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18. Geology around dam site, Nunamara

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The Launceston City Council requested a geological examination of a dam site at Nunamara as a possible alternative to one that is being investigated on Patersonia Rivulet. The alternative site is situated about 400 m north-east of Nunamara Post Office and would dam St Patricks River. The proposed dam would be about 9 m high, 150 m long and would impound about 545 Ml (1,200 million gallons) of water.

GEOLOGY

The distribution of the various rock types around the dam site is shown on Figure 17. The area has been mapped previously by Longman (Longman *et al.*, 1964) during a regional geological survey of the Launceston Quadrangle.

Permian

Permian rocks are exposed around the margins of the storage area of the dam and some outcrops can be found in the bed of St Patricks River. Exposure is poor: where dips can be measured, they average 10-15° SW.

Part of the Lower Permian sequence is exposed about 3 km north-east of the dam site and consists of blue-grey mudstone with fossiliferous horizons. Liffey Group sandstone beds are exposed above the Lower Permian in cliffs up to about 18 m high. Sandstone beds with worm casts occur towards the top of the Liffey Group. Just to the south-east and east of the dam site, is an area of Permian mudstone and sandstone beds which Longman mapped as Lower Permian. Some of the mudstone beds are very similar in lithology to those of the Lower Permian, but the presence of pebbly sandstone beds within the sequence and the similarity of some of the mudstone beds to the Upper Permian sequence, suggests that they might be Upper Permian in age. The bed of sandstone in this area mapped by Longman as Liffey Group appears to be too thin (possibly only 3 m) and no worm casts have been observed. Pebbly sandstone beds have been mapped in several areas but it cannot be definitely established that they represent one horizon within the sequence. Similar pebbly sandstone beds occur north of the dam site where they almost certainly belong to the Upper Permian sequence. If these separate outcrops of sandstone do in fact represent the same horizon, the NNE-SSW fault inferred by Longman which cuts across the dam site has produced little or no displacement. Probable faults mapped east of the dam site are based on probable dislocations of the pebbly sandstone bed.

At some locations only small areas of Permian rocks are exposed and as it is not known which part of the sequence they belong to, they are shown on the plan as undifferentiated beds.

Dolerite

Dolerite, in the form of boulders and isolated outcrops, is widespread. Locations where probable outcrop has been found near the dam site, have been indicated on Figure 17. Between the dam site and the road to Patersonia there is an area of dolerite boulders with intermixed rounded quartz gravel. Similar material is exposed in a road cutting of the bridge over St Patricks River. These areas have been shown on the plan and probably represent material in the pre-basalt valley.

From the distribution of the dolerite, in the vicinity of the dam site, it is likely that it is in the form of a SW-dipping body and could be con-

cordant with the Permian beds (*i.e.* dipping at 12-15° SW).

Basalt

Vesicular basalt occurs almost continuously along the Tertiary valley which runs to the west of the dam site. The basalt tends to weather deeply.

Alluvium

Recent alluvium consisting mainly of clay with some sand and gravel, occurs in the floors and on the flood plains of the streams in the area.

SUITABILITY OF THE DAM SITE

The dam site is situated in an area where the river valley is narrow and dolerite appears to crop out on the west side, in the bed of the river, and there is a probable small outcrop in the east embankment. Fine-grained dolerite crops out in the river bed about 120 m upstream from the dam site; it does not appear to be strongly jointed. If it is not deeply weathered where it is not exposed, there should be few geological problems in the construction of a dam. Because of the proximity of the dam site to the Tertiary land surface there is some possibility of deep weathering. However, if the dolerite is not deeply weathered, the excavation of a side spillway would be expensive.

The axis of the dam is parallel to the main fault direction of the area. Longman mapped an inferred fault cutting across the dam site: if an alternative interpretation of the geology is correct, this fault might not exist or if it does, movement along it could be small.

The degree of weathering of the dolerite can be determined by seismic and resistivity surveys, followed by the drilling of 5 or 6 diamond drill holes to 25-30 m. The results of the geophysical surveys would aid in determining the position and attitude of these test holes.

RECOMMENDATIONS

Geophysical work in the form of seismic and resistivity surveys should be carried out at the dam site to determine the depth to unweathered rock. These surveys should be extended north of the west abutment and south-east of the east abutment to determine the state of weathering in these areas.

