UR1973_47

The stability of a proposed subdivision at Clara St, West Ulverstone.

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An area of landslip to the west of Clara Street, Ulverstone was examined on 26 June 1973 at the request of the Ulverstone Council.

GEOLOGY

The hill to the west of Clara Street, on which Maud Street, Amy Street and Burnett Crescent are being developed has been mapped as Tertiary basalt (Burns, 1963). This overlies soft Tertiary sand, gravel and clay the presence of which is inferred at the south end of Amy Street, and in turn this succession overlies a complex of hard Cambrian mudstone and volcanic rocks. Only the Tertiary rocks are important in this discussion.

The basalt capping of the hill is deeply weathered and no fresh outcrop of this rock is seen, but its existence has been inferred from the thick 'red soil' mantle. Deeply weathered rock cores are also visible in soil erosion gullies in the steep slope at the north end of Amy Street. No outcrops of the Tertiary sediments are known in the area although Burns' inference that they were present may have been based on evidence now obscured.

THE PRESENT SLIP

The present slip has occurred on a slope of about 19° about 150 m north-east of the present eastern end of Maud Street. The slip is about 30 m long downslope and 10 m wide, the head has dropped about 60 cm and the foot has turned to a wet earth flow. Water is discharging from the toe at about 10 l/min. The slip is active and appears to be only a few months old as judged by the growth of plants.

Although this is the only active slip in the area, old slips of much larger size are recognisable in several places around the hill (fig. 1) but the age of these is unknown.

DISCUSSION

Landslips in the red soil derived from weathered basalt and in the underlying sediments are a common sight along the north-west coast from Point Sorell to Rocky Cape, both along the coastal escarpment and inland. Groom's Slip at Penguin and the nearby Lonah slip have been active since before 1900 (Stevenson, 1972*b*) and other large slips are easily visible from the Bass Highway at Lillico.

The best documented slip of recent years has been that affecting the Panorama Heights Subdivision at Devonport (Stevenson, 1972*a*). In the nearby Victoria Bridge slip, weathered basalt and soil moved downward on a slope of 19° and on the subdivision itself drilling and stability analysis showed that it is only marginally stable. The geology is very similar to that seen at West Ulverstone.

An analysis of slopes as represented by the contours has been made for the Clara-Amy Street area. The average slope over these contours (20 ft) has been estimated for the immediate area of the existing active slip. All areas steeper than this have been determined and are outlined on the plan. The limitations of this technique, based as it is on coarse contours, are such that it tends to be conservative and the areas of steep slope are probably greater than represented by the outlined areas.

An examination of the contours also reveals anomalous areas (marked A, Figure 1) where divergent contours represent strong changes of slope. A horizontally and vertically concave head lies above a doubly convex toe. This particular appearance is recognised as diagnostic of old 'fossil' landslips. The age of these is unknown, but the risk of a recurrence must be appreciated and is in fact borne out by the existing slip.

The driving force for any landslip is gravity and an ever present ingredient in water. It both increases the weight of the soil and softens it, thus decreasing its strength. Were it not for the presence of water the existing slip would not have occurred and no future risk would exist, but since water is going to be present we must consider how it reaches the slip or steeply sloping potential slip areas, if this can be prevented, and how it can be effectively removed.

Without detailed drilling or indirect methods the route by which the water reaches the surface where it can do damage is unlikely to be determinable, but it must originate either from rainfall or from domestic water released into the ground higher up the hill. There is no evidence for any kind of pressure spring such as could bring water from lower levels, and it must be pictured as entering the ground either as rain, or by introduction into the ground from garden watering, leaky supply pipes or drains or by some other human means. The redirection of the rain as a result of road guttering, or sealing, storm drains, or the construction of houses and their drains could produce flows of water where little existed under 'paddock' conditions and so produce the existing slip. The introduction of additional water which comes ultimately from piped water supply is likely to be a more important factor.

However it reaches the ground, it percolates downward through the very permeable red soil and rock until it reaches impermeable clays or other material and then makes its way down the surface of this to emerge where it can on the ground at a lower level. Such water movement is very difficult to control except where water first enters the ground, and only here can it really be prevented.

It is a matter of experience that any slip which begins to be active is very difficult to arrest, and tends to grow and extend its influence. It is possible to introduce pipes into the slipping area so as to remove the water before it can saturate the soil and so weaken it, but such a measure requires constant vigilance with no real guarantee of its efficacy. It must be admitted that of the many other measures such as counterfort drains, tree planting, surface drains, retaining walls, none has been found wholly effective. In most cases such measures are at the same time uneconomic.

CONCLUSIONS

(1) An active slip is present in the area.
(2) This is caused by excess water probably ultimately from piped supply.
(3) The slip may be expected to grow larger.
(4) It represents a recurrence of a landslip condition that has existed for a long time.
(5) Potential for landslipping exists over most of the hill slopes on the north and east sides of the hill.
(6) Control of water discharge is the only practicable immediate measure that offers any hope of success in arresting the condition.

