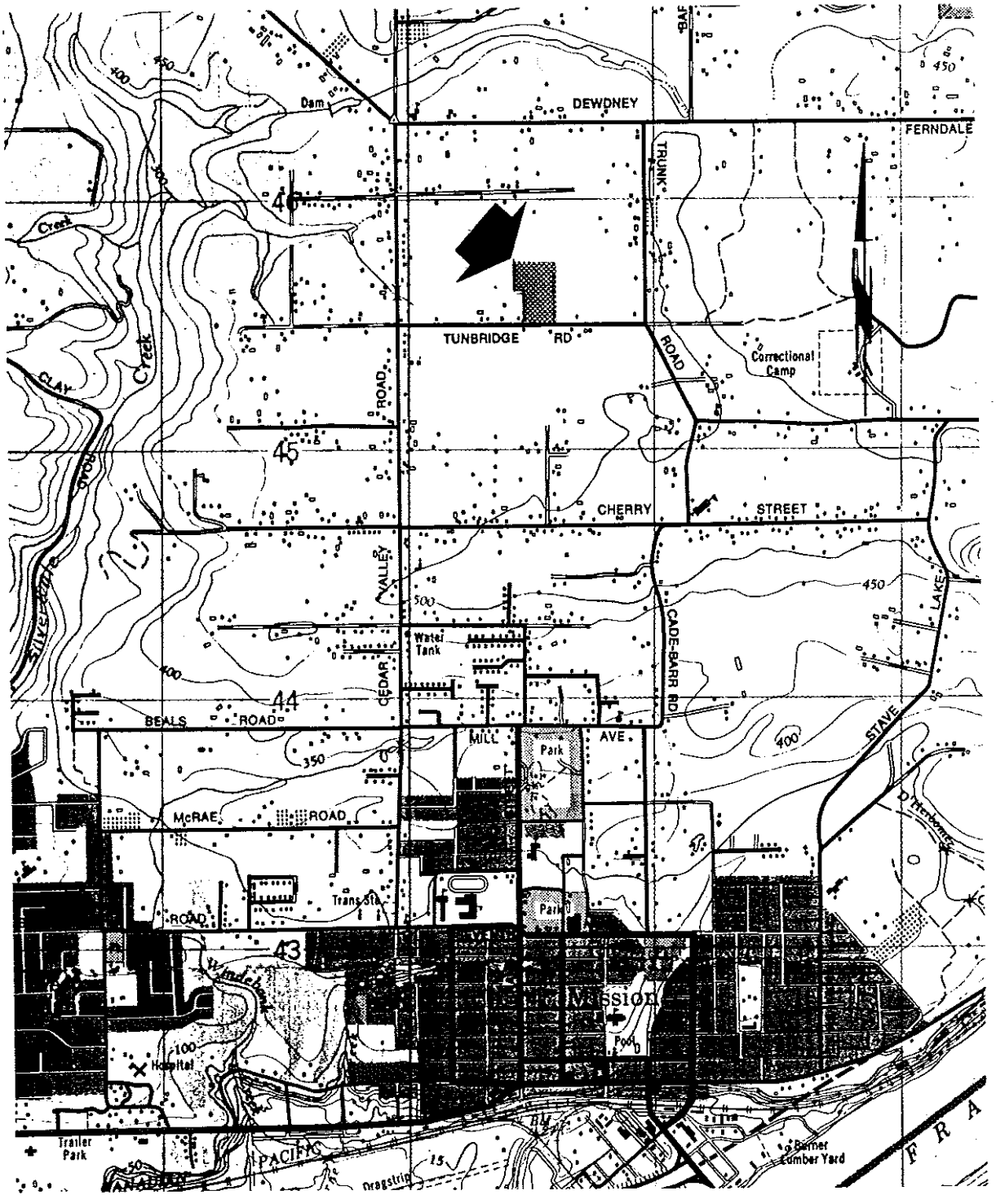
E. Livingston, P. Eng.

