

**TASMANIA DEPARTMENT OF MINES
UNPUBLISHED REPORT 1985/74**

Inspection of Ambrose's subdivision at Windermere

by W. R. Moore

At the request of the developer a proposed subdivision in Windermere Road was inspected on 24 October 1984. Three proposed house sites were tested by digging of three pits as shown on Figure 1. The laboratory results of these samples are shown in Table 1.

No further testing was being undertaken on samples from pits 1 and 2 on proposed house sites 1 and 2 in the Zone III landslide area (the potential landslide area). The only testing to be completed is on samples collected from Pit 3 (house site 3) situated in the Zone IV area, defined as an old landslide or adjacent to active landslide. These shear box tests take a considerable time as residual friction angle and cohesion results are required rather than peak values which are thought not to model as accurately the processes of a slope failure. Unfortunately the shear box samples have been delayed as the Department has only one shear box available and it cannot only be used for one subdivision and more particularly by one geologist. A private soil testing laboratory could undertake such a time consuming test but the expense would be prohibitive.

House site 3, pit 3

The low angle of friction values obtained to date from samples slow shear box tested from Pit 3 appear to indicate that a recent slope failure has occurred at this locality and another house site may have to be selected in what is considered to be a more stable area on this block. The alternative site is situated higher up the slope in the tree line at the head of the old landslide mapped by Stevenson in 1974. The proposed house site 3, tested by the deep pit 3, is thought to be located on a younger parasitic slide on this older larger major slide. When the results are available, slip circle analyses using these results will require modelling and this site will be the subject of a separate report.

House sites 1 and 2 (pits 1 and 2)

No shear box testing was undertaken on these two sites as they are thought to be outside the old landslide, the toe of which is outlined as the boundary of the Zone IV and Zone III areas on Figure 1. The laboratory tests on the three samples taken at a shallow depth (Table 1) show that the subsurface clays at these two sites are highly plastic, with plasticity indices of 79–90. The clays are also high-shrinkage expansive clays with linear shrinkage values of 27–28%. X-ray diffraction testing shows the clay composition to be strongly montmorillonite and kaolinite.

Because the surface morphology indicates that these sites are outside the toe of the landslide (Stevenson, 1974), the sites are considered to be suitable for houses and the building of one house on each lot is recommended. This recommendation assumes that the Health Department or the local council officers will give or have given approval for septic tanks and their overflow drains. It is recommended that the position of these tanks and drains should be away from the house sites and preferably downslope of the house for slope stability considerations. The subsurface clay, as exposed in pits 1 and 2, is impermeable as well as being highly plastic (a CH soil in the SAA classification), whereas the surface soil is a dark grey organic clay soil (OH).

Linear shrinkage, house sites 1 and 2

Because of the high linear shrinkage of the clays at both sites seasonal foundation movements can be anticipated. The house foundations should be designed to withstand or accommodate these movements and should be designed by a professional foundation engineer.

Slope stability, house sites 1 and 2

Highly plastic, strongly montmorillonite clay on slopes of 5° to 7° are known to have failed in Windermere and the sites under investigation have a potential risk of slope failure. This risk is considered to be no greater at these two house sites than for any other houses already built on the upslope side of Windermere Road in areas shown as Zone III landslide area on the Department of Mines Tamar Valley landslide risk map (fig. 2).

The risk of such a slope failure occurring at these two proposed sites can be reduced by adequate drainage reducing any excess water accumulating. These drains must be well maintained and function over long periods of time. Deep cuts into the slope resulting in its oversteepening should be avoided at the house sites and on driveways up to these sites. Large areas of fill built out on the slope will also load the slope and would add to its instability and such fill areas should be reduced to the minimum. Swimming pools should preferably be above the ground types so that any water leakage may be observed. Any pool should be located away from the edge of the slope. The planting of trees and shrubs on slopes should be encouraged and the excess watering of gardens and lawns be avoided.

Even though the area is a Zone III area within the discretion of the building inspector, adherence to the special building code of 1978 for building within landslides would appear prudent at these two sites.

Recommendations — Sites 1 and 2

The following recommendations are made for house sites 1 and 2 on the proposed subdivision.

1. One house site only be permitted on the two blocks of the proposed subdivision and at the locations shown on Figure 1, provided that septic tanks have been or will be approved by the Health Department, or Council officers.
2. It is recommended that the septic tank and overflow drains be lower down on the slope, in the areas discussed on the site visit of 24 October.
3. With the presence of underlying subsurface clay and slopes of 5 to 7 degrees, both sites have a potential for landslide failure and should remain in a Zone III landslide risk area.
4. The risk of slope failure is considered to be no greater at these sites than other Zone III areas on the upslope side of Windermere Road, as shown on the Department of Mines Tamar Valley zonal map.
5. As the slopes are sensitive to slope failure, precautions both in building and living on the sites should be followed as outlined in this report. The aim in any landslide risk area is to reduce the amount of water absorbed in the ground by an adequate drainage system.
6. As well as being prone to failure the soil and subsurface clays are expansive. By the use of specially designed foundations, future problems with house cracking should be avoidable.

