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## 27. Landslips, Upper Plenty Road, August 1970

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Following continuous and heavy rainfall during the latter part of July and throughout August, slips of various scales blocked, and in one place destroyed the Upper Plenty Road at the end of August. The following notes on the slips were made on 2 September shortly after the road had been re-opened.

The Upper Plenty Road winds up the hillside beside the Plenty River some 10 km west of New Norfolk. The only rock type in the area is dolerite. Variable amounts of superficial deposits (rubble, talus, scree and soil) are derived from the dolerite. The river has cut a deep, steep-sided gorge and the road climbs from river level at the New Norfolk-Moogara junction to the top of the divide.

The road surface has a minimum width of 4.5-6 m and in order to obtain such a width substantial cuttings have been required in several places. All cuttings observed were, without exception, very steep and many were nearly vertical. In only a few places is solid dolerite exposed. Elsewhere the cutting face is made of various mixtures of soil and dolerite boulders. In addition there had been no regard to obvious, if small, drainage lines down the slope. No slips were related to major streams since there were no cuttings at these places.

The nature of the material exposed in the cuttings was somewhat variable. However, it was all derived from dolerite, and in general was a mixture of brown soil, clay, boulders or partly weathered dolerite fragments. In only one place did solid dolerite actually fail. In general even where the dolerite was quite weathered, but nevertheless in place, the cuttings have held.

Abbreviations:

d = estimated maximum depth of break (m)
h = estimated height of slip (m)
k = distance in kilometres from Upper Plenty Road junction (signposted Moogara 4, New Norfolk 6)
w = width of break (m)
bf = actual drop of material at the back of the slip (m)

### DESCRIPTION OF THE SLIPS

(1) k = 1.3; h = 3, d = 4.5.

Failure associated with seepages and a cutting predominantly of soil with very few boulders or rock fragments resulted in mud flow.

(2) k = 2.3-2.4; h = 6, d = 9, bf = 0.9.

A very large slip at k = 2.35 with lesser slips over this portion of the road. All are associated with a series of major surface and soil horizon seepages. Soil content high with little rock material present. This slip blocked the road as a mud flow 15 m wide.

(3) k = 3.5; h = 11-12, d = 11.

Slip of soil with a number of small dolerite boulders. This is

the first slip to show any rotation of material suggesting a reasonably unitised break. Two large seepages were related and were flowing at an estimated rate of 4,500 l/h (1,000 gal/h) at time of record. This slip had failed previously.

(4) k = 3.7; h = 11, d = 8.

This slip is a rock slide. The proportion of rock fragments is high, but there is a significant amount of soil and clay. The slip included one large piece of fresh dolerite (ex-outcrop?) 6 x 4.5 x 3 m which had dropped at least 4.5 m but had not been rotated. The soil material appears to have flowed about the large block as a series of mud flows.

(5) Small scale, soil slips occur at k = 1.1; 2.3-2.4, 3.5, 3.9, 4.

(6) Major slippage zones (fig. 24): k = 4.3-4.5.

(*a*) Cuttings up to 2.5 m high in soil and boulders. No significant slippage occurred as the top of the spur is approached and there was probably little runoff over this region to add to direct rainfall, whereas north of the creek the hill slopes steepen and the catchment area becomes significant.

(*b*) Cuttings up to 9 m high in soil and boulders (proportion 1:1) bf = 1.2-1.5. The material has failed and then moved as a muddy mass. Small portions of the slip which have not fragmented have dropped vertically. Any vegetation merges into the flow once failure takes place.

(*c*) The main slip (h = 21, d = 18, bf = 6) has occurred in loose fragmental material and bare outcrops have now been exposed. Future failures will be limited to the overburden at the back and top of the face. The section shows in pictorial form the history of this part of the cutting. The seepages above massive rock, now exposed, were responsible for the failure.

(*d-e*) Smaller slips now exposing massive dolerite. Their effect was limited due to the thin cover of loose material as compared to (*c*).

