

36. Geological and seismic survey of a dam site on the Kermandie River

P.C. Stevenson

The site is about 4 km south-west of Geeveston and access is by an all-weather road. The whole area is thickly timbered with abundant undergrowth; there are some logging tracks and the northern half of the storage area has recently been burnt out. The areas of the proposed dam abutments have not been burnt and access is very difficult since they are both steep and thickly timbered.

The site was examined and the seismic survey carried out during June 1970 in response to a request from Rivers and Water Supply Commission.

GEOLOGY

Thick vegetation prevents any detailed examination of the area, but outcrops in the river bed, in road and track banks and in the burnt area are invariably of dolerite. A thick cover of brown clay containing many dolerite boulders is very widespread and is almost universally present in the storage area. The clay is derived from the dolerite and is probably a solifluction deposit formed during Pleistocene times. Such clays are commonly seen on high dolerite areas and are very well exposed on Mt Wellington. No other rocks are seen in any part of the area with the exception of some secondarily cemented quartz sands which occur in small patches about 50 cm thick in some parts of the storage area. Their origin is obscure, but does not appear to indicate any feature inconsistent with the presence of a universal dolerite basement.

The outcrops in the abutments are poor. The river bed is well exposed and shows solid fresh dolerite for 100 m or more upstream and downstream from the approximate centre-line. Above river level the steep slopes show a few surfaces of fresh dolerite with joints spaced at intervals of about 1 m, but in general the cover is so thick as to prevent any sight of the ground surface.

SEISMIC SURVEY

Three seismic spreads were observed; one on each abutment and two within the storage area (fig. 32).

Each spread was 90 m long and was fired from both ends. Those on the abutments required the cutting of lines, while the storage area spreads were laid out along logging tracks.

Storage Area 1

This spread showed a layer with a seismic velocity 760 m/s and thickness of 2-3.6 m overlying a material with a seismic velocity of 3,000-6,000 m/s. This is interpreted as dolerite-derived clay with boulders overlying solid dolerite some of which is jointed and weathered.

Storage Area 2

This spread showed a layer with a seismic velocity 1,100 m/s varying from 3.6-5 m thick overlying material with a seismic velocity of 4,300 m/s. This is interpreted as stiff dolerite-derived clay overlying moderately jointed fresh dolerite.

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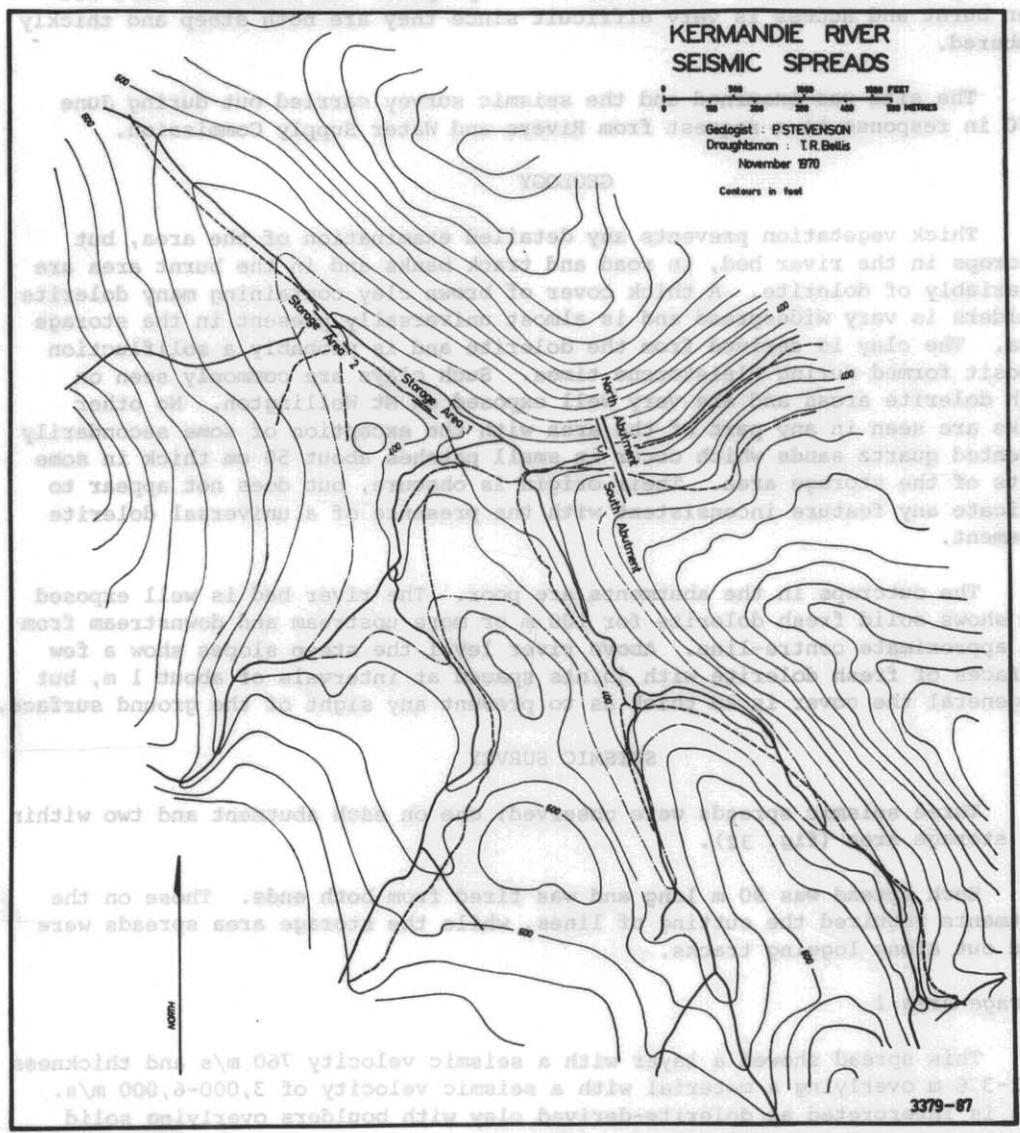
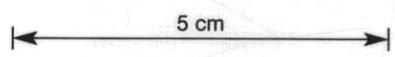


Figure 32.



This spread shows from 3.5-5 m thick overlying material with a seismic velocity of 4,300 m/s. This is interpreted as still dolerite-derived clay overlying moderately jointed fresh dolerite.

South Abutment

Section 3: Petrology

This spread was laid out uphill from the access road on a slope of 12° and does not include the steep cliff below it. It showed that the dolerite profile below the surface is very irregular from 60 cm - 4.5 m in steps probably corresponding to major joints and that the seismic velocity of the dolerite varied from 2,700-4,500 m/s and possibly higher. This variation would correspond to irregularity of jointing and probably weathering.

North Abutment

An irregular profile of dolerite below a surface slope of 24° is again thought to represent steps due to major joints. The overlying material is of low velocity and is soil and clay resting on the joint steps, while the seismic velocity in the dolerite is of the order of 4,500-6,000 m/s.

CONCLUSIONS

The storage area is floored by dolerite-derived clay which could be expected to be impermeable, and this is underlain by fresh dolerite. Free-board around the area is higher and no hazards are suspected.

This clay cover has been stripped from the steep slopes of the abutments. The rock surface is stepped by wide-spaced joints which probably result from relaxation due to the erosion of the steep sided valley: these joints would not be expected to extend deeply into the rock. The joint steps are mantled by organic soils derived from the rain forest vegetation. The abutment rock, apart from the coarse jointing is fresh and unweathered.