The geophysical surveys should be supplemented by diamond drilling. Water pressure tests could be performed in the drill holes to determine the possibility of water loss by seepage from the dam.

REFERENCES

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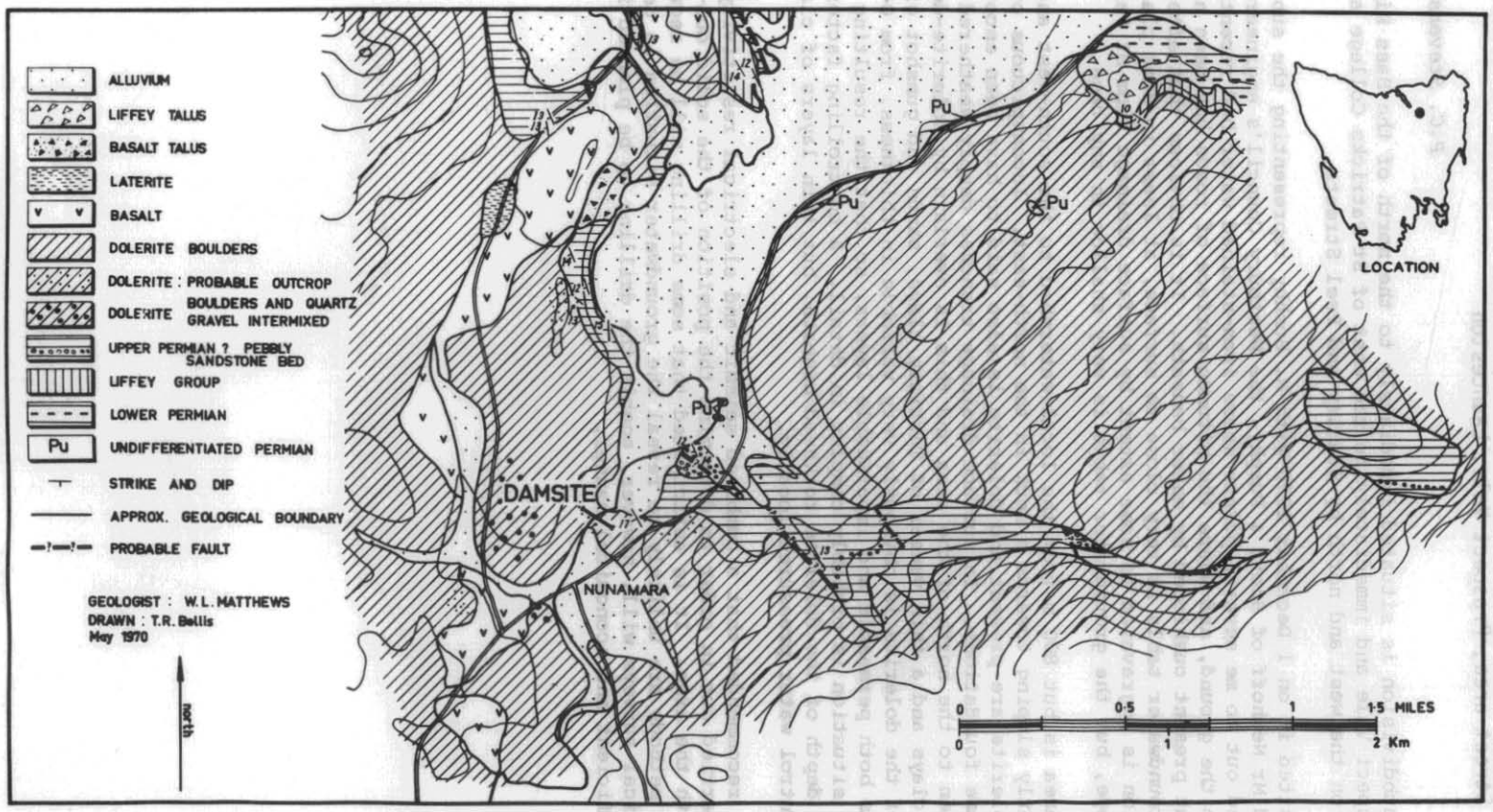

Figure 17. *Geological sketch map of Nunamara dam site.*

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