Site 3

This site is thought to be on a section of a parasitic slide which is considered to be younger than the large old landslide outlined by Stevenson in 1974.

This old slide appears to cover the Zone IV area of the proposed subdivision. This site has all the problems of sites 1 and 2 plus the shear box tests indicate that the clays have a low residual angle of friction and cohesion. These tests are still continuing and will need to be followed by slope stability analysis modelled under varying conditions. When this work is completed a further report will be written. Site 3 may have to be moved higher up the slope, just within the tree line where it will be at the head of the old landslide but away from the later parasitic slide. This alternative site will most likely require a new investigation trench.

References

- MATTHEWS, W. L. 1976. Test pits on R. Ambrose's property at Windermere. *Unpublished Report Department of Mines Tasmania 1976/32.*
- STEVENSON, P. C. 1974. Stability of land at Windermere. *Unpublished Report Department of Mines Tasmania 1974/28.*

[21 January 1985]

Table 1

Soil testing, Ambrose, Windermere

Site	Depth (m)	Moisture content (%)	Plastic limit	Liquid limit	Plastic index	Linear shrinkage (%)	XRD
1	0.6	44	30	109	79	28	Montmorillonite (very strong), kaolinite
2	0.6	45	28	118	90	27	Montmorillonite (strong), kaolinite (strong)
	0.9	42	29	125	96	27	
3	0.3	40	-	101	-	-	Montmorillonite (moderate), kaolinite (moderate)
	0.6	44	29	120	99	25	
	0.9	41	30	118	88	24	
	1.2	40	-	-	-	-	
	1.5	39	26	105	79	22	
	1.7	36	-	87	-	-	
	2.4	37	27	99	72	22	
	2.7	36	26	97	71	21	

