Unpublished Report 1981/55

Landslide at 'Springfield', Hampson Street, Penguin

R. C. Donaldson

At the request of Mr R. G. Marshall, the site at Hampson Street, Penguin, was inspected on 4 September.

A landslide has developed in the steep slope behind 'Springfield' which is situated at the eastern end of Hampson Street, Penguin [DQ225477]. The failure is of the earth slump–mud flow type and is reported to have taken place on or about 14 August involving approximately 150 m^3 of material which caused damage to the rear paling fence and deposited material in the backyard of the house block. The actual landslide itself developed on the adjoining property immediately upslope of the southern boundary of the Marshall's land creating a two metre high headscarp approximately 7.5 m wide.

Morphologically, the failed slope represents part of an ancient coastal escarpment which rises abruptly from a gently sloping coastal marine platform to a basalt plateau. The basalt forming the higher land in this region is underlain by Tertiary sediments and where exposed comprises sand, gravel, clayey sand and clay. Historically, much of the escarpment in the Penguin region has been subject to landslide activity at one time or other, although there have been few movements recorded over recent years.

Nevertheless, landslides similar to the one at Hampson Street are not an uncommon feature along the North West coastal region where moderate to steep slopes are underlain by basalt intercalated with sediments of Tertiary age. Investigations have indicated that those slopes steeper than about 14° are most prone to instability. Factors that can be attributed to inducing failure in many of these situations include periods of intense or prolonged rainfall, groundwater seepages, high groundwater levels, and the additional input of water to the groundwater system by stormwater discharge from existing housing developments further upslope. All of these factors possibly contributed to the failure above Hampson Street, although it is not possible to state with any degree of certainty which was the triggering mechanism that initiated the movement.

The main causes thought to have contributed to the movement are considered in more detail in the following sections.

The section exposed in the headscarp of the slide revealed up to 2 m of basalt-derived materials underlain by over 1.5 m of permeable sand and clayey sand which does not outcrop on the hillside. A detailed description of the materials exposed is appended. Groundwater was noted issuing freely from the sand resulting in a concentrated flow of water behind the slope and causing an unusual build up of groundwater or pore water pressure which is an important factor in producing instability.

Related to this unusually high flow of groundwater through the sand aquifer is the excessive rainfall that has occurred over the winter months in the district. Figures for Burnie show that rainfall over the three months of June, July and August was 42% in excess of the normal long-term average, and that for the month of August alone the rainfall was 60% above that normally recorded. Empirical correlations of rainfall with episodes of landslide activity are well documented in Tasmania, including a large landslide on the coast road between Penguin and Ulverstone which is also known to have moved during August.

It is conceivable that another source of water originating from the stormwater discharge area of the existing housing subdivision in the South Road/Hales Street region was a contributing factor. Water was reported to have been ponded following heavy rain and prior to the failure in an area about 200 m the south, and upslope of where the landslide developed. This additional source of water could have subsequently infiltrated into the groundwater system and moved downslope towards Hampson Street.

From the evidence above, it is concluded that the control of subsurface water is of major importance when considering remedial measures for this situation. Traditionally this is often best achieved by drainage measures, either surface, subsurface, or both. Methods frequently used to accomplish subsurface drainage are the installation of horizontal drains, or vertical walls, depending on the geological conditions. Fortunately, in this case the aquifer (sand horizons) has been exposed at the surface as a result of the failure, and as long as the aquifer is allowed to flow freely, an unusually high build up of groundwater pressure in the aquifer will not be likely. To avoid saturation of the materials downslope, the water should be collected near the point of exit in the heel of the slide and then piped away into the town drainage system.

The planting of shrubs and trees in and around the landslide would be beneficial in that the roots would bind the soils together and also extract moisture from the slope. The Forestry Department would be able to advise on the type of shrubs that would be most beneficial in these conditions.

The surface ponding of water reported in the area of stormwater discharge of the subdivision upslope should be brought to the attention of the Council and the matter investigated.

[24 September 1981]

TASMANIA DEPARTMENT OF MINES

ENGINEERING LOG – EXCAVATION

excavation no. 1
sheet 1 of 1

project LANDSLIDE AT "SPRINGFIELD" location HAMPSON STREET, PENGUIN.

co-ordinates DQ225477
R.L. 45m a.s.l. (approx)
excavation dimensions

exposure type headscarp of landslide.
equipment
operator

pit commenced 4 Sept. 1981
pit completed 4 Sept 1981
logged by R.C Donaldson
checked by R Cox.

penetration 1 2 3	support	water	notes samples, tests	metres R.L. / depth	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour secondary and minor components	moisture condition	consistency density index	hand penetrometer kPa (25 50 100 200 400)	structure, geology
						CH	CLAY: high plasticity, brown, some fine sand, trace gravel, and charcoal, roots and root fibres.	M ≈ PL	St. to V.St.		TOPSOIL
				1		CH	CLAY: high plasticity, yellow brown, some sand, with upto 30% basalt rock fragments; S.W.-H.W., grey, low to high strength, vesicular, fragments to 200 mm across.	M > PL	St to V.St.		BASALT DERIVED MATERIAL
				2		SC	Clayey SAND: sand fine to medium, grey, clay of high plasticity.	M≈PL	St		TERTIARY SEDIMENTS
						SP	SAND: fine to medium, grey, trace clay,	W	L to MD		— " — " — "
				3		SP	SAND: fine to medium, yellow brown, (ferruginous), freely flowing groundwater.	W	L to M.D.		— " — " — " [SAND AQUIFER]
				4							

sketch