

UR1975-69

Ground movement at Tarooma.

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The Public Works Department requested an investigation of ground movement affecting the surface of the Channel Highway between Meath and Belhaven Avenues, Tarooma [EN285451], because of the possibility of the severance of mains, cables and the road itself.

The area was examined by the writer on 4 November after heavy rain and again on 10 November after several dry days.

#### GEOLOGY

Due to poor exposure, little detail is known of the geology. The area is located on the eastern slopes of the Mount Nelson-Bonnet Hill dolerite ridge (Leaman, 1973). Upslope of the Channel Highway, the dolerite is cut by at least two faults running parallel to the shoreline, and which enclose Permian mudstone. The dolerite passes under the mixed clay and sand of the Tertiary succession which crops out on the shoreline and lower slopes. The Tertiary sediments exposed in road cuttings contain large dolerite blocks, indicative of Tertiary rockfall activity.

The whole complex is mantled by clayey and stony soils, while the development of housing and the uncleared bush further obscure detail. The nature of the geology is shown in Figure 1.

#### EVIDENCE FOR MOVEMENT

Slight ground movement cannot usually be detected in undeveloped ground, but separation of joints and cracking of road surfacing, concrete guttering, kerbs and paving slabs can be seen along the Channel Highway between Meath and Belhaven Avenues. Longitudinal cracks up to 5 mm wide have developed in the road surface, the total horizontal deformation amounting to about 30 mm across the width of the road. Vertical movement is shown by a downward curvature of the downslope side of the road but the amount is impossible to estimate as the original camber is unknown. The concrete paving slabs at two places on the lower side of the road have moved differentially up to 2 cm with a horizontal movement of about the same amount. The kerbing does not show this movement.

The spoon drain on the upper side of the Channel Highway is little disturbed, with a gap greater than 10 mm occurring at any one location. No evidence of movement is seen in Harrow Place.

The brick house at the northern corner of Belhaven Avenue and the Channel Highway has a history of cracking and cracks one centimetre across can be seen in the south-west corner at the level of the top of the window.

There is no clear evidence of major ground movement. Artificial structures, such as the road and the house may show structural damage resulting from only minor movement. The area contains no old or new natural surface features that can be associated with recent landslips although the geology may be favourable to such occurrences. No old landslip heel scars or steep toes are apparent even though the road cuttings may encourage such features to develop. There is no evidence of shear movement about downslope vertical planes crossing the road, and no sign of earthflow, either old or new, below the slope. No horizontal movement is apparent.

