Mr. V. Raudsepp

Chief Engineer

Water Inv. Branch

J. Foweraker, Geological Engineer

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Ground-Water Possibilities at the Proposed Institution Site on the Trent River

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General

A field investigation was made of possible sources of ground water for an institution near the Trent River, south of Courtenay on Vancouver Island. In a report on the Trent River, Water Supply Possibilities, 1964, (File No. 0254126) the building site is described as being possibly on the south side of the Trent River near the B. C. Hydro and Power Authority main transmission line from Campbell River. In the course of the present field investigation the writer found that conditions for adequate ground-water supplies appeared to be unfavorable in the general area. However, if a proposal is made to go ahead with a drilling program, two sites are suggested here, where limited supplies (for example 20-50 g.p.m.) might be obtained.

The writer spent January 7th to 10th in the field investigating the surficial geology along the Trent River, and examining other exposures in nearby areas. The general area is covered by the G.S.C. Map 32-1960, Courtenay, Surficial Geology by J. G. Fyles, 1956-57, and by the Soil Map of Vancouver Island, Courtenay-Campbell Sheet 1958. The pertinent parts of these maps are reproduced in Figures 1 and 2 respectively.

Geology

In Fig. 1, Fyles shows the Trent River to be bounded on the south side mainly by marine deposits (5d): varied stony, gravelly and sandy marine-veneer deposits generally less than 5 feet thick. These beds overlie ground moraine deposits (3): till, lenses of gravel, sand and silt. On the north side the river is bounded by deltaic deposits (6a); gravel and sand commonly underlain by silt and clay. (Deltaic deposits are also present upstream from the proposed building site on the south side as well). All these surficial deposits appear to be relatively thin (20-30 feet thick) and overlie bedrock shales. The Trent River has cut its winding river pattern in these shales to a depth of 150-175 feet. The shales are found to outcrop continuously from a point upstream from the logging road bridge (A, in Fig. 1) to a point downstream near the railway bridge (C, in Fig. 1). The shale is prominently displayed ~~where~~

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where the river cuts into the valley side, and forms steep faces and active scree slopes. Slumping and sliding has taken place in several places, both in the shales and in the overlying surficial deposits. This movement has no doubt been assisted by the undercutting from the river and seepages from near the top of the slides. On the valley floor, the tree covered narrow valley flat areas appear to be periodically flooded and recent drift wood was found on several of these areas. Although rain fell during most of the field investigation and the river appeared to be running well above its normal stage, the river water remained essentially clear.

Further upstream, near the logging road bridge at A, Fyles shows further deltaic deposits, and also glacio-fluvial deposits (4a); hummocky, knob and kettle, and ridged deposits consisting of gravel, sand, and lenses of till. The writer investigated several gravel pits that have been opened up in this area and found several seepages near the base of these pits. Bedrock shale however outcrops in the river valley walls up and downstream from these deposits. It appears therefore that these surficial deposits, are of limited extent and thickness, and are perched on the shales well above the Trent River.

The abandoned stream channels investigated by Fyles further upstream again are cut in bedrock sandstone, and the surficial deposits that are present above this are of limited extent and thickness.

The present Trent River deltaic deposits do not extend for any distance or depth upstream, as bedrock shale outcrops at river level near the railway bridge crossing at C.

Ground Water

The relatively small thickness of the surficial deposits found on either side of the Trent River, the position of these deposits high above the present river level, and the impermeable nature of much of the underlying material especially on the south side of the river, suggest it is unlikely that a suitable supply of ground water can be found near the proposed building site. It should be pointed out here that the information from the Soils Map (Fig. 2) would appear to contradict the previous statement, as the proposed building site is shown to be situated in a rapidly drained loamy sand over sand or gravel. However, on the basis of the surficial geology map, and the investigation of exposures in the field near the site by the writer, it is clear that

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over much of this area the soil may be overlying impermeable tills and silt beds. Other soils shown adjacent to the Trent River (Fig. 2, D, R, and B) are shown in the legend as also overlying material described as slowly permeable. The poor drainage of surface water observed by the writer in several areas of low relief near the site could be due to these conditions.

Referring to the north side of the river, a Mr. Carter of the Van Dyke Logging Company, informed the writer of a well drilled to 60-90 feet by the company (at the point marked E in Fig. 1). He stated the drill passed through gravels at this depth, and estimated the flow of water at 40-50 gallons per minute. The well is not, at present in use. However, if this information is correct, then it would appear that the bedrock must be much deeper at this point, and although no further evidence could be found to substantiate Mr. Carter's claim, it suggests that a limited ground-water supply is available here.

