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19. A probable landslip at Stanley.

W.L. Matthews

Several buildings and the roadway along Alexander Terrace in Stanley have shown recent signs of cracking. The building inspector for the Circular Head Council requested that the area be examined to determine whether these features were due to landslip.

RELIEF AND GEOLOGY

The main street of Stanley runs along the lower slopes of The Nut while much of the remainder of the town is on flatter land. Further to the west the land surface rises to the Green Hills. Behind the main street and its extensions, the land rises in an undulating fashion to a roughly circular zone of almost vertical cliffs which rise to about 140 m above sea level and bound The Nut.

The geology of the area has been examined by a number of workers and most recently by Cromer (1972) and Baillie (1974). Crinanite, a Tertiary basaltic rock forms The Nut and talus from the weathering of this rock is found below the cliff line. At various places tuff and agglomerate beds can be seen underlying the talus, sometimes in contact with the crainanite. The presence of tuff and agglomerate beds, the dips of these deposits, and the shape of The Nut suggests that the feature is a volcanic centre. Basalt boulder beds occur on the lower slopes. The flatter area between the slopes of The Nut and Green Hills are covered by sand and sand dunes which are at least partly windblown in origin.

DISCUSSION OF LAND STABILITY

Three old rotational slips and a break in topography which may be an old slip, have been mapped on the southern side of The Nut (fig.44). Tuff and agglomerate probably underlie most of the talus areas at depth, particularly on the southern side of The Nut. If The Nut is a volcanic centre, the tuff and agglomerate beds would be expected to dip downslope. This situation would aid the formation of slips. The talus is probably mainly loose, unconsolidated and fairly permeable to water. Where examined the tuff is deeply weathered, but moderately compact, and would be relatively impervious to the entry of water. When disturbed it breaks up into loose granular fragments and would become more permeable.

The recent cracking has occurred in buildings and the roadway in front of the break of slope and towards the toe of the slope (fig.45). A crack in the ground about one centimetre in width can be traced for 8-10 m behind a shop extending into the rear foundations of the building. A low stone wall under a cement floor at this point has dropped about 0.3 m. An arcuate shaped crack, about one centimetre in width extends across Alexander Terrace behind the previously described crack. A house fronting onto the roadway has developed cracks in the fence and verandah, both of which are concrete constructions. The house is built of timber and shows no visible disturbance. A 1.5 m high rock wall between the roadways is capped with thin concrete which has lifted off the rocks by about 2-3 cm. It is not known whether these cracks in the walls occurred recently. The nearby post office has developed a number of cracks in the walls since it was painted in recent months, and a shop further up the street has had two plate glass windows broken, possibly related to earth movement. The outside of the buildings show little signs of significant deformation. There are a number of cracks in the asphalt of the footpath in the area but it is not known when these formed.

