1977/13. Slope stability at Liverpool Crescent, West Hobart.

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Following a request from the Hobart City Council the area of steeply sloping hillside between Liverpool Crescent and the Hobart Rivulet [EN250510] was examined on 22 and 25 March 1977.

There are two bedrock types in the area. A Jurassic dolerite body lies to the east and can be seen in contact with a Triassic sandstone-mudstone body to the west. The line of contact is approximately as shown on Figure 1. Each rock mass is subject to wasting and so produces distinctive slope deposits which largely conceal the source rocks beneath.

The dolerite produces a reddish brown clay soil with a variable proportion of boulders. Some are very large (up to 3 m in diameter) and distinguishing these from bedrock is difficult. In general, below Liverpool Crescent the soil thickness is one metre or greater, while above it, many more boulders are seen and soil thickness is usually less than one metre. The rock beneath is moderately to highly weathered, although most large boulders are very fresh inside.

The dolerite soil being clayey, is subject to shrinkage so that in dry weather surface cracks are evident.

The sandstone-mudstone sequence produces sandy, light-coloured soils with the mudstone products adding some cohesiveness.

The different characters of the materials are illustrated by the prevailing slope angles and slope forms. The dolerite shows upper slopes of about 19° rising to about 27° on the lower slopes, with material at the foot being actively removed by the rivulet. On the sandy soils the top slope is markedly less at about 10° and the lower slopes where undisturbed, lie at about 22°.

Where water either in water courses or having been diverted, flows down over these materials a difference of behaviour is also seen. The lower slopes on the dolerite soils are cut by small gullies 1-1.2 m deep which are only significant where vegetation has been removed as along the H.E.C. power line uphill from Weld Street. No such gullies are apparent in the vegetated areas.

The lower slopes and to some extent the upper slopes on the sandy Triassic-derived soils are more fragile, so that overground flow has cut gullies 2-3 m deep in the lower slopes and up to half a metre in the upper slopes. The presence of trees is evidently not an adequate protection on this material. The gullies now present are not now being very actively eroded, and are probably the result of accelerated erosion after the 1967 bush fires.

The cracking clay nature and boulder content of the dolerite soils to some extent explains their greater resistance to gullying. The soil cracks can often evenly absorb and slowly dissipate moderate rainfall and rainwash. When more intense water action occurs, the clays swell, the water flows on the surface readily and much energy is dissipated in the water courses by the presence of large stones and boulders. The lower dolerite slopes may have also been protected by the presence of an old water race which is still effective.

The sandy soils by contrast tend to erode by tunnelling and subsequent collapse to form deeper gullies without a means of energy dissipation until the relatively soft bedrock is reached. Two problems are to be considered, the ground stability under development conditions, and the integrity of the slopes if stormwater is allowed to discharge down them.

With regard to the first, no indications of mass movement have been seen, and the usually small depth of bedrock would render it unlikely. Nevertheless foundations should normally penetrate the soil thickness into rock unless locally low slopes allow slab-on-the-ground construction. Cuts above about 2 m in clay soils will be subject to slow creep because of their shrinking nature, and may be difficult to retain, and cuts in sandy soils will require protection. Similarly fills in both should not be made steeper than local natural slopes and should be adequately protected and drained.

In the matter of stormwater drainage the foregoing analysis provides the basis for decision. In the clay soil areas, stormwater may be discharged down the slope without great risk. Ideally it should be spread by means of two or more discharges from each dwelling into small water-spreading contour channels filled with rubble. The presence of vegetation on the lower slopes is obviously important and clearing or overburning should be discouraged.

In the sandy soil areas, stormwater drainage should be piped to existing water courses, and discharged to below the 300 ft (90 m) contour where some form of energy dissipation device such as a rubble-filled pit or leaky weir has been provided. Again the presence of vegetation is important and should be maintained and possibly increased.