The writer also talked with residents on the present Trent River delta area. They described two shallow wells dug on the delta, adjacent to the Trent River which produce 400 and 1200 gallons per hour respectively. They also stated that the river invariably goes "underground" in the dry period, or is reduced to a very small surface flow. A limited water ground-water supply could be expected in this delta region.

The possibilities of finding a suitable ground-water supply in the surficial deposits near the logging road bridge over the Trent River (A, Fig. 1) are considered to be unfavorable.

Recommendations and General Summary

Ground Water:

The field investigation indicates that no extensive aquifer or large source of ground water exists in the area investigated. However, if it is decided to continue with further ground-water investigations by drilling, then the writer would recommend that either the present delta area of the Trent River and/or a site near the Van Dyke Logging Company plant (E, Fig. 1) be investigated. The latter site it should be noted, is based only on the information supplied by Mr. Carter.

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Drainage:

Land near the proposed site was found to be water-logged after heavy rain and may present some drainage problems.

Water Quality:

The Trent River water appeared to be essentially clear, and free of silt, although considerable rain had fallen in the area and the river stage was above normal.

J.F.

J. Foweraker
Geological Engineer

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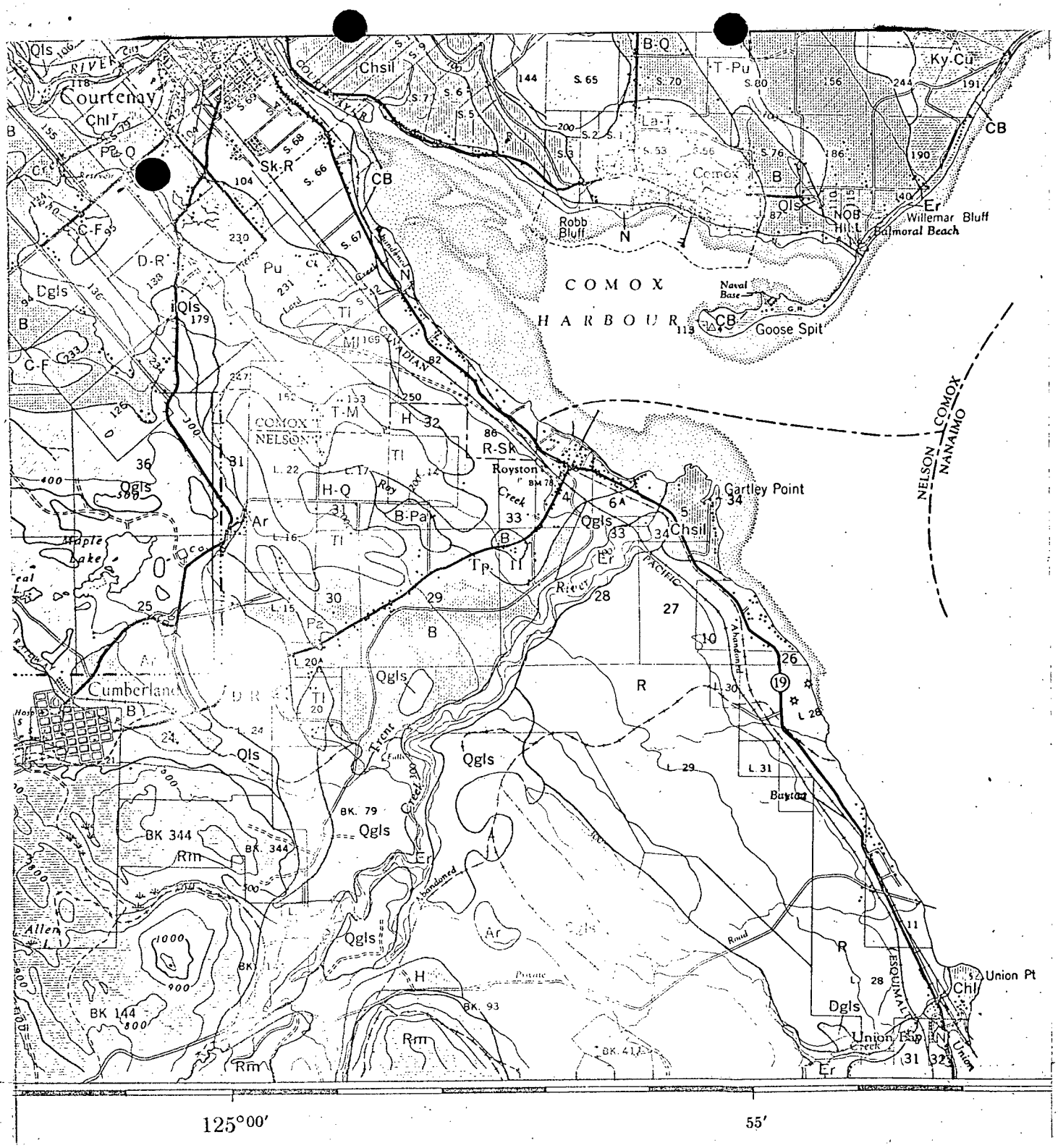

Figure 2. Soil Map, Trent River Area.

LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

SALISH SEDIMENTS (8)

8 SHORE, DELTAIC, AND FLUVIAL DEPOSITS: gravel, sand, silt, clay, peat; 8a, alluvial-fan deposits; 8b, dune sand

7 VALLEY ALLUVIUM AND COLLUVIUM: boulders, gravel, stony loam, sand, silt, clay (thickness generally less than 5 feet). Includes patches of 6 and 8

CAPILANO SEDIMENTS (5,6)

6 TERRACED FLUVIAL DEPOSITS:
6a, Deltaic deposits: gravel and sand commonly underlain by silt and clay
6b, Floodplain and channel deposits: gravel, sand, minor silt (shown only where averaging 5 feet or more in thickness; thinner deposits included in unit 7)
6c, Alluvial-fan deposits; poorly sorted gravel

5 MARINE DEPOSITS (INCLUDING GLACIO-MARINE):
5a, silt, clay, stony clay
5b, sand, pebbly sand, sandy gravel; generally underlain by clay
5c, gravel, sand; in spits, bars, etc.
} thickness few inches to 30 feet
5d, varied stony, gravelly, and sandy marine-veneer deposits
5e, varied stony, sandy, loamy, and clayey marine-veneer deposits
} thickness generally less than 5 feet

VASHON DRIFT (3,4)

4 GLACIO-FLUVIAL DEPOSITS: gravel, sand; lenses of till; 4a, hummocky, knob-and-kettle, and ridged deposits (eskers shown by symbol); 4b, terrace and pitted terrace deposits

3 GROUND MORAINE DEPOSITS: till; lenses of gravel, sand, and silt; 3a, till, alluvium, and colluvium

QUADRA SEDIMENTS (1)

1 Sand; minor gravel, silt, peat, peaty soil, driftwood

2 Gravel, sand, silt, clay, till; beneath Vashon ground moraine, relation to Quadra not known

Areas of bedrock outcrop and of outcrop interspersed with patches of thin overburden . . . . . R

Bedrock outcrop in area of overburden . . . . . ×

Geological boundary (approximate) . . . . . ⌒

Limit of geological mapping . . . .

Glacial striae (S), grooves (G), stoss-and-lee surfaces (SL), miniature crag-and-tail forms (CT) (direction of ice movement indicated, not indicated) . . . . . ⌀

Crag-and-tail hills . . . . . ⌀

Landslide scar . . . . . ⌒

Scarp between deltas or river terraces . . . . . ⌇

Abandoned channel . . . . . ⌇

Limit of marine overlap (not shown on deltas) . . . . . • • • •

Gravel pit . . . . . ⚒

Figure 1 (continued)

