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Investigation of a proposed house site in Avonbury Court, Norwood

by W. R. Moore

An auger hole was drilled on 6 May and samples collected for laboratory analysis at a proposed house site at 6 Avonbury Court, Norwood (514600 mE, 5409800 mN). The auger hole was sited 12 m from the road boundary peg directly downslope from the driveway entrance, and was located approximately in the middle of the proposed house site. The block has a low slope angle of 5° which steepens to 6–7° at its northern boundary.

The drilling showed the surface soil layer to be a thin (0.2 m) organic silt with fine ironstone gravel. This surface layer is underlain by a gravelly clay subsoil to a depth of 0.8 metres. These surface sediments are considered to be high river terrace gravel and silt associated with the Norwood bench level and are considered to be Quaternary in age.

Beneath these superficial surface sediments is a thick sequence of clay, which was drilled to refusal at 5.2 m depth. In this sequence was grey, red, grey-red mottled and orange clay with two minor hard bands of cemented gravel or ironstone layers.

The clay sequence drilled is of the Launceston Beds of Tertiary age. In the Launceston area and Tamar Valley these clays are highly expansive and highly plastic and may fail when wet, causing landslides.

Because 6 Avonbury Court is high up on the slope close to the top of the Norwood bench it appears particularly well-drained as indicated by the low moisture content and hardness of the clay beneath the surface sediments. This, combined with the low slope of the block, makes the risk of any slope failure very low.

The moisture content of the samples is low (25–29%) and all samples felt dry. The clay was hard to stiff, except for a soft zone below a hard pan at 3.9 m depth. In this soft zone the brown clay showed no evidence of shearing or shear polish and it was still firm (70–100 kPa) . This soft zone with the low moisture content (25%) is considered to be too deep (3.9–4.3 m) to be of any significance to the block's potential stability.

All the clay samples tested gave high plasticity values with plastic indices ranging from 66 to 113. The two clay samples at high levels in the hole (at depths of 1.6 m to 2.5 m), and most likely to be affected by seasonal wetting and drying, have plastic index values of 99 and 113 and liquid limits of 131 and 142. These high values show that these clays have the ability to absorb large quantities of water which is reflected in their high linear shrinkage values of 25% and 27%.

Even though the clay was dry when drilled this material has the ability to swell and shrink with seasonal wet and dry periods. It would appear desirable to use a strengthened slab designed to withstand such potential movements. It is recommended that a competent structural engineer be used to design and supervise the building of the foundation slab thus avoiding future cracking of the house by expansive clay movements.

[17 June 1986]

Table 1

Soil laboratory results, 6 Avonbury Court, Norwood

Sample No.	Depth (m)	Moisture Content (%)	Plastic Limit	Liquid Limit	Plastic Index	Linear Shrinkage (%)	XRD Clay fraction			Total quartz (%)
							K (%)	M (%)	G (%)	
1	1.6	28	32	131	99	25	90–95	5–10	–	5–10
2	2.5	29	29	142	113	27	85–90	5–10	0–5	5–10
3	3.4	27	28	116	88	24	90–95	5–10	0–5	15–20
4	4.3	25	23	89	66	21	85–90	5–10	5–10	10–15
5	5.2	27	24	125	99	26	90–95	5–10	0–5	10–15

K = kaolinite, M = montmorillonite, G = goethite

Analyses by R. N. Woolley, Department of Mines, Hobart

TASMANIA DEPARTMENT OF MINES

ENGINEERING LOG — BOREHOLE

Borehole no. 1

sheet 1 of 1

project P I James, proposed house site investigation

location 12 m from survey peg on road boundary
6 Avonbury Court, Norwood

co-ordinates 514600, 5409800

R.L. 80 m

inclination vertical

bearing

drill type Triefus

drill method Auger

drill fluid None

hole commenced 6 May 1986

hole completed 6 May 1986

drilled by B. E.Cox

logged by W. R. Moore

checked by

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency density index	hand penetrometer kPa (25 50 100 200 400)	structure, geology
						ML	**Silt with gravel**. Silt — brown, fine, low plastic, organic Gravel — fine ironstone grits and buckshot gravel	D	Fb		Surface silt
						GC	**Gravelly clay**. Clay orange-brown, highly plastic Gravel — medium–coarse ironstone quartzite pebbles	M ≤ PL	St		Clay with gravel
	None	None	S1	1.0			**Clay**. Grey-red, highly plastic	D	H		Hard layer
			S2	2.0		CH	**Clay**. Red, grey and grey and red mottled, highly plastic	M ≤ PL	ST to V St		Softer layer
			S3	3.0							
							Hard band, limonite and bauxite nodules	D	H		Hard pan
			S4	4.0			**Clay**. Brown, highly plastic	M	F		Soft layer
			S5	5.0			**Clay**. Red-yellow, limonitic and bauxitic, highly plastic Fine ironstone gravel and bauxitic nodules	D	H		Hard layer
							Drill refusal at 5.2 metres				