



Land stability assessment of three sites at Penguin Road, Lonah

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Following a request from The Municipality of Ulverstone, three sites on and adjacent to Penguin Road at Lonah, west of Ulverstone, were inspected on 8 October.

Site 1: Proposed widening of Robertsons Road

The reconstruction of Robertsons Road (426400 mE, 5445950 mN) will entail the widening and slight re-alignment of the existing gravel road. Of particular concern to Council is the stability of the slope in the area where additional cut is required, between about chainage 50–100 metres (Photo 1).

The existing road cutting along this section is estimated to be between three and four metres in height. The proposal is to cut back into the slope several metres more, to between three to five metres; this will result in an increase in the height of the cutting by only about one metre.

Examination of the existing cutting revealed brown high plasticity clay with associated basalt boulders; bedrock was not observed outcropping in the cutting, but a slightly weathered basalt was noted outcropping in the creek bed on the lower side of Robertsons Road. From the evidence available, it is probable that 'bedrock' is unlikely to be encountered in the proposed extension to the cutting; the profile is likely to be residual weathered materials in the form of basalt soils and associated boulders.

The existing cutting shows no signs of instability and has stood the test of time. As a result, there is little reason to suggest that the proposed new additional cut will behave differently.

The existing weatherboard residence is situated some 40 to 50 metres distant from the proposed road cutting. The house has been built on a relatively flat land segment although the land slopes away steeply (23°) in front of the house. It is not envisaged that a substantial failure will develop as a result of the roadside cut, and in the unlikely event that this should occur, it is likely that the dwelling would remain unaffected.

In summary, it is unlikely that major stability problems will result from the proposed works.

Site 2: Landslip on Penguin Road in the vicinity of Rockliffs Road

The failure of a section of Penguin Road (426630 mE, 5445780 mN) has caused severe cracking and settlement of the pavement which is evident over a distance of about sixty metres (Photo 2). An inspection of the road pavement revealed a series of longitudinal or *en echelon* cracks developed along the northern traffic lane. There appeared to be two main areas of road failure; a 10 m long segment followed by a 50 m long segment adjacent to the first. The tension cracks were observed to be up to 30 mm across, although the total lateral movement associated with this failure is considered to be significantly greater. Substantial vertical movement appears to have also occurred as shown by the disrupted stormwater drain beneath the road, which has been displaced by an estimated 100–150 mm. Council has reportedly repaired the road surface on several occasions as the vertical movement in the pavement was making conditions potentially hazardous for driving.

The factors or mechanism that led to the road failure could not be determined from the initial on-site visit. What is of greater concern is to establish whether movement is confined only to the roadway or whether it is a larger deep-seated failure involving the railway. There are signs of bulging in the embankment between the road and railway but no obvious signs of movement were observed either in the alignment of the rail tracks or in the ground down to the shoreline. Whilst it is unclear as to the extent of the movement, it may be necessary to consider the road failure as part of a larger landslide feature.

At the time of the visit, it was raining heavily and it became readily apparent that movement is being accelerated by the ingress of surface water through the unsealed cracks in the road, and from the seepage of runoff water into the ground via the disrupted subsurface stormwater drains beneath the road. The volume of water issuing from this stormwater drain

was estimated to be between 0.7 and 1.0 litres per second. This water was being discharged onto the ground beside the railway track and then being picked up again and piped under the railway and again discharged directly on to the steep slope segment below the track. This is an ineffective road drainage system and as it exists, can only aggravate the problem.

It is recommended that further work be carried out, especially with respect to defining the limits of movement. It is proposed that the Department of Mines map the area where deformation is evident and establish two or three survey lines across the area to effectively monitor the extent and rates of lateral and vertical movement. It is envisaged that the lines would be resurveyed at regular intervals of about three months.

An effective road drainage system is required to reduce the direct ingress of surface waters into the slip. Existing drains should be repaired where damaged and the water piped down to the foreshore before being discharged.

Site 3: Road failure, Rockliffs Road

Only a cursory inspection was made at this site (426600 mE, 5445700 mN) due to inclement weather. A small slip has developed which has resulted in subsidence of part of the road by up to 150 mm over several metres (Photo 3). This feature needs to be re-appraised with respect to determining the following:

- is it a problem associated with road fill only;
- is it associated with movement of the larger landslide which developed upslope several years ago;
- is it likely to affect the house downslope.

It is anticipated that this work will be carried out in the next month.

[5 November 1992]



Photo 1: Robertsons Road looking towards cutting



Photo 2: Pavement failure, Penguin Road



Photo 3: Rockliffs Road — landslide and road failure