



Test pits on a proposed house site at Windermere

by W. L. MATTHEWS

Three test pits were dug on a building lot at Windermere to examine subsurface conditions.

Relatively soft clay occurs near the surface in each pit (although in pit 3 a nearby tree has reduced the moisture content). Silty clay occurs at levels below about 0.7 m in each pit and this is quite stiff. Two samples from pit 1 have been subjected to X-ray analysis to identify the composition of the material and Atterberg Limits have been determined.

Depth (m)	0.5	1.5
Liquid limit	86	115
Plastic limit	25	27
Linear shrinkage	20	26
X-ray analysis (clay fraction) (%)		
Kaolinite	80	65
Montmorillonite	10	15
Goethite	5	15
Gibbsite	5	5

Determinations by R. N. Woolley

Because of the stiffness of the deeper material, there seems little risk of the lower part of the lot (where the test pits were dug) being affected by landslip. The western part of the lot is elevated and the steeply sloping part has some risk of being so affected, particularly if the slopes are disturbed with widespread excavation or poor drainage practices prevail.

The tests on the material from the pits suggest that the clay has expansive properties and foundations should be designed to take this into consideration. The lower material (i.e. below about 0.7 m) is likely to show this property more markedly than the near-surface clay.

It will be important to install adequate drainage around the top side of the house as in rainstorms quite a lot of water could flow on to the house site. This would best be directed down the western side of the house site.

In summary, the proposed house site appears to have a low landslide risk, the clay has expansive properties which should be considered in foundation design and drainage is recommended on the top side of the lot.

Test pits

Pit 1

- 0 – 0.15 m Dark brown clay soil, moist.
 - 0.15 – 0.7 m Brown clay, fragmented to plastic, soft and moist.
 - 0.7 – 2.65 m Brown and grey mottled clay, hard.
- Hand penetrometer unconfined strength measurements
- 0.15–0.7 m 1.5 kg/cm²
 - 0.7–1.5 m 4.5 kg/cm² or greater
 - 1.5–2.65 m > 4.5 kg/cm²

Pit 2

- 0 – 0.15 m Brown clay soil, fairly loose.
 - 0.15 – 0.80 m Brown clay, plastic to fragmented, fairly soft and moist.
 - 0.80 – 2.25 m Brown and grey mottled clay, some sand and silt, becoming harder with depth.
- Hand penetrometer unconfined strength measurements
- 0.15–0.8 m 1.5–2 kg/cm²
 - 0.8–1 m 2.25–2.75 kg/cm²
 - 1–2.25 m >4.5 kg/cm²

Pit 3

- 0 – 0.2 m Dark brown silty clay soil, dry.
 - 0.2 – 0.5 m Brown clay, fragmented to plastic, moist.
 - 0.5 – 2.0 m Brown and grey mottled clay, becoming harder with depth.
- Hand penetrometer unconfined strength measurements
- 0.2–0.5 m 3–4 kg/cm²
 - 0.5–2.0 m >4.5 kg/cm²

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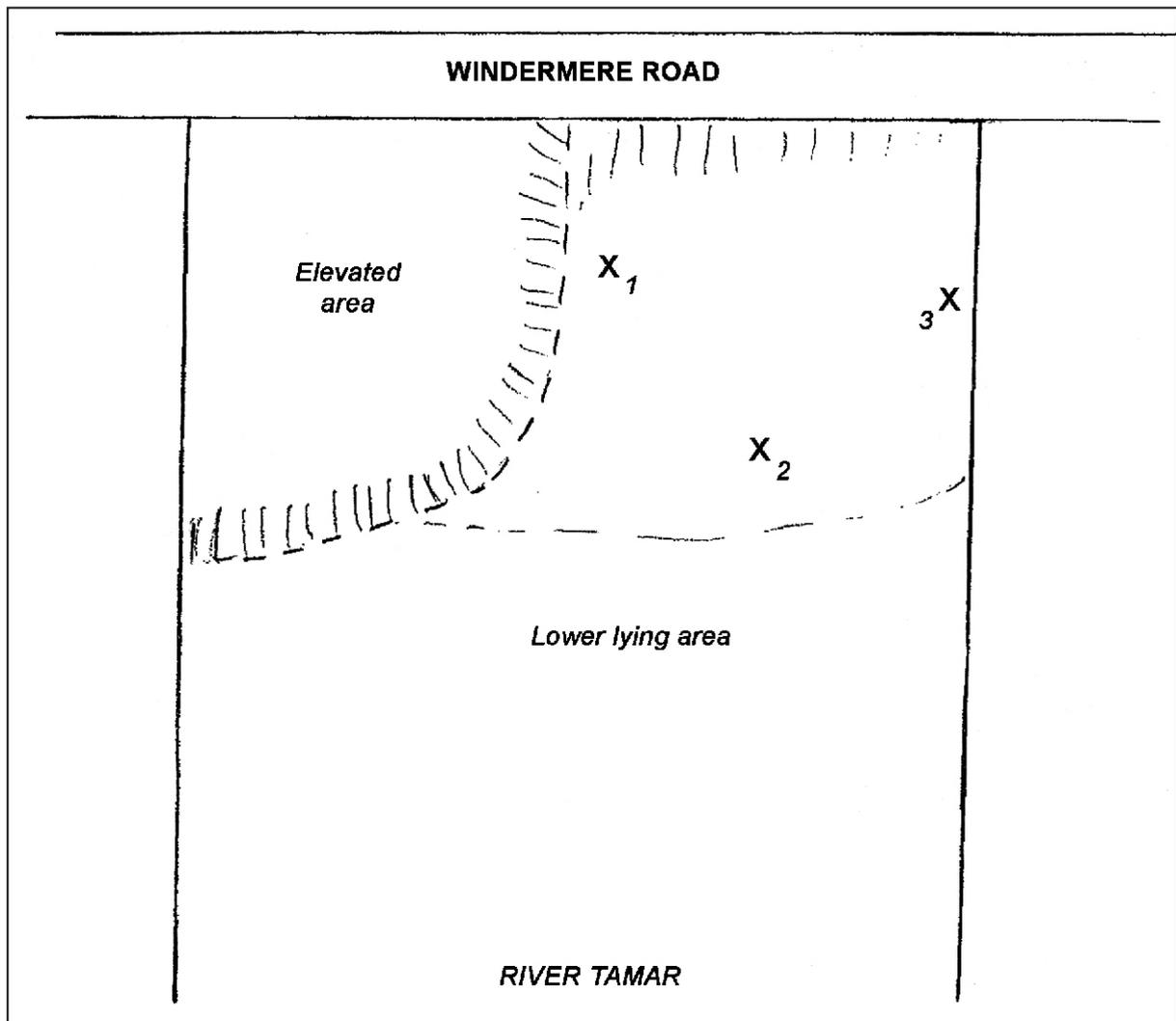


Figure 1
Location of test pits.