

1984/78. Slope stability of a proposed subdivision, Queechy Road, Launceston.

W.R. Moore

#### Abstract

A proposal to subdivide a block into two lots required a stability report for the local municipal council. The block is situated at the foot of the Queechy scarp, this scarp having slopes ranging from 10° to 25°. There is an existing house on one lot and it is proposed to build a small house or unit on a narrow, relatively flat (2°-3° slope) area adjoining the road.

There is a risk of slope failure occurring on the steep slope behind the house causing damage to the house, but this risk is small compared with the risk of slope failure when building on the steep slope itself. No major failures are known to have occurred in the western section of Queechy Road. Minor translational movements are reported to have occurred and to allow building on the steep slope would require costly, detailed investigations and slope analysis.

Five recommendations are made which would reduce the risk of building at the proposed location to what is considered acceptable limits.

#### INTRODUCTION

Mr B.W. Lister proposes to subdivide into two lots his block at 2 Queechy Road, Launceston [EQ143109]. The block is situated close to the junction of Penquite Road and Queechy Road, and is on the western section of the Queechy scarp. The block overlooks the lagoon and flood plain of the Kings Meadows Rivulet where the rivulet joins the North Esk River (fig. 1).

An examination of the block was undertaken on 27 September and 10 October and a preliminary report was written in October. This is the formal report requested for the council.

#### SLOPE STABILITY

The majority of the block is very steep, with slopes of 20°-25°, and is located on the lower section of the 30 m high Queechy scarp. A sharp break in slope occurs at the foot of the slope, ten metres from the road boundary along the eastern boundary of the block, where a 17° slope eases to three degrees. The 17° slope is only short (11 m long). The slope then increases rapidly to 20° for the remainder of the eastern boundary of the block (fig. 2).

The relatively flat area adjacent to the road pinches out westwards and the slope of the western boundary is a uniform 20°, with only a two metre wide low sloping (2°) area. It is on this flatter section that Mr Lister proposes to site the house on the eastern half of the subdivided block. The house is to be located on a flat section 11 m wide with a slope of 5°. Locating the house in this position gives no stability problems, particularly as it is proposed to build a retaining wall at the rear of the house. A well-drained retaining wall would, by its weight and position at the toe of the slope, add to the stability of the steep slope.

Translational movement is known to have occurred on the steep section

of the Queechy Road scarp, causing minor cracking of the houses and their surrounds. In spite of the steepness of the slope, no major failures are known to have occurred along the western section of the scarp.

On the Tamar Valley Landslip Zone Map the proposed subdivision is shown as a Class III area, which is defined as a potential landslide zone (fig. 3). Even the low sloping  $3^{\circ}$ - $5^{\circ}$  area on which it is proposed to build the house is classified as Zone III. This classification should remain, even though the risk for this particular area is low. A major slope failure on the steep slope at the rear would damage a house on the proposed site. Therefore, by definition, this area should remain in the potential risk zone.

On the steep slope ( $17^{\circ}$ - $25^{\circ}$ ) of the subdivision the potential risk of failure is far greater. From other site investigations in this area, the old river terrace forming the Queechy scarp is capped with gravel, sand and silt. These river sediments have been deposited on Tertiary sediments of the Launceston Beds, dominantly clay with minor soft sandstone beds or lenses (Longman, 1966). The clay of this area is highly plastic with a low shear strength. It is the minor sandstone beds or lenses within the clay, combined with the free-draining properties of the overlying river terrace gravel and sand, that are considered to give the higher slope stability to the Queechy-Sandown Road area than would otherwise occur if the Tertiary sediments were all clay (Moore, 1984).

If building were to be permitted on this steep slope, a very detailed subsurface investigation would appear to be necessary to find out how much sandstone was present and the properties of the sediments. To consider building on the clay of the Launceston Beds where slopes were  $20^{\circ}$ - $25^{\circ}$  would require long term shear box testing of the clay samples plus Atterberg limits testing etc. The results of soil laboratory testing and subsurface investigation should be included in an accurate geological model of the slope for analysis (Moon, 1984a). The analysis should include all the Queechy scarp for possible failure, as well as the proposed subdivision slope (Moon, 1984b).

Such an investigation appears far too expensive for house building, and it would appear preferable to recommend that no building occur on the steep slope of this proposed subdivision.

#### RECOMMENDATIONS

- (1) A single house can be sited on the low sloping section of the subdivision adjoining the road.
- (2) No further building is recommended on the steep  $20^{\circ}$ - $25^{\circ}$  slope area.
- (3) No undercutting of the toe of the slope to widen the proposed house site be permitted.
- (4) A retaining wall with adequate drainage provision be built at the back of the house on the toe of the steep slope.
- (5) The planting of trees and shrubs on the steep slope should be encouraged and any watering of these kept to a minimum.

