UNPUBLISHED REPORT 1962/02

Preliminary report on the Parklands landslide

by K. L. Burns and R. D. Gee

Location

The landslide is located on the south side of the Bass Highway, about 200 feet west of Hilder Street, in the Burnie suburb of Parklands. This is several hundred yards west of landslides which destroyed one house, and were investigated by T. D. Hughes in 1958 (Technical Reports 3, pp.135–136).

Geology

Underlying the slide area is a Quaternary marine platform cut in Cooee Dolerite. This is a flat platform, cut about 10 feet above sea level, and extending for about 200 yards inland.

Behind the subdivision the platform is backed by a near-vertical cliff in Rocky Gape Group sandstones, overlain at the top by Tertiary basalt.

The angle between the cliff and the platform is occupied by a wedge of talus. The talus wedge consists of large boulders of basalt, sandstone and dolerite. Near the base the matrix is a friable unconsolidated feldspathic sand or arkose derived from the dolerite.

The Parklands subdivision is built on this ancient talus slope.

The geological conditions are vastly different from that of landslides previously investigated in this area, but are conditions which are fairly common along the coast.

History of the landslide

Tentatively, the history of the landslide is as follows. A landslide occurred in this area in 1920. Between 1927 and 1930 the railway was shifted inland, and the Bass Highway moved south to provide room for the railway. The southern side of the highway was trimmed, and a loose stone retaining wall was built.

A landslide in 1932 crossed the highway. The part of the retaining wall affected was rebuilt, with a bay about 5 feet deep on the site of the slide.

In 1955 the area was subdivided, with footpaths and a roadway constructed on the bank. From 1955 to the present time, the slope has slowly shifted, pulling services away from the mains, and necessitating insertion of loops in the main water pipe to accommodate the movements.

The rate of movement has accelerated in recent years. The possibility of sliding was anticipated, and the water main shifted uphill to avoid the danger zone. However the rate of movement accelerated, culminating in the present rapid rate of 3 feet in 10 days. The extreme heel of the slip caught about three pipes in the water main.

Work in hand

Prompt action cut off the water within 15 minutes, but although a washout was averted, in that time the whole slide was probably saturated. The slide blocked a table drain on the highway, flooding the road. The landslide is now bridged by a temporary connection in the water main, and the Council has approved plans to relocate the pipe north of the Bass Highway.

Stormwater from the Pearson driveway, which was feeding directly into the slip, has been temporarily diverted into earth drains on the private road.

At the request of the PWD, the Burnie Council has removed some of the toe from the Bass Highway. Conscious of the danger of this procedure, the Council has been careful to remove only that amount necessary to keep two traffic lanes open, an amount estimated at 40 to 50 yards.

Character of the landslide

The slide is small, about 100 feet wide and 50 feet long, on a very steep slope. The tension zone at the heel has destroyed the private road, and closed access to two houses, as well as disrupting the water main.

The transcurrent movement on the flanks has broken PMG cables and inspection hatches, and broken the footpath.

The toe has pushed across the table drain, blocking drainage and causing temporary flooding, and has destroyed the retaining wall and footpath and blocked the road.

The slide is a slope or embankment failure moving on a very steep surface with an unrestricted toe. Despite draining of much of the water, it is still active.

Dangers of continued movement

The toe is moving across the highway causing a hazard to traffic. Rapid movement would close the highway.

If the slip collapses completely, the unsupported backslope will be very steep, and new slides will develop behind, with a high probability of damage to houses.

Further movements will make reconstruction of the private roadway difficult and expensive, and will deprive more householders of vehicular access.

There is evidence of incipient movement in areas adjacent to the slide. At this stage the whole front of the retaining wall must be regarded as potentially unstable. There is a high probability that without corrective measures, the present difficulties will be at least duplicated.

Cause of the landslide

At the present stage, no single factor can be pinpointed as the cause of the slide. However there are a number of factors which must be contributory.

These are:

1. Essential instability of the slope, which after all, is a talus slope formed by mass movement in the first place.
2. The toe of the talus slope has been oversteepened by highway works.
3. The top of the bank has been loaded by surplus spoil in house construction, and by the building of the private road.
4. Inadequate provision has been made to dispose of household storm water. This neglect is most apparent in the property immediately behind the slip, but at the present stage this appears to have been a contributory factor only in that it has localised the position of the first slip. Provisions in other properties are adequate only for light rains,
5. Drainage provisions for the whole talus slope, containing some twenty homes, are suspect. It has been suggested that a sewer line built down the cliff slope at the back has increased the amount of water conducted into the talus. Whether this is a factor or not, it seems very probable that the long history of the slide is due to saturation of the front of the talus slope by waters which pass underground at the backslope.

Investigations in hand

The investigations in hand are designed to determine the factor of safety of the front slope, in order to find out whether the whole embankment is unstable, or whether the slide is a freak caused by a local concentration of surplus water.

When this is completed, it will be possible to examine the feasibility of a retaining wall to provide immediate stabilisation of the embankment.

It will also be determined whether long term stability can be provided by disposing of local water, or whether deep drainage must be provided to dewater the whole talus slope.

If it becomes necessary to dewater the whole slope, a width of about 200 yards, which is a likely possibility at this stage, a somewhat more extensive investigation will have to be made to determine the water intakes, and to design a rational drainage system.

Recommendations

It will be about a week before specific recommendations as to temporary stabilisation can be made. In this time there is a good possibility of heavy rain. The active landslide is moving on a steep surface, with the only factors preventing complete collapse being cohesion and sliding friction at the sole. Heavy rain will provide more weight in the slumped mass, and lower the cohesion and friction with a high probability of complete collapse, which will block the highway and leave at least one house in an unstable position.

To avoid the immediate dangers, the following procedures must be adopted as soon as possible:

1. Substantial and effective drains must be provided to collect run-off from the Pearson driveway, and conduct it away from the slip.
2. No material must be removed from the toe, even to keep the highway open. If further movement occurs, it is suggested that an attempt be made with a bulldozer to bank the spoil back onto the toe. If impractical, then one highway lane should be closed.
3. Parking and heavy traffic must be barred from the full length of the private road. While examining the area, I noted a truck with 8 tons of wood using the road. Such traffic must be stopped, at least temporarily.

[22 August 1962]