

1981/18. A landslip on Repulse Road, north of Maydena

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*Abstract*

Debris flows near Mt Dawson have affected Repulse Road over the last few years. The land surface is steep and is underlain by dolerite in varying stages of weathering, with overlying talus. Seismic spreads suggest that relatively solid dolerite is deep under much of the roadway near the affected part. Alteration of the drainage due to road construction and removal of trees has probably had some influence on initiating movement. Drainage measures to prevent water seeping underground and re-establishment of vegetation should aid in ensuring stability is maintained. Movement of the roadway into the slope a little further should ensure that a greater proportion of it has relatively solid dolerite close underneath. This would produce a higher cutting.

INTRODUCTION

A landslip has occurred on a road maintained by Australian Newsprint Mills about 30 km north of Maydena, on the east side of the Florentine River valley [DN574906]. Advice on possible stabilisation measures was requested by the company, as it is desirable that the road remains open.

RELIEF AND GEOLOGY

Repulse Road passes around the north-western slopes of Mt Dawson. Where the landslip has occurred (fig. 1), there is a slight re-entrant into the ridge, and the land slopes at an average angle of about 25°, although the slope below the slip area, taking the road fill into account, is steeper than this.

The slip area is underlain by dolerite. The road cutting where the landslip has taken place is up to 10-15 m high and has some *in situ* dolerite exposures. Some of these exposures are of deeply weathered rock (now essentially a clay), while others are of fractured rock with some weathering. Below the road the only exposures are of deeply weathered dolerite in the base of the areas gouged out by the landslips. Above the road there are isolated exposures of unweathered dolerite. Much of the area is covered by a varying thickness of talus made up of clayey material, derived from the weathering of the dolerite, and dolerite boulders.

Rocks of Permian age are exposed on the lower slopes west of the landslip and these consist mainly of sandstone and siltstone. Ordovician limestone is exposed further west in the floor of the Florentine Valley.

DESCRIPTION OF LANDSLIP

The movement has taken place in the last few years. There does not appear to be any significant disturbance of the slopes on aerial photographs taken in February 1973. Most of the movements are believed to have taken place over the last two to three years.

The movements that have taken place have involved the road fill and areas below the road. As movements have proceeded, the roadway has been extended successively into the slope, thus increasing the height of the