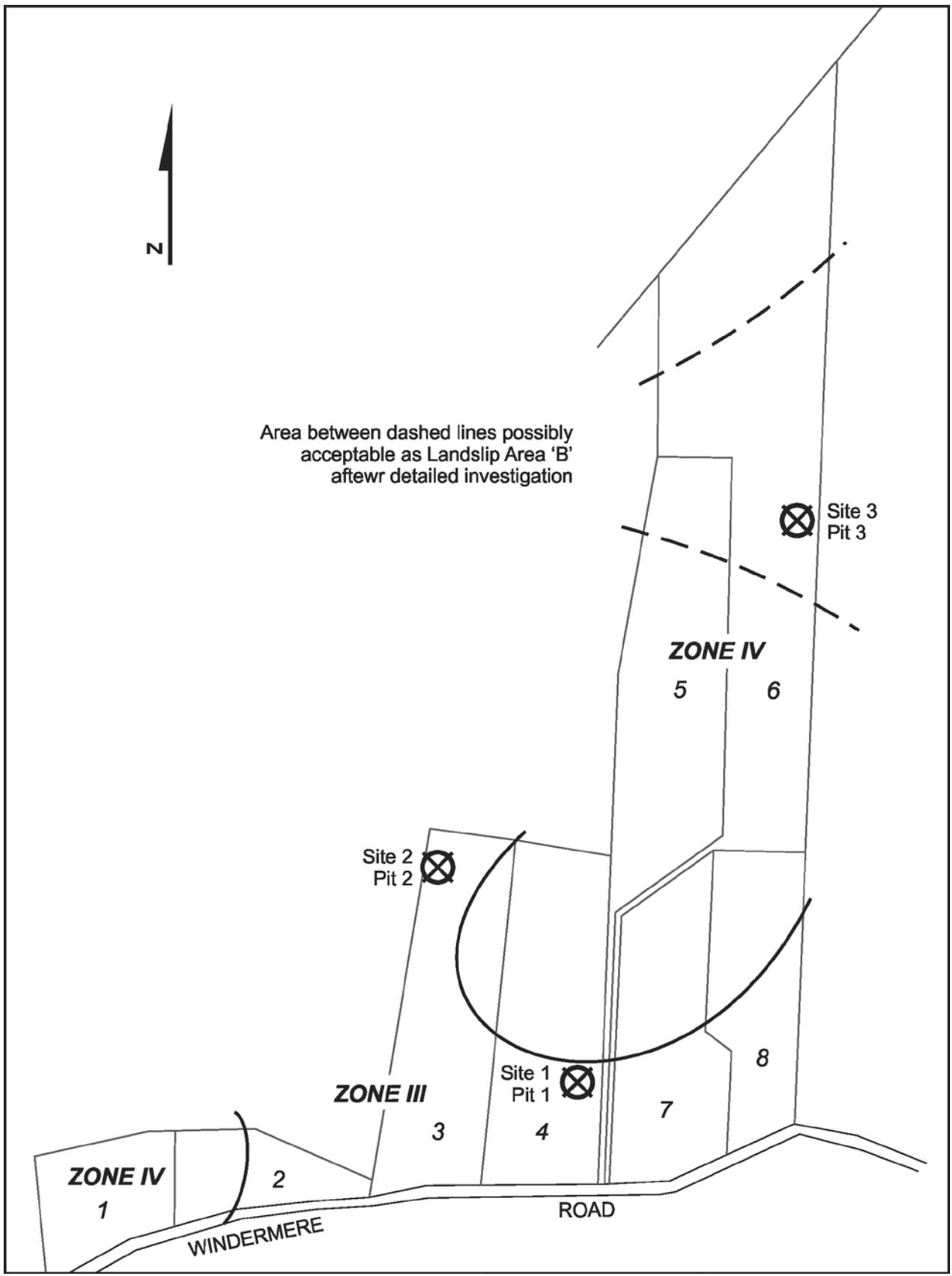


Figure 1
Location of test pits

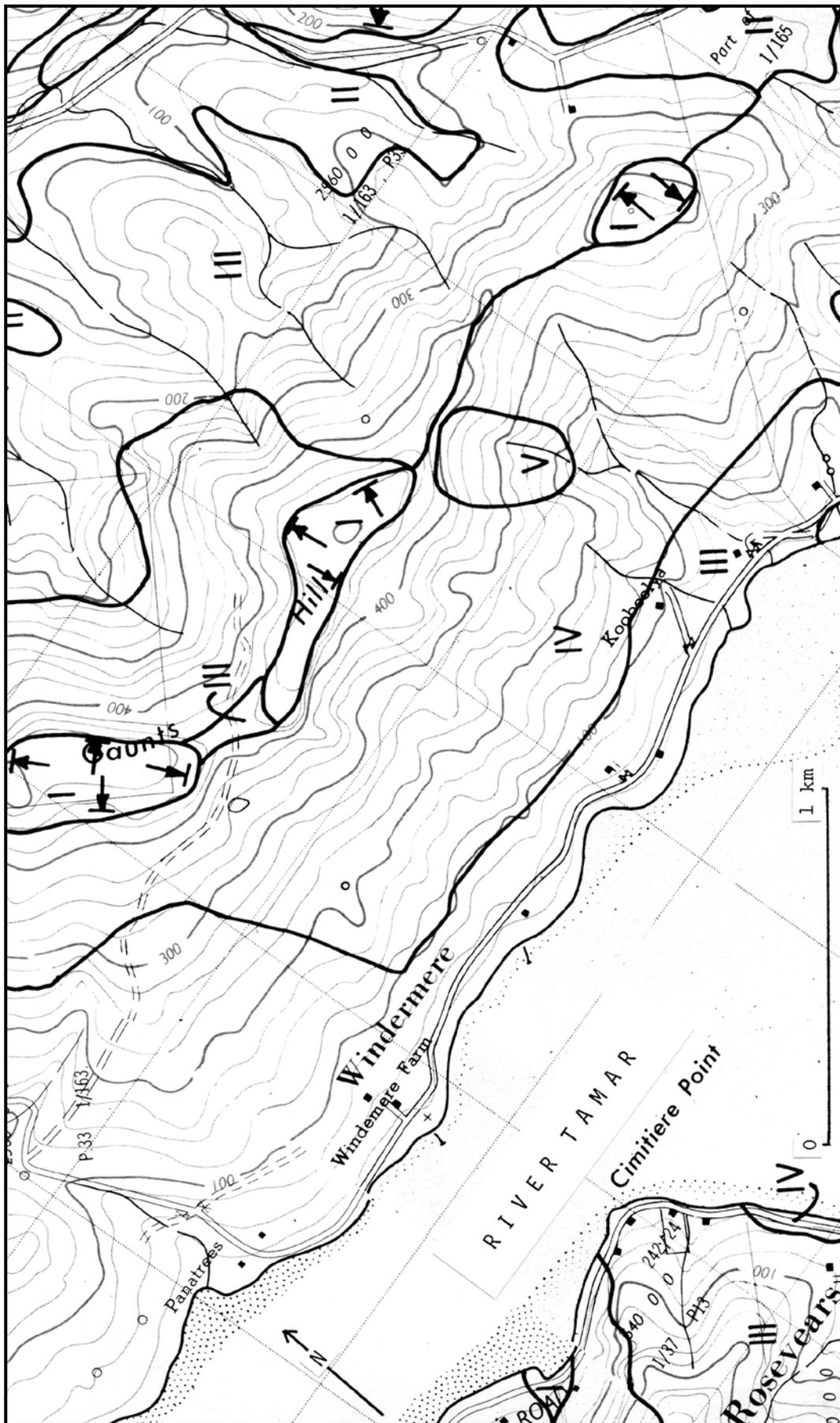


Figure 2

Landslide zone map, Windermere