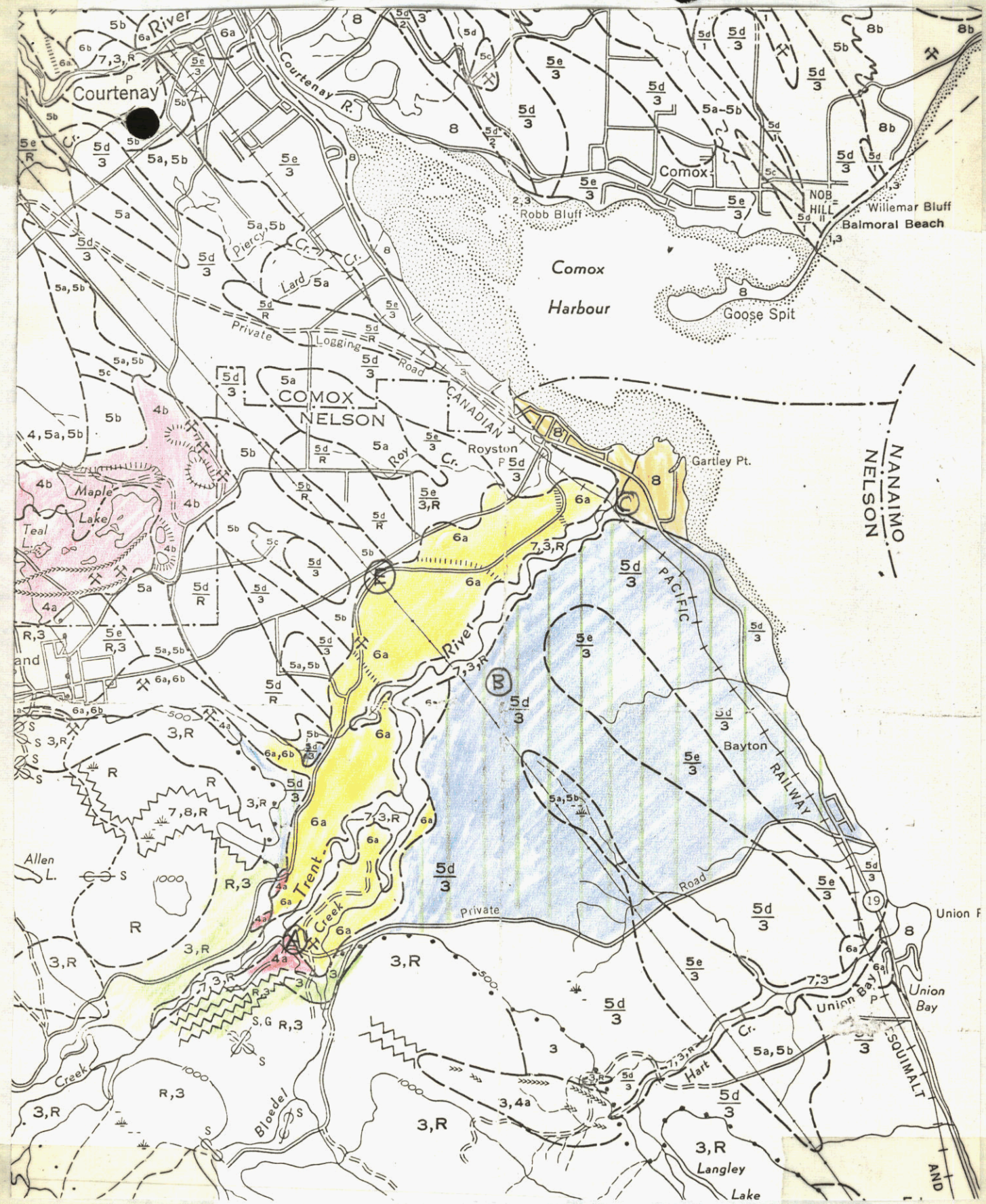

Figure 1 Surficial Geology Map, Trent River Area.

LEGEND

SERIES	QUALICUM	BOWSER	DASHWOOD	ROYSTON
TYPE AND SYMBOL	Loamy sand Gravelly loamy sand Q	Loamy sand B	Loamy sand Gravelly loamy sand D	Gravelly loam R
SOIL GROUP	Brown Podzolic	Brown Podzolic	Brown Podzolic	Brown Podzolic
DRAINAGE	Rapidly drained	Imperfectly drained	Well to moderately well drained	Well drained
DOMINANT TOPOGRAPHY	Level to gently sloping	Gently Sloping	Sloping to gently sloping	Undulating to steeply sloping
STONINESS	Few to excessively cobbly and stony	Stone free	Frequently cobbly and stony	Moderately to very stony
DESCRIPTION OF VIRGIN SOIL	36 to 44 inches of yellowish brown grading to pale brown loose very permeable loamy sand or gravelly loamy sand (B), over pale brown or grey loose sand or gravel (C)	20 to 30 inches of reddish brown loamy sand containing many iron cemented clods; over 4 to 6 inches of yellowish brown to reddish brown strongly cemented ortstein (B), over very slowly permeable gravelly sandy loam till or marine clay (D)	25 to 30 inches of yellowish brown, loose, permeable gravelly loamy sand or loamy sand (B), over grey, often mottled, very slowly permeable, gravelly sandy loam till or marine clay (D)	18 to 20 inches of dark yellowish brown to yellow brown gravelly loam; with weak blocky structure and few concretions, very permeable (B), overlying a compact, grey brown and very slowly permeable, clay loam till (C)

CONVENTION

c — clay
cl — clay loam
scl — sandy clay loam
sil — silt loam
l — loam
fsl — fine sandy loam
sl — sandy loam
gsl — gravelly sandy loam
ls — loamy sand
gls — gravelly loamy sand
✓ — rock outcrop

Figure 2 (continued)