Attachments

APPENDIX A

AREA LOCATION MAP AND SITE PLAN

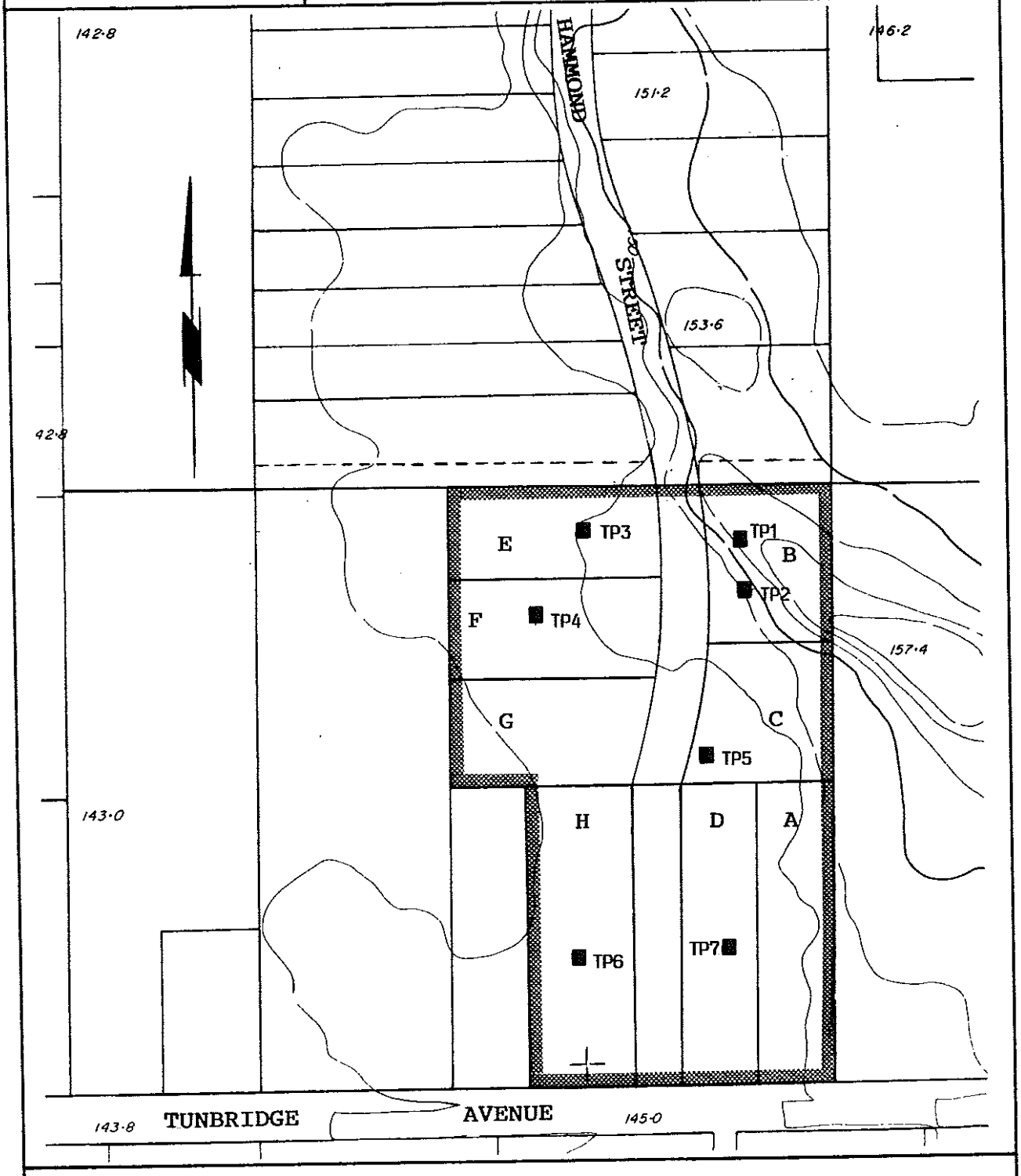
FIGURE 1	AREA LOCATION MAP - PROPOSED HIMBEAULT SUBDIVISION AT 33113 TUNBRIDGE AVENUE



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 proposed Himbeault Subdivision.

