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An examination of the landslip potential at the Panorama Heights Subdivision, Devonport

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In response to a request from the Devonport Council dated 19 October 1971, the area of the Panorama Heights subdivision was examined on 25 and 26 January 1972. A surface examination was followed by the excavation of four trial pits.

The Panorama Heights subdivision lies to the south of the eastern approach road to the new Victoria Bridge and covers about 34 ha. Roads have been formed and building has begun in the northern third. The central third is undeveloped pasture land and the southern third pasture and woodland.

The question of landslip first arose because a slip involving an area of about 3500 square metres on a slope of 17-21° occurred during the construction of approach roads to the new bridge. This slip is in material very similar to that seen at Panorama Heights and is close by on the other side of the Bass Highway.

Geology

The geology of the area is shown on the Devonport sheet of the Geological Atlas 1 Mile series. The hill on which the subdivision stands consists of basalt, appearing almost entirely as red soil and a few scattered basalt blocks. The basalt is believed to overlie sand and clay of Tertiary age, which do not appear on the surface within the area, but from their soft unconsolidated nature would not be expected to outcrop, and are known to be potent causes of landslip. The weathering of basalt to red soil can produce considerable thicknesses of unconsolidated material which can themselves slip. To the west and south of the hill the basalt overlies dolerite and this is seen in outcrops along the River Road to the south of the H.E.C. transmission line and in the wooded area in the southern third. The dolerite in hard or weathered form is not regarded as a landslip risk.

Because of the development in the northern third, and the dolerite in the southern third, and for reasons of access, the trial pits were dug in the central third of the site. In addition, there are changes of slope in the vicinity of these blocks which have the appearance of old slips. In detail one of these consists of an elliptical area of long axis about 200 m downslope and 80 m across slope. In vertical profile the old slips are concave and steeper than normal in the heel scar region, almost horizontal or even back-tilted in the centre and steeper and convex at the toe (fig. 1). One larger and perhaps two smaller features of this kind can be distinguished.

Trial Pits

Pit 1 was dug to the north end of the short axis of the largest slip feature. There is little hope of seeing subsurface features directly related to slip movement even in recent slips but the pit was intended to show if any sub-basalt clay and sand were present close to surface where they might be expected to control slipping, or whether some other material which could have the same effect was present. Pit 1 showed:

> 'Red soil' — firm red clay with many listric fissure facets of 1-2 mm dimension, from surface to 11 ft (3.3 m). The top 5 feet (1.5 m) contained sparsely scattered charcoal fragments.
>
> Ground slope 12° approximately.

Pit 2 was excavated in the heel area of the same slip feature and showed:

> Red soil to 11 ft (3.3 m).
>
> Charcoal fragments in top 4 ft (1.2 m).
>
> Most fissure surfaces unpolished and the whole reported as harder than in Pit 1.
>
> Ground slope 8-10°.

The significance of the charcoal may be that this layer represents the layer remoulded during slip movements, the charcoal being derived from surface bush burning.

Pit 3 was excavated on the heel area of a smaller feature to the south of 1 and 2, and showed:

> Red soil, firm digging in red clay with some polished fissures 12 ft (3.6 m).
>
> Occasional basalt floaters.

Pit 4 was excavated on an even 21° slope to the north of where some surface basalt floaters were apparent and showed:

Red soil, firm red clay with deeply weathered rock fragments in the form of yellowish clay at depth —13 ft (4 m).

The trial pits showed, that:

(a) the slopes of the middle third consist of 'red soil' only.

(b) that the subsurface findings are not inconsistent with a past failure of the slope and did not suggest any other cause for the anomalous slope profile.

The soil profile is thick but by no means unusual in these circumstances.

Conclusions

It appears that slope failure has occurred in the past in the region of pits 1 and 2 and at pit 3 and that the failure has occurred in 'red soil' clays. Those clays occur throughout the middle third, and can be assumed to extend over most of the northern third. A slip potential therefore exists in these areas. A slope of 19° has been assumed as an unsafe angle and areas steeper than this have been marked on Figure 1.

The southern third is underlain by dolerite and no appreciable slip risk exists.