[4 April 1977]

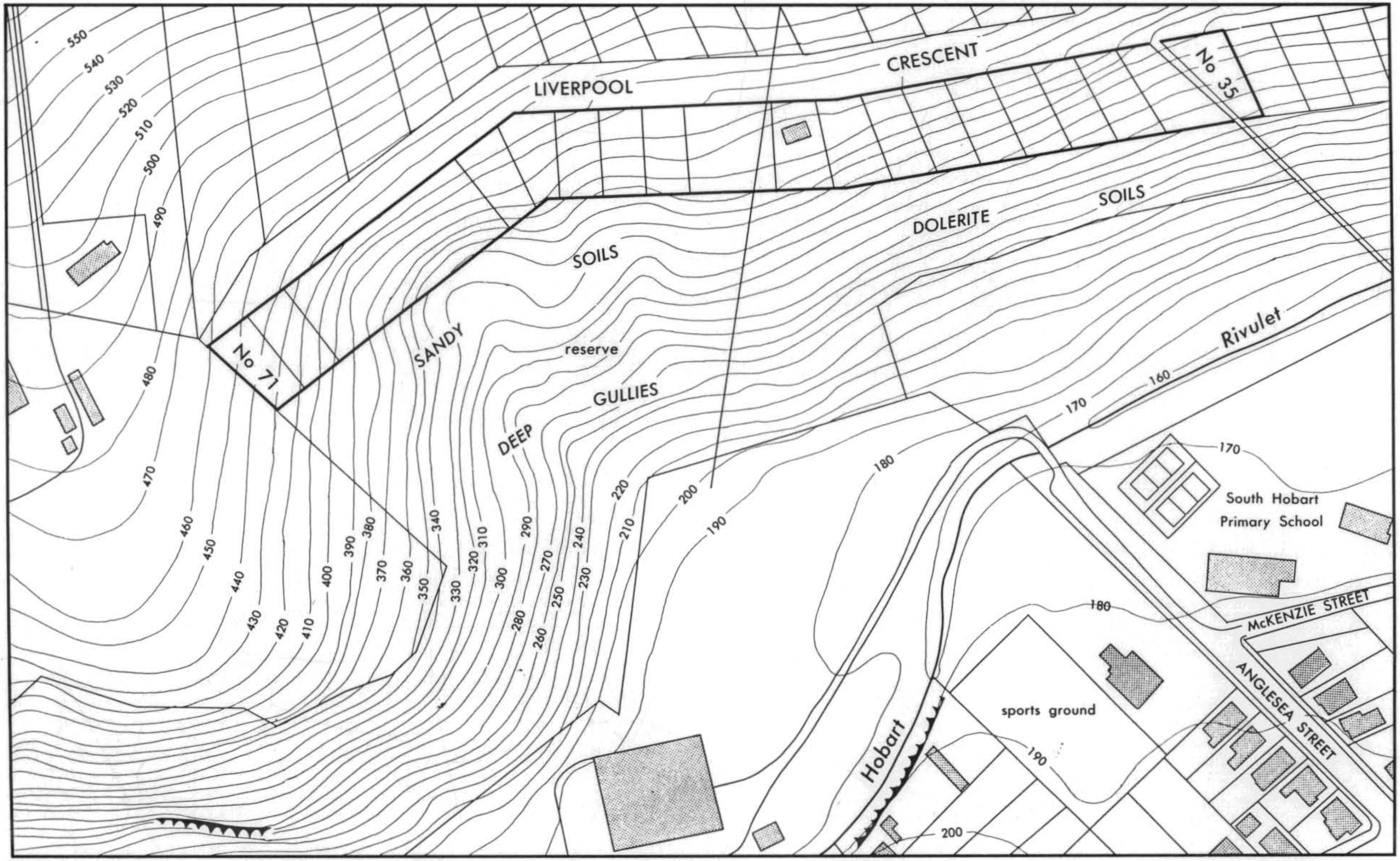
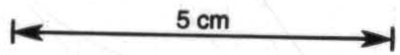

LIVERPOOL
CRESCENT
No 35
No 71
SANDY
SOILS
DOLERITE
SOILS
reserve
DEEP
GULLIES
Rivulet
Hobart
South Hobart
Primary School
McKENZIE STREET
ANGLESEA STREET
sports ground

Figure 1.


5 cm