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An inspection of test pits at a proposed subdivision, Norwood, St Leonards.

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Following a previous inspection of the land owned by H.D. Schramm and Others (Matthews, 1973) test pits were dug to enable subsurface material and groundwater conditions to be examined. Seven test pits were dug in the positions shown on Figure 1. As the owners are only interested in developing the area north of the line of block 21 at the present time, the test pits were confined to this area.

DESCRIPTION OF TEST PITS

<i>Pit 1</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.3	Brown sandy soil.
	0.3-1.1	Brown and red clay, silty and sandy clay grading to grey clay with some iron oxide staining.
	1.1-1.5	Brown and grey sandy clay, hard and plastic, some fissuring in the clay.
	1.5	Hard limonite-cemented bed too hard to penetrate with a backhoe.

A small amount of water seeped into the hole from the bottom of the soil layer.

<i>Pit 2</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.2	Dark brown clayey soil.
	0.2-0.6	Light brown grey clay, fairly soft, one limonite nodule about 8 cm in diameter.
	0.6-1.5	Light grey medium to hard plastic clay with red and brown iron oxide staining, some slip planes in the clay.
	1.5-1.7	Lenticular brown-red fragmentary limonitic bed thinning out at places around the pit wall.
	1.7-2.7	Light grey medium to hard plastic clay, fairly massive with slip surfaces widely spaced. Pink patchy stain on clay throughout and one lignite fragment in bottom of pit.

<i>Pit 3</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.3	Dark brown sandy soil with some quartz gravel fragments.
	0.3-1.1	Reddish brown, soft, fissured clay.
	1.1-1.4	Reddish brown slightly harder fissured clay with slip surfaces and nodules of limonite up to 0.3 m across.
	1.4-2.0	Light grey clay (some sandy pockets) with red iron oxide staining, very fissured, a few limonite nodules up to 0.1 m across. The clay is moderately hard.
	2.0-2.6	More massive grey clay with sandy pockets, iron oxide staining, fissures widely spaced.
	2.6	Limonite-cemented bed, difficult to penetrate.

Water seeping into pit from fissured zones (i.e. from 0.9-1.8 m).

<i>Pit 4</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.5	Dark brown sandy soil with gravel fragments.
	0.5-3	Brown very soft and friable arkose, some grey and some reddish areas, occasional plant fossils.

Seepages entering the pit at 0.9-3 m from the surface.

<i>Pit 5</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.3	Dark brown sandy soil, a few gravel fragments.
	0.3-0.9	Sandy beds (feldspathic) with some thin seams of reddish and brown clay. Material is soft and friable.
	0.9-3	Even-grained brown and reddish sand (feldspathic) with some lenticular areas of grey sand. Sand is relatively compact and is generally harder than in pit 4.

Water from several small seepages entered the test pit from 1.2 m from the surface to the bottom of the pit.

<i>Pit 6</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.3	Dark brown sandy soil, some gravel fragments.
	0.3-1.1	Brown red fissured clay with increasing sand (feldspathic) towards the bottom of the section.
	1.1-2.9	Brown sand (feldspathic) with some reddish and grey areas, a few fossil plant stems and leaves, thin seams of red clay occur at various intervals. The sand is softer than in pit 5, but not as soft as that in pit 4.

Slow flowing seepages from a depth of 0.8 m to the bottom of the pit. The seepages flow out on top of the thin red clay seams.

<i>Pit 7</i>	<i>Depth (m)</i>	<i>Description</i>
	0-0.3	Dark brown sandy soil, a few pebbles.
	0.3-1.2	Brown and reddish fairly soft fissured clay with sand (feldspathic) which is more abundant towards the bottom of the section.
	1.2-2.7	Red and brown sand (feldspathic) with small grey areas, thin seams of red clay, a few plant fossils. A harder limonite-cemented coarse sand band at 2.4 m (about 0.2 m thick). The sand is generally somewhat compacted.

Reasonably strong seepages entered the pit at intervals from 0.9 m from the surface to the bottom.

DISCUSSION

Two test pits (1, 2) were dug east of the valley running through the area examined. Pit 1 struck a hard limonitic band at 1.5 m which prevented further digging. Hard plastic clay with some fissuring was struck in both of these pits except for about 0.6 m of softer material near the top of pit 2. There was very little water seeping into the pits. Pit 3, west of the valley near the top of the slope, struck soft fissured clay to a depth of about 1.4 m when firmer clay was encountered. The recent rains had made this area water-logged and some drainage from houses to the north would accumulate in this area.

Test pits 4, 5, 6 and 7 were sited around the west side of the valley. The predominant material in each pit was a feldspathic sandstone with some clay in the top part of the pits and thin seams of clay (about 10 mm) throughout the sandstone. The sandstone is very friable and in some parts of the pits the grains have very little cohesion. This lack of cohesion is often associated with, or the result of, moisture and seepages. In other parts of some of the pits limonitic cement makes the sandstone harder and more compact. Very soft material was encountered throughout test pit 4. A description of the sandstone by G.B. Everard, mineralogist and petrologist, is given in Appendix 1.

Seepages were often found to flow into the pits on top of the thin seams of clay interbedded with the sand. Some clay seams dip at angles of up to about 30°.

CONCLUSIONS AND RECOMMENDATIONS

The inspection of the test pits and a detailed examination of the land surface suggests that the subdivision could be undertaken with reasonable safety. However some precautions should be taken.

Houses around the perimeter of the proposed subdivision have septic tank and sullage drains discharging on to the proposed subdivision. A sewerage system should be installed to collect this water and also serve the new subdivision.

On the east side of the valley, stiff clay underlies the area and there is little danger of landslip provided there is good surface drainage and deep cuttings are avoided around the sides of the slopes. House foundations should be deep enough to avoid the effects of expansion and contraction of the clay due to alternate wetting and drying.

On the west side of the valley the slopes are steeper and again, cuts around the slopes should be avoided as much as possible and where shallow cuts are necessary, they should be protected as the sandstone is likely to erode very easily. Any retaining walls installed, should be adequately drained. Surface drainage in this area should be good and special drains should be installed to collect water from seepage areas (e.g. in the vicinity of pit 4). There is a seepage in which a special drain should be installed to collect water which accumulates in this area.

Valleys extending through the area should be allowed to drain freely and water flow should not be inhibited by areas of fill.

REFERENCE

- MATTHEWS, W.L. 1973. Stability of a proposed subdivision, Norwood, St Leonards. *Unpubl.Rep.Dep.Mines Tasm.* 1973/53.

Appendix 1

DESCRIPTION OF SANDSTONE

G.B. Everard

The specimen is an oxidised clayey sandstone containing about 40% of quartz grains averaging 0.25 mm across, 15-20% of grains of feldspar completely altered to pulverulent white kaolin, and a similar proportion of lithic constituents of more variable grain size. The lithic constituents tend to be dark in colour and to consist of quartzite. The matrix is an iron-stained lithic clay.

[21 August 1973]