REFERENCES

LONGMAN, M.J. 1966. One mile geological map series. K/55-7-39. Launceston. *Explan.Rep.geol.Surv.Tasm.*

MOON, A.T. 1984a. Bishop's simplified slope stability analysis with a Hewlett-Packard 41C calculator. *Unpubl.Rep.Dep.Mines Tasm.* 1984/51.

MOON, A.T. 1984b. Preliminary ideas on the development of guidelines for consultants undertaking slope stability assessments. *Unpubl.Rep.Dep. Mines Tasm.* 1984/56.

MOORE, W.R. 1984. Subsurface movement in expansive clay : An alternative explanation for house cracking at Sandown Road, Launceston. *Unpubl. Rep.Dep.Mines Tasm.* 1984/59.

[27 November 1984]

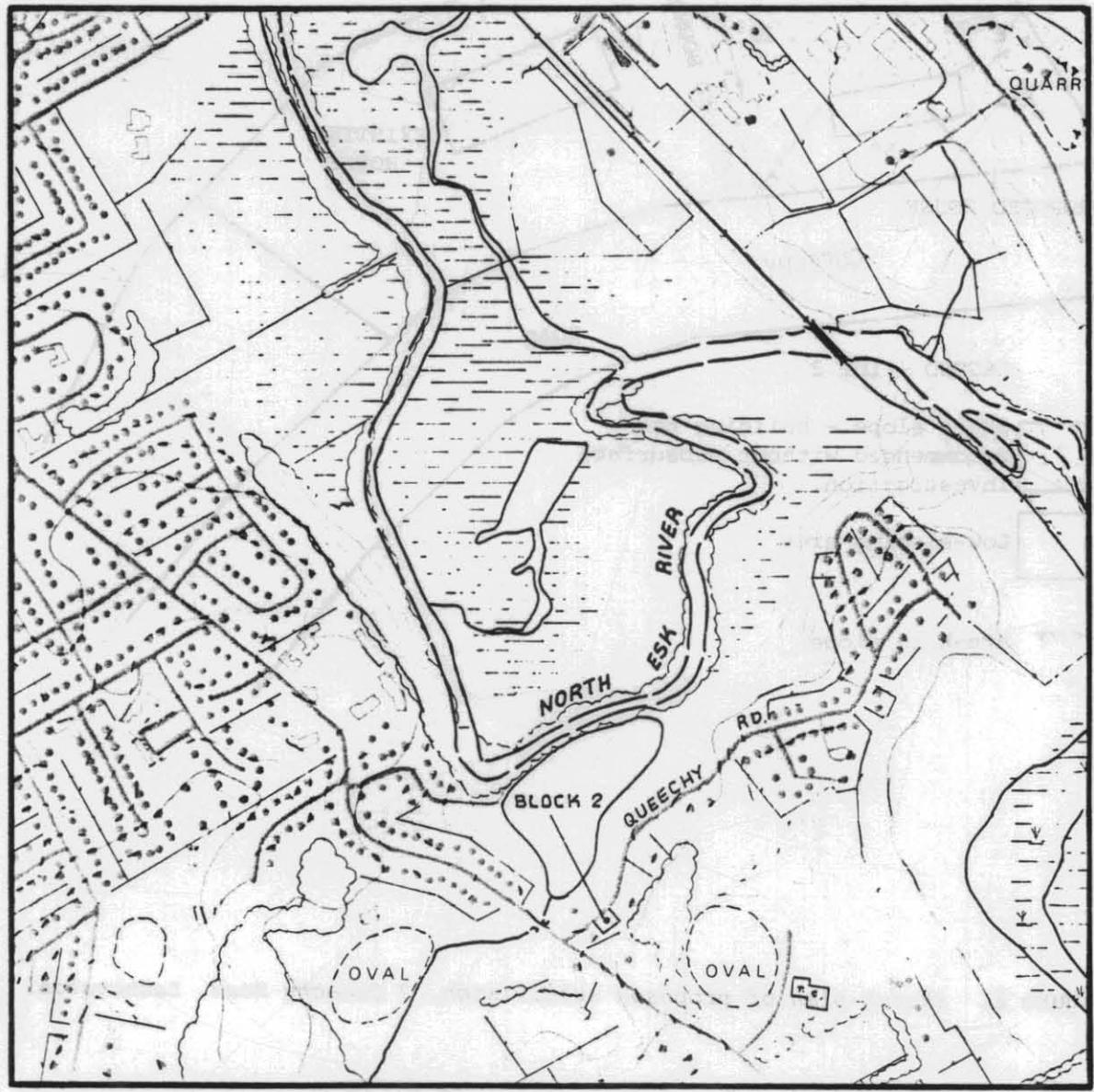
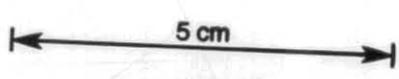


Figure 1. Location map of Queechy Road area.