(*f*) No slippage due to dolerite outcrop.

(*g*) Zone of terraced slips, each with bf = 0.6-0.9 and no obvious rotation. They are generally small because of rock at shallow depth (partially exposed near road level) which prevents large scale movement.

(*h*) Large slip of two steps, bf = 0.6,3 which moved later than the terraced slips (*g*), and which shows very little rotation. No outcrops of solid rock is visible at road level.

(*i*) Much weathered dolerite, no failures. Loose cover very thin.

## GENERAL OBSERVATIONS

All slopes are exceptionally steep, and in times of rainfall the sheet run-off at the surface and the rock soil interface is significant. All cuttings over 2.5 m have failed to some extent. When it is realised that many cuttings are over 12 m high at angles of 75-90° in loose material failure is not surprising.

Remedies could include cutting back to bedrock (weathered or fresh); stepping the cuttings, or trenching up hill. The latter is the only practical solution in most cases but such trenches would need to be dug to solid rock and gravel or rock filled to remain useful drains. Where weathered or fresh rock is exposed in a cutting the overlying soil should be scraped off the region adjacent to the face.

In several cases attempts to remove slipped material have been concentrated at removing that on the road. This effectively steepens the slope and invites future failure. The entire road, at this time, remains a potential slip area perhaps more dangerous than before as now at least one face is 20 m high.

The material in failure does not remain as a unit but immediately breaks down into a mud-rock flow and only at the very back of a face does any coherence sometimes remain.

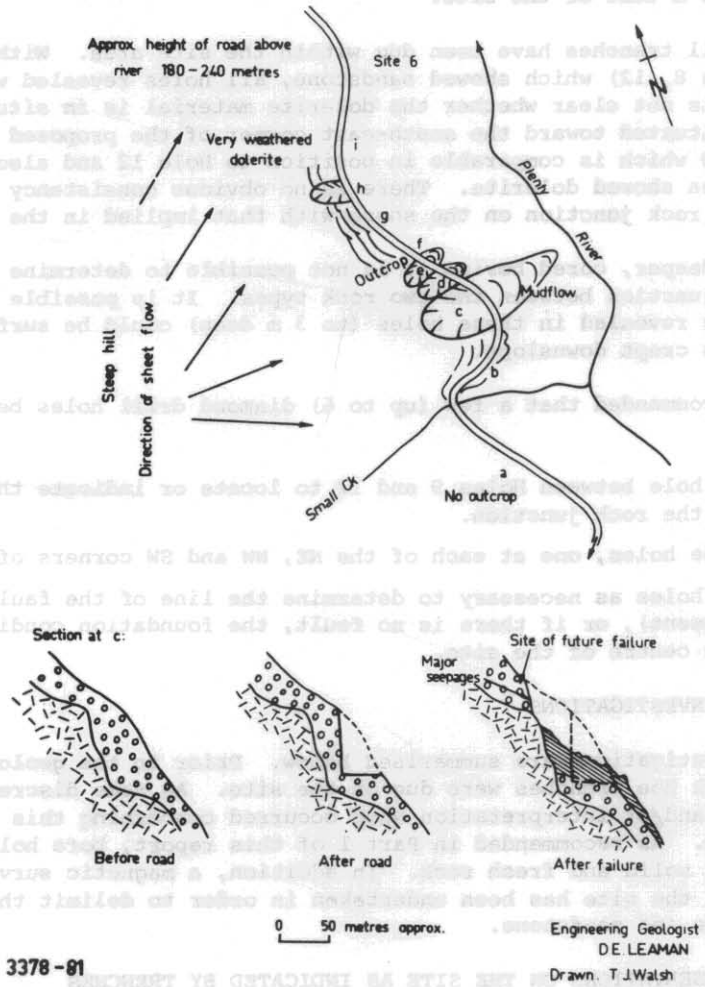


Figure 24. *Landslips on the Upper Plenty Road, August 1970.*

5 cm