18-2

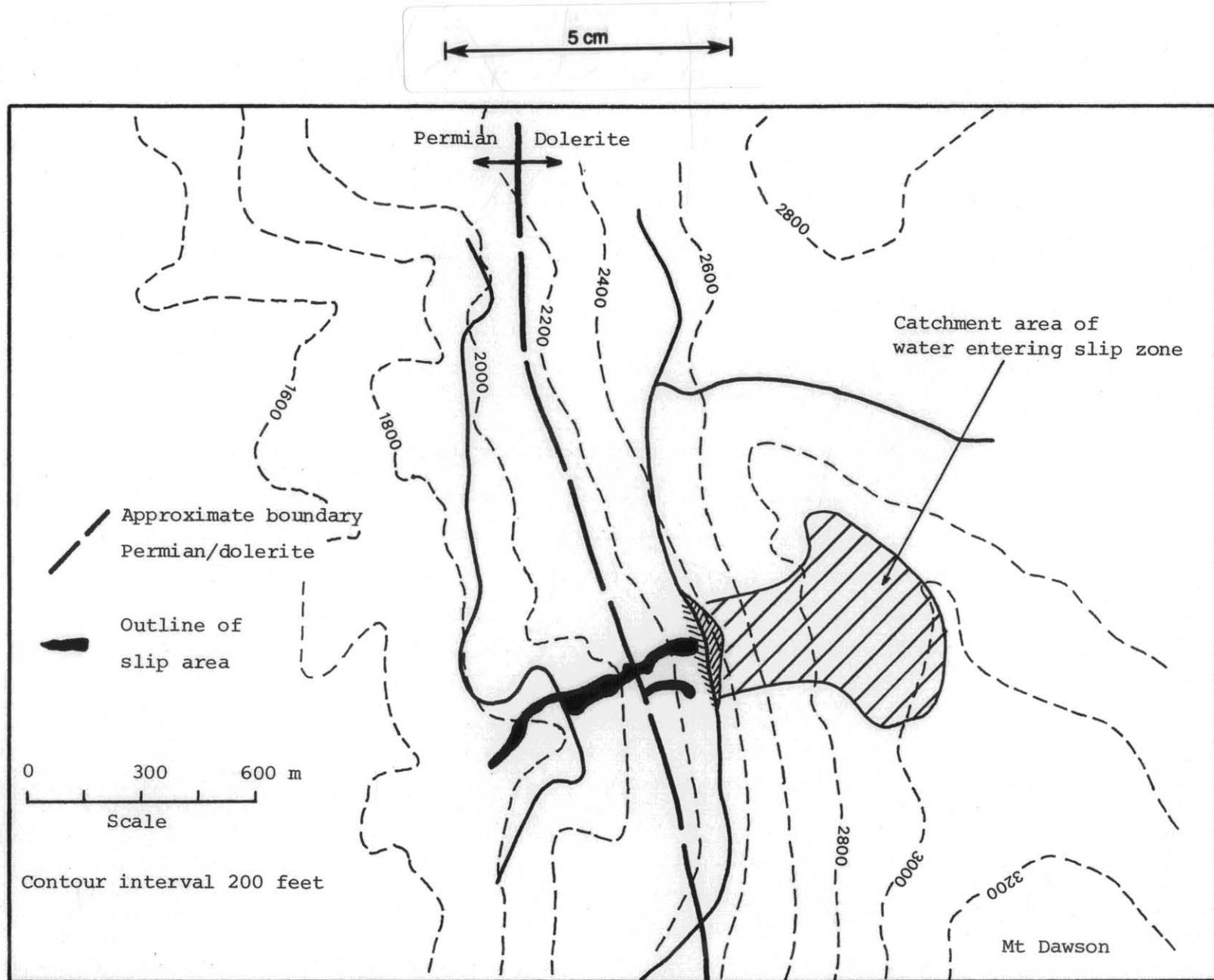


Figure 1. Landslips near Repulse Road, north of Maydena

cutting. No large scale movements appear to have taken place in the cutting itself, except for numerous dislodged boulders that roll on to the roadway.

The slips are long narrow zones of disturbance which, near the top, have gouged out channels several metres deep. The largest slip, which reaches to the road fill material, extends over a distance of 400-500 m down the slope, and road material (basalt boulders) can be found over much of its length. Another slip, the head of which is a little below road level, has also taken place since 1973, but at this stage has had no effect on the road. A smaller slip area between these two slips has not extended up to the road.

These slips could best be described as debris flows.

#### CAUSES OF LANDSLIP

The slope was probably in a relatively unstable situation before any disturbance by road works or the harvesting of timber from the slopes. Minor disruption of the natural drainage by the road, together with the clearing of the land of large trees, have probably been contributing causes to the development of the landslips. Tree roots aid in maintaining stability and there may be some delay after trees are cut down before their effects are lost (*i.e.* before the roots start rotting). Removal of the canopy ensures that rainfall is not intercepted before reaching the ground, so that a permeable soil can become saturated very quickly. It should be pointed out, however, that there are many debris flows in rain forest areas that occur spontaneously, without any prior disturbance of drainage or tree removal.

#### SEISMIC SURVEY

Seismic spreads were fired along the roadway (on the inside of the road) in an attempt to locate the level of less weathered rock, but this survey was somewhat less successful than expected. Three spreads were fired along the road covering the sections that have been affected by the movement (fig. 2). These spreads had a geophone spacing of five metres and only the most northern spread indicated material other than deeply weathered dolerite over long sections. Interpretation of the northern spread suggests material with an average seismic velocity of a little over 2000 m/sec at depths of 3-5 metres. If this velocity represents dolerite, it is either weathered or jointed. Dolerite such as in the out-crops upslope from the road would probably exhibit seismic velocities of 4-5000 m/sec.

The average highest velocity for the other spreads was 1100-1350 m/sec, which represents relatively unconsolidated material, although small sections of these spreads show higher velocities. If material with a velocity of 3000 m/sec underlies the southern spread, it would be at least 23 m below road level.

#### POSSIBLE METHODS OF STABILISING AREA

If relatively solid rock occurred just below road level, methods of stabilisation may have been more easily devised. It seems likely that the only realistic means of attempting to maintain stability of the area is to undertake some drainage measures and promote vegetation regrowth. An additional measure may be to move the road further into the slope and have a greater proportion of the road underlain by *in situ* dolerite. Despite