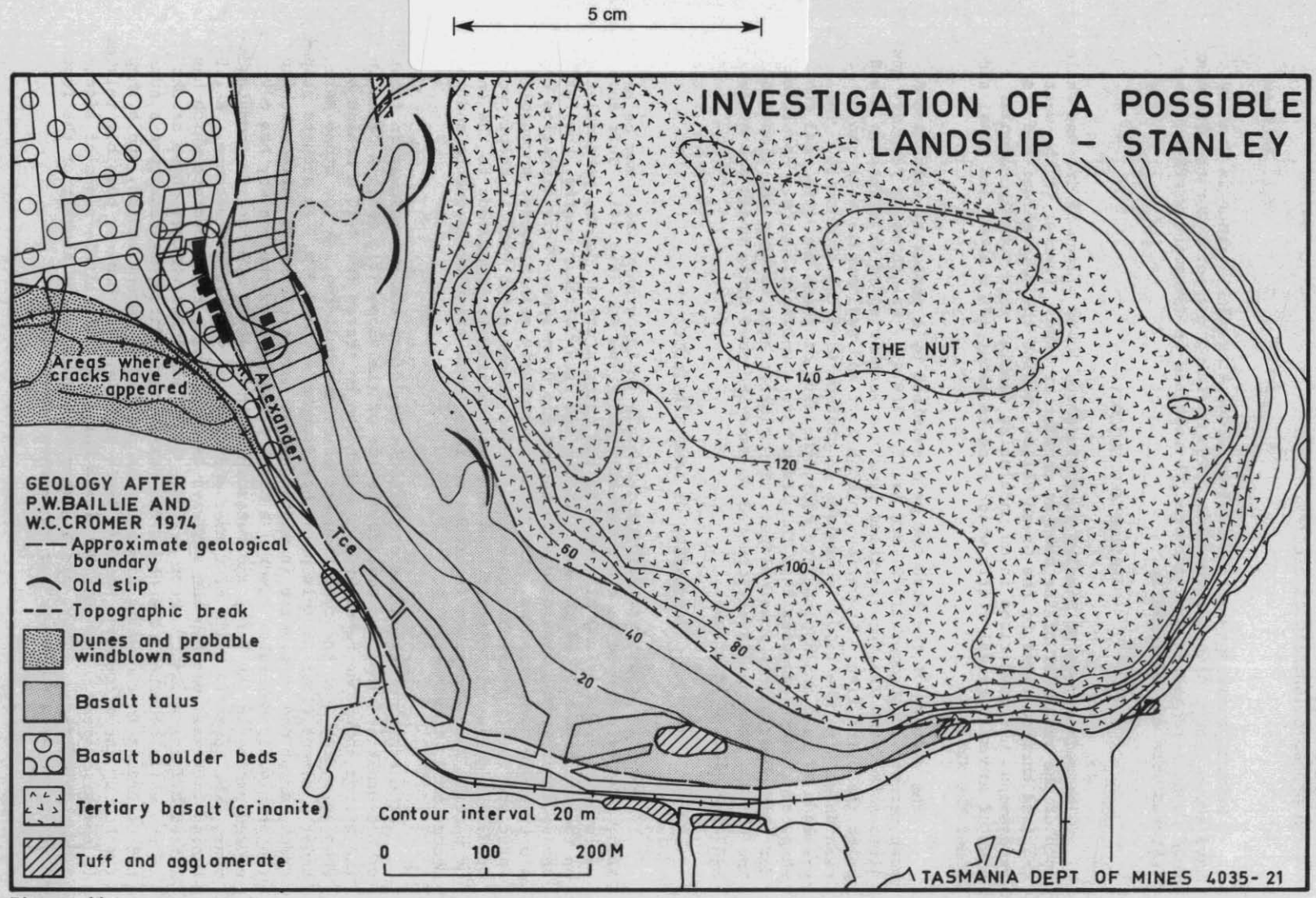
5 cm
INVESTIGATION OF A POSSIBLE LANDSLIP - STANLEY
THE NUT
140
120
100
80
60
40
20
Areas where cracks have appeared
Alexander Tce
GEOLOGY AFTER P.W.BAILLIE AND W.C.CROMER 1974
Approximate geological boundary
Old slip
Topographic break
Dunes and probable windblown sand
Basalt talus
Basalt boulder beds
Tertiary basalt (crinanite)
Tuff and agglomerate
Contour interval 20 m
0 100 200M
TASMANIA DEPT OF MINES 4035-21

Figure 44.

A number of seepages occur in the bank behind the shop where the ground cracking has occurred. One seepage flows at about 10-15 litres per minute, the property owner stating that it has flowed at this rate for approximately six months, but had not occurred before then. If this is correct, it would appear that some alteration in the groundwater flow direction has taken place, a drain has become blocked, a water supply pipe may have corroded and is leaking, or a poor connection may have been installed. The council replaced the water main along the edge of the upper roadway between January and March 1975.

If this seepage has only occurred this year and not before, it is likely that any movement is connected with it. Changes in drainage or a leaking pipe would be the most likely causes of such a seepage.

Above average rainfall has occurred during May, June and July with almost double the average in May and July (table 1). This excess of rainfall could also have initiated ground movement. It is common for new slips to occur in the toe of old slips. During March of this year the rainfall was approximately three times above average, and there would probably have been enough rain to make most springs flow strongly. However above average rainfall also occurred in July and August last year and this detracts a little from, but does not exclude completely, the argument that excessive rainfall caused any slip.

Table 1. RAINFALL AT STANLEY (mm)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Mean	43	47	50	93	93	106	117	105	85	88	66	62	937
1974	31	6	10	177	65	49	283	115					
1975	65	9	162	49	180	111	244	80					

Stanley does not have any sewerage or stormwater drain systems, septic tanks being used by most householders. The lack of such services on fairly steeply sloping land underlain by basalt talus, endangers the stability. Even if this is not the cause of unstable conditions developing, it is likely to aggravate the situation.

CONCLUSIONS AND RECOMMENDATIONS

It is apparent that at least part of the area in which cracks have developed, is affected by a slip which has developed at the toe of an older slip in common with slips in many other areas. The amount of movement is currently relatively small. Other sections for example the Post Office and the shop where plate glass windows have broken, could be affected by a slip but the cracks could have been caused by softening of clay in the talus due to moisture increase and subsequent settlement.

If the seepages in the bank behind the shop are only a recent development, as the owner states, it is apparent that some change in the groundwater flow has taken place, or drainage has been re-directed. It is possible that a domestic water pipe has corroded and is leaking or a poor connection has been made in the water main and these possibilities should be examined.

Heavy traffic should be prevented from travelling along this part of Alexander Terrace and a speed limit of about 30 km/h placed on other traffic along Wharf Road and Alexander Terrace near the area affected.