Recommendations

It is recommended that an analysis of the stability of the red soil slopes be carried out before building is allowed to continue in the subdivision. A drilling programme should be undertaken to enable representative samples to be obtained, and soil mechanics measurements be done to determine the physical properties of the material. An estimate of the possible subsurface moisture conditions would be required as preliminaries to the analysis.

Thereafter, the extent of the risk attached to continued building could be determined.

[10 February 1972]

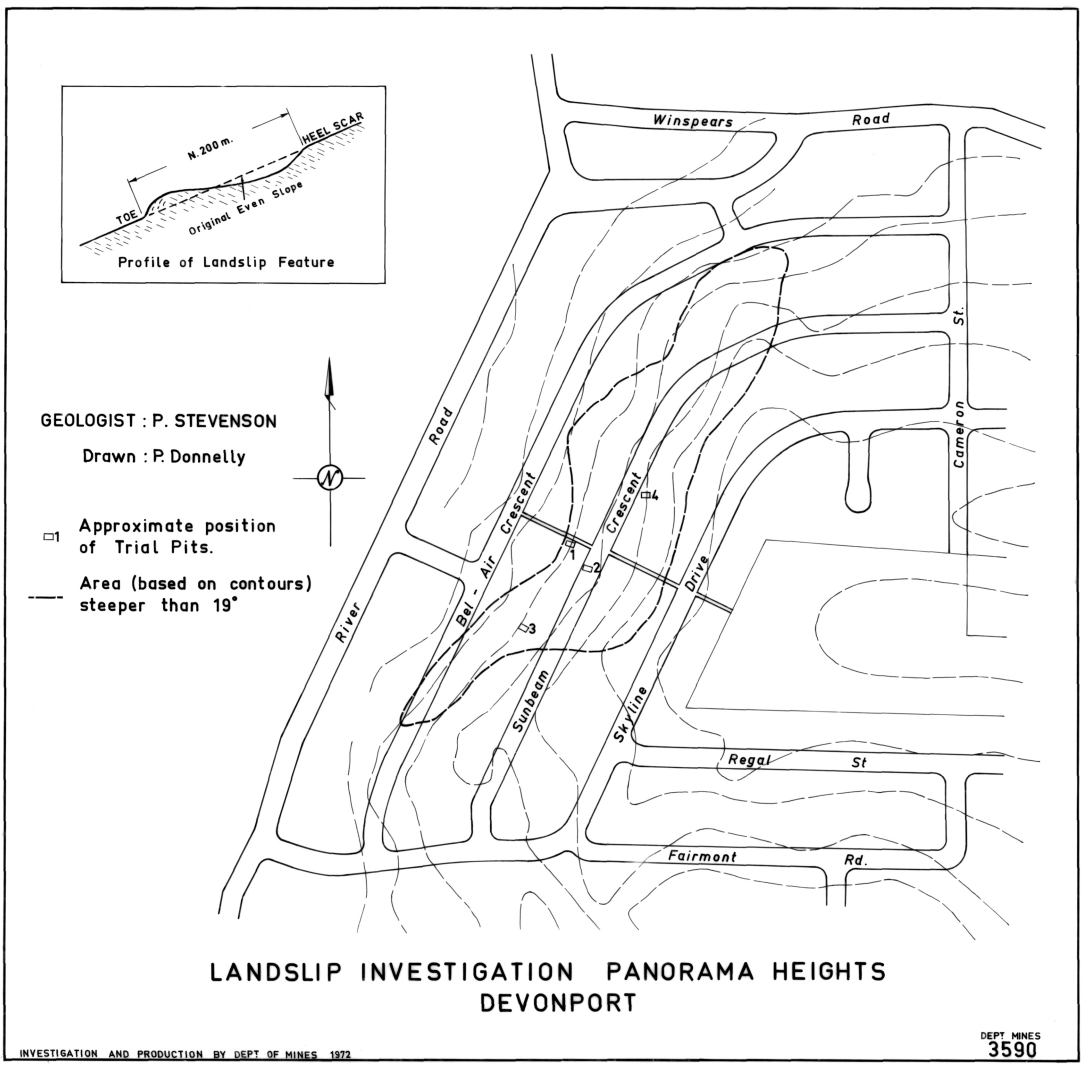

Figure 1