18-4

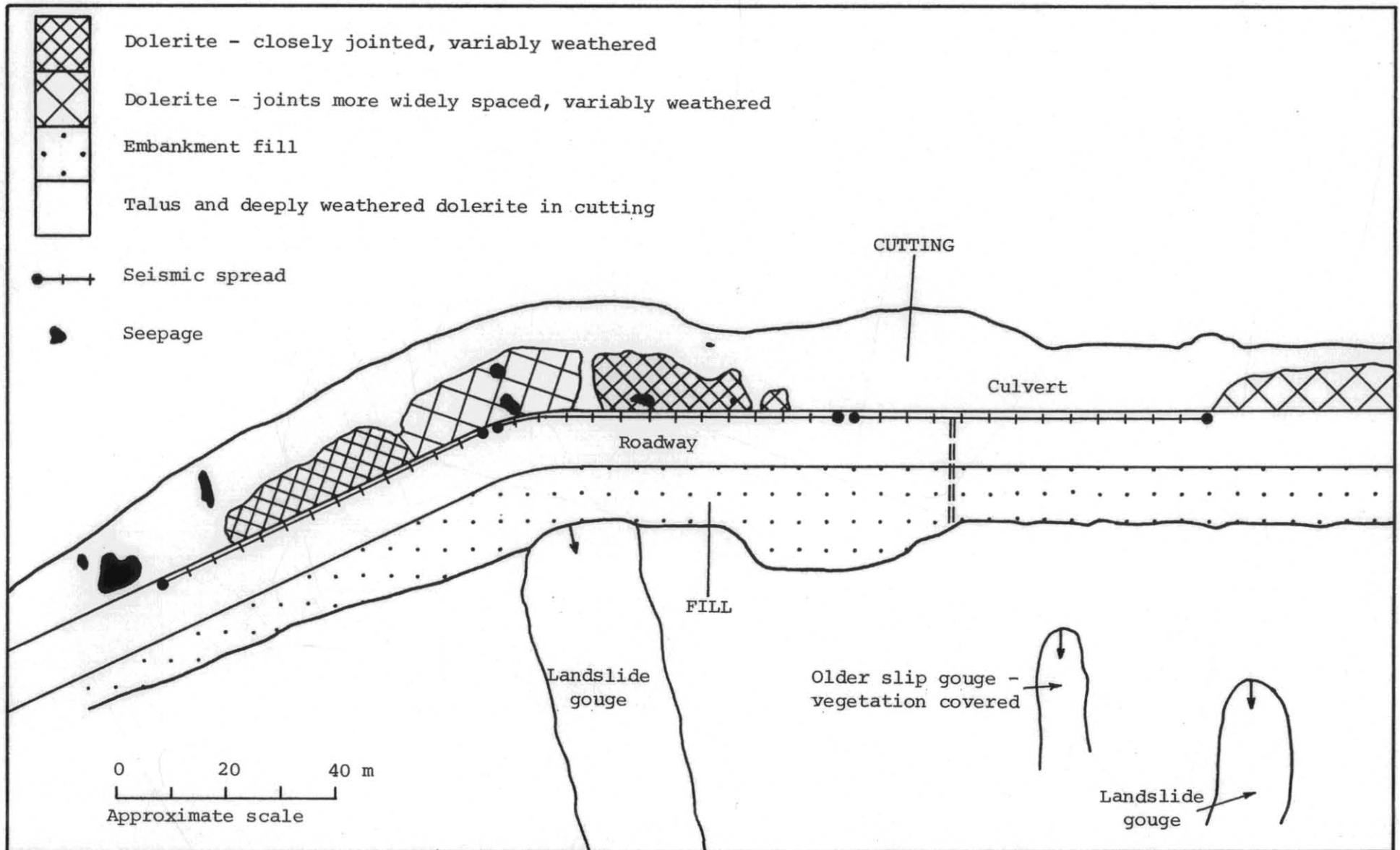


Figure 2. Sketch plan, area around landslip on Repulse Road

5 cm

4/5

the seismic results, a comparatively large proportion of the road cutting has exposed variably weathered dolerite. Moving the roadway a little into the slope would require a higher cutting and a number of benches may be necessary.

Drainage measures should aim at preventing water from seeping underground and these include:

(a) to intercept water seeping from a flatter area above the slip before it reaches the vicinity of the road. Two small streams run towards the slip area (disappearing before reaching it) even in the summer. In wet periods the flow of these streams could be expected to increase in volume markedly. A drain would have to be installed uphill from the cutting top to intercept this water before it disappears underground.

(b) A drain around the top of the cutting (or a bench near the top) would intercept surface flow between the above drain and the cutting top before it flows down the cutting face.

(c) A sealed table drain along the inside of the road would remove rainwater which falls on the cutting itself and water from further up the road.

Discharge areas for water from the above drains should be selected with care. Discharge on land with a high slope angle and thick talus just below the road are likely to cause further problems. The present culvert in the slip area could aggravate the situation.

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