A possible means of stabilising the area would be to place rock against the foot of the slope, but some hundreds of tonnes would probably be necessary

just to stabilise the small area behind the shop. If the slip covers a wider area, this solution would probably be impractical.

Drainage from the seepages should be maintained and conducted away from the slope.

Although the installation of sewerage and stormwater drains is a long term measure, the possibility of these services being made available should be examined closely. The gradual weathering of the talus by effluent from septic tanks, and the uncontrolled flow of stormwater may have influenced the stability of the area and will certainly aggravate any unstable conditions that develop in the future.

REFERENCES

CROMER, W.C. 1972. *The petrology and chemistry of the Circular Head Teschenite.* B.Sc. Hons thesis, University of Tasmania : Hobart.

BAILLIE, P.W. 1974. The geology of the Stanley area. *Unpublished geol. map Dep.Mines Tasm.*

[10 September 1975]

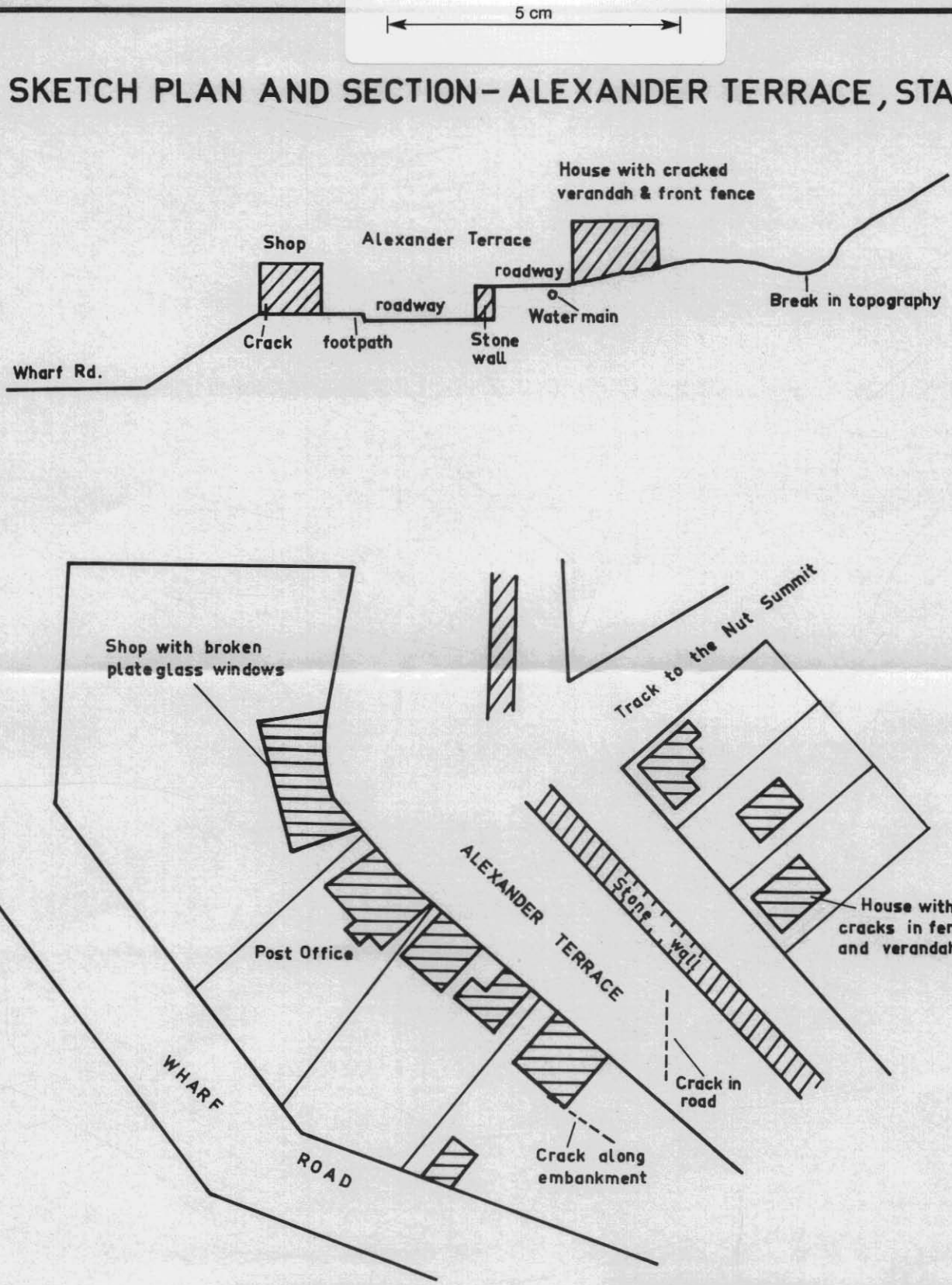

FIGURE 45

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