(7) The whole phenomenon presents a threat to the stability of the existing houses on Burnett Crescent and Maud Street east of Amy Street.

RECOMMENDATIONS

(1) No subdivision of the area between Burnett Crescent and Clara Street should be allowed at this stage.

(2) The whole problem should be examined in detail by engineers and geologists to confirm, modify, or reject these findings as they are the result of a preliminary examination.

REFERENCES

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[13 July 1973]

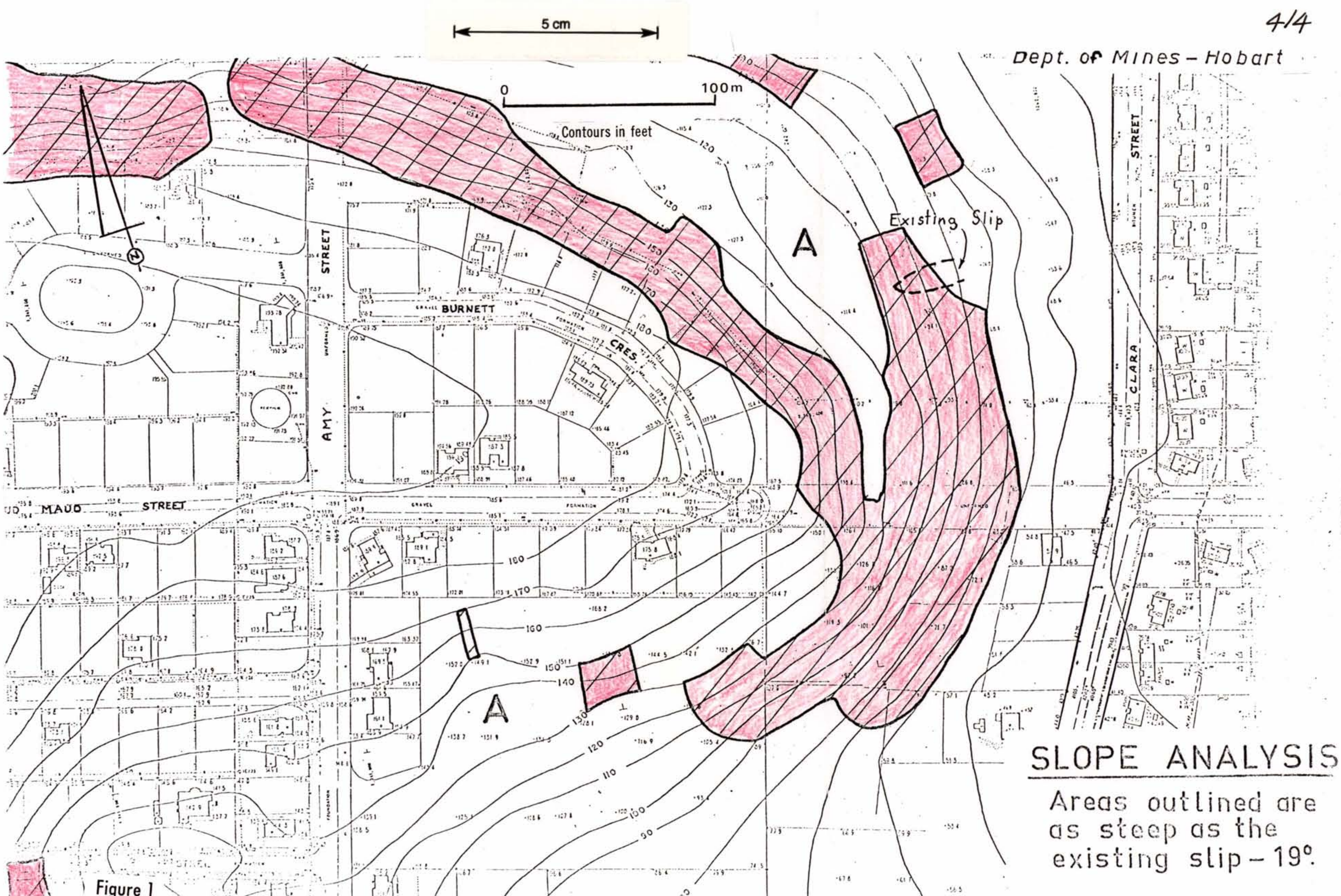
5 cm
Dept. of Mines – Hobart
0
100m
Contours in feet
Existing Slip
A
A
BURNETT
CRES.
AMY
STREET
MAUD
STREET
CLARA
STREET
180
170
160
150
140
130
120
110
100
90
SLOPE ANALYSIS
Areas outlined are as steep as the existing slip – 19°.

Figure 1