FIGURE 2	TEST PIT LOCATIONS ON PROPOSED HIMBEAULT SUBDIVISION AT 33113 TUNBRIDGE AVENUE



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. ▒▒▒ defines the boundary of the proposed Himbeault Subdivision.
3. ■ TP1 marks the approximate (unsurveyed) location of a test pit.

APPENDIX B

TEST PIT LITHOLOGS

HIMBEAULT TEST PIT LITHOLOGS

Location of Property: In the District of Mission, north of Tunbridge Avenue at the south end of Hammond Street.

Legal description of property: $E\frac{1}{2}$ of Lot 9, Section 33, Township 17, Plan 1072, N.W.D.

Date of test pit digging and examination: August 31, 1990.

Test Pit 1 on Proposed Lot B

0 - 0.4 m	(0 - 1.3 ft)	dark orange-brown silty loam with many roots and few stones
0.4 - 1.0 m	(1.3 - 3.3 ft)	brown, sandy, stony weathered till
1.0 - 1.6 m	(3.3 - 5.3 ft)	grey, compact, very sandy stony till.

Test Pit 2 on Proposed Lot B

0 - 0.4 m	(0 - 1.3 ft)	reddish-brown sandy loam soil with fragments of charcoal
0.4 - 1.4 m	(1.3 - 4.6 ft)	sandy stony weathered till; brown at the top with a gradual change to grey at the bottom; a few roots extend to the bottom
1.4 - 1.8 m	(4.6 - 5.9 ft)	grey, compact, very sandy stony till.

Remarks: The upper 0.5 m (1.6 ft) of this pit may have been disturbed by old land clearing.

Test Pit 3 on Proposed Lot E

0 - 0.4 m (0 - 1.3 ft)	orange-brown sandy loam soil with many specks of charcoal and several large roots
0.4 - 0.9 m (1.3 - 3.0 ft)	grey sand with rusty mottling and rusty streaks; a few pebbles
0.9 - 1.95 m (3.0 - 6.4 ft)	grey, rusty mottled medium-grain sand.

Remarks: The upper part of this pit, to a depth about 0.5 m (1.6 ft), may have been disturbed in old land clearing.

Test Pit 4 on Proposed Lot F

0 - 0.4 m (0 - 1.3 ft)	reddish-brown sandy loam soil with many roots
0.4 - 1.2 m (1.3 - 3.9 ft)	rusty, mottled, grey medium-grain sand with very compact thin interbeds of silt; a few roots to about 0.7 m
1.2 - 1.8 m (3.9 - 5.9 ft)	grey medium grain sand with a few thin silt interbeds.

Test Pit 5 on Proposed Lot C

0 - 0.5 m (0 - 1.6 ft)	orange-brown sandy silty loam with roots and a few pebbles
0.5 - 1.9 m (1.6 - 6.2 ft)	grey and rusty mottled medium-grain sand; most roots stop at 0.7 m but a few fine roots reach 1.1 m; sand contains a few finer and coarser interbeds.

Test Pit 6 on Proposed Lot H

0 - ∿0.3 m (0 - 1.0 ft)	black sandy organic soil; saturated, perhaps from recent rain
0.3 - 0.5 m (1.0 - 1.6 ft)	brown pebble gravel; may be a lense
0.5 - 1.7 m (1.6 - 5.6 ft)	greenish grey and rusty mottled medium-grain sand; mottling is very bright coloured; rapid inflow of water caused hole to cave.

Test Pit 7 on Proposed Lot D

0 - 0.2 m (0 - 0.7 ft)	black organic soil
0.2 - 1.0 m (0.7 - 3.3 ft)	grey sandy silty gravel
1.0 - 1.7 m (3.3 - 5.6 ft)	very rusty gravel; most pebbles are rounded and about 1 to 2 cm in diameter; gravel is saturated below about 0.4 m and the pit caved from inflow.