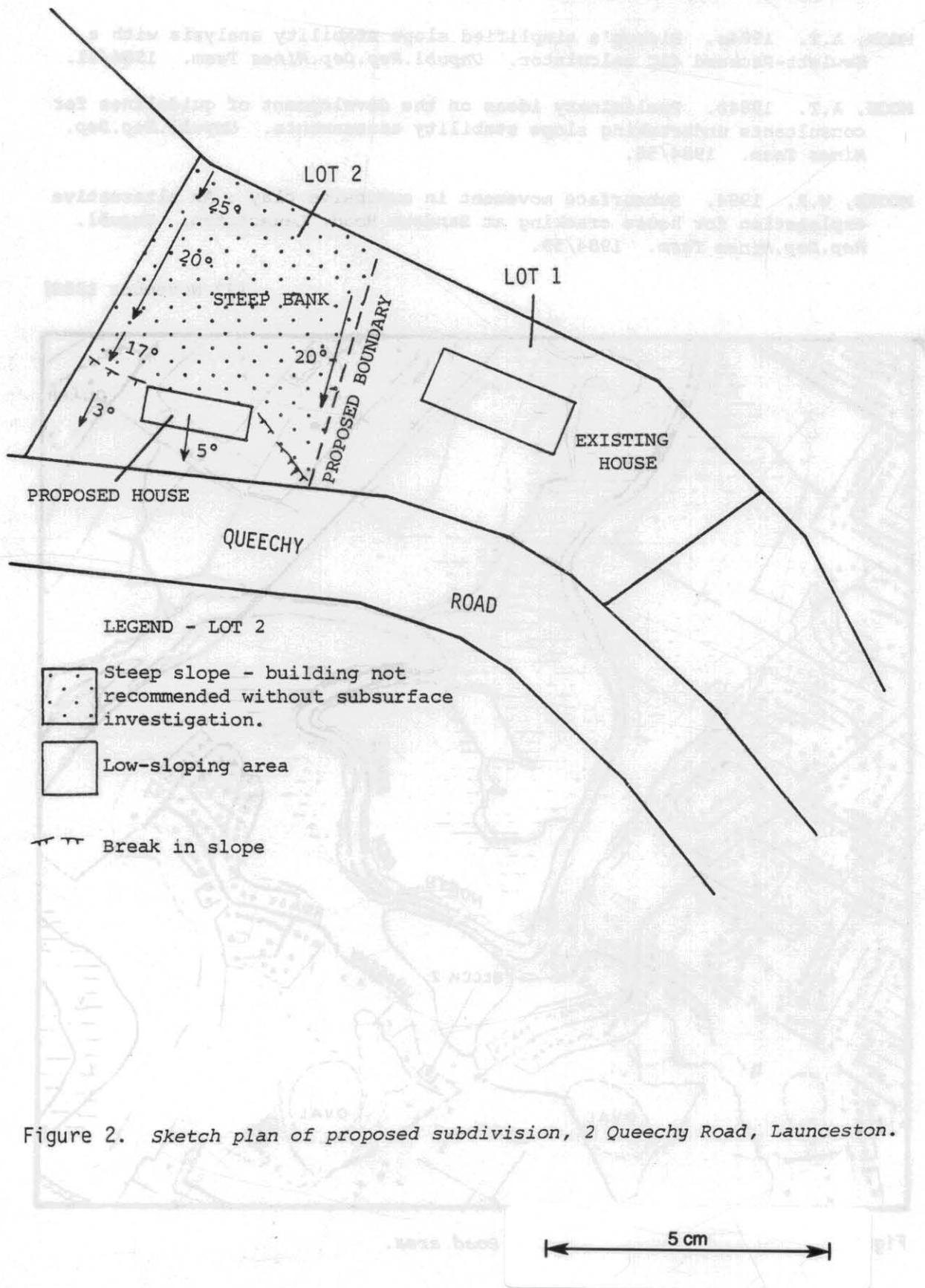


Figure 2. Sketch plan of proposed subdivision, 2 Queechy Road, Launceston.



Figure 3. Landslip zone map, Queechy Road area.

- Zone V - Active landslips and adjacent areas.  
No building without specialised investigation and design.
- Zone IV - Old landslips and adjacent areas.  
No building without specialised investigation and design.
- Zone III - Potential landslip areas.  
Building methods in accordance with a special code.
- Zone II - Stable ground, but on soft rocks.  
Strict adherence to existing building code.
- Zone I - Stable ground on hard rocks.  
No abnormal problems or risks.

5 cm