There is an excess of water, which may encourage movement in natural

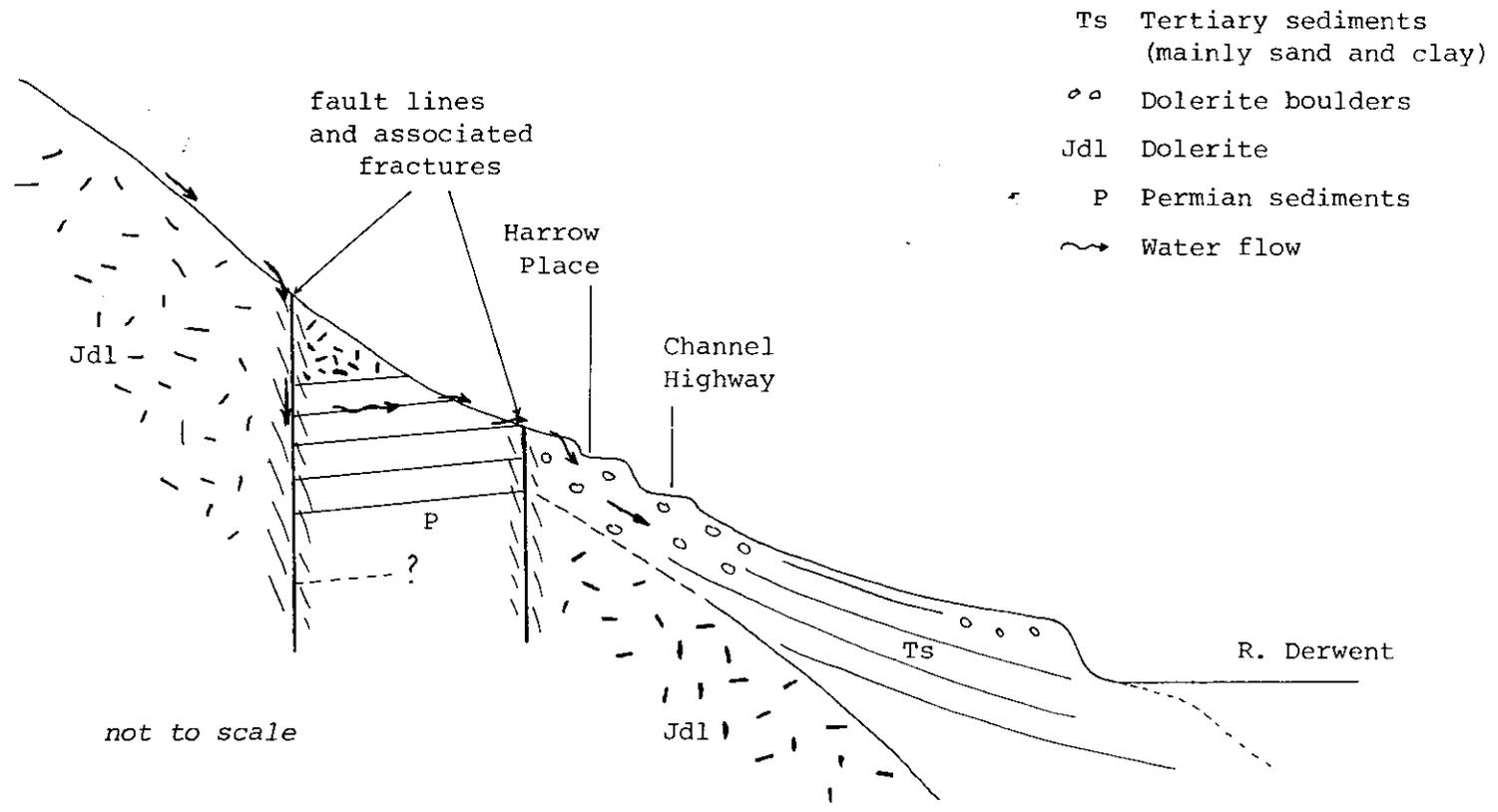


Figure 1. Diagrammatic section in the Harrow Place-Belhaven Avenue area, Tarooma.

or artificially placed earth material. After rain, the slopes above Harrow Place, and particularly the gardens fronting on to the road run with and exude water, whilst water flows from cracks in concrete steps and driveways, from retaining walls and from excavated carports. Tile drains have been laid in many places. Numerous springs occur in the upper slopes behind the houses probably at the contact of pervious and impervious rocks. Some of these surface flows have been diverted by ditches. The soils on the lower slopes near the Channel Highway appear more permeable and dry, but the lowest slopes below the highway are wet and ill-drained. The possible behaviour of surface water is shown in Figure 1. Rain falling on the dolerite of the upper slopes enters the ground through fissures associated with the fault lines, and reappears as springs along the bedding planes in the Permian mudstone. It will repeatedly appear and be absorbed as it flows downslope over materials of variable permeability. Sufficient confinement exists for groundwater pressures to build up locally. More permeable sediments forming the surface at Harrow Place largely absorb the water, but it may travel downslope below surface to reappear on the lower slopes, or develop uplift pressures if not discharged.

#### CONCLUSIONS

- (1) No horizontal translatory mass movement is taking place. There is potential for landslip.
- (2) Some minor movement in the road surface may be related to consolidation in road fill or underlying soft materials.
- (3) The same origin is likely for the damage to the house.
- (4) Any movement will be facilitated by high and active groundwater.

These conclusions may be further examined by bore holes placed below, in, and above the zone of movement wherein the groundwater levels and pressures may be monitored.

Local residents have reported movements as having occurred for some years and they will no doubt continue. The period 1974-75 has been notable for heavy rain but a drier period may reduce further movement temporarily.

#### RECOMMENDATION

Groundwater levels and pressures beneath the area should be monitored and, if found to be excessive, reduced.

#### REFERENCE

LEAMAN, D.E. 1973. Geological atlas 1:50 000 series. Zone 7 sheet 82 (8312S). Hobart. *Department of Mines, Tasmania.*

[12 November 1975]