

1979/4. Geology around a proposed damsite on the Guide River.

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*Abstract*

A proposed damsite on the Guide River is underlain by deeply weathered basalt, probably interbedded with quartz gravel in some localities. Permeability tests should be conducted to determine whether leakage is likely to be a problem. Possible old landslips occur on the eastern abutment and stability analyses may be necessary if subsurface investigations confirm this. A seismic traverse to determine the depth to unweathered bedrock and a more detailed surface geological survey are suggested before any subsurface investigations are undertaken. An alternative site for a dam is downstream in the Precambrian rocks which occur on both banks of the river. The possible occurrence of Precambrian rocks in the west bank just upstream from the proposed dam could also provide an alternative site if the present site proves unsuitable.

INTRODUCTION

The Burnie Municipal Council is examining the possibility of building a dam on the Guide River to provide an additional water supply for Burnie. It is proposed to build an earth-fill dam about 9 m high near where Eighteen Mile Road crosses the river [CQ965349].

GEOLOGY

The area has been mapped previously at a scale of 1: 63 360 (Gee et al., 1968). This resulted in only Tertiary basalt being located around the damsite. Quarrying and road making in the area by APPM has exposed areas of older rocks and preliminary mapping indicates Precambrian slate and quartzite occur downstream and east of the damsite and within the storage area. At the southern end of the storage area on the western side of the river, fine-grained quartz gravel occurs interbedded with basalt in a road cutting. Quartz gravel is also exposed in a road cutting just downstream from the damsite on the eastern abutment.

Basalt is the dominant rock type within the area and as with most locations on the North West Coast where it occurs, it is deeply weathered. Usually only soil derived from weathering occurs at the surface with exposures confined to road cuttings and occasionally in the river bed. Although the whole length of the stream in the dam area was not traversed, only two exposures were found (fig. 1). At higher levels above the damsite area on both sides of the river, the basalt is vesicular but the vesicularity appears to decrease as the dam level is approached. The Precambrian rocks are less deeply weathered and reasonably fresh rock can usually be inspected at shallow depth at most locations. This is shown by the development of quarries in this material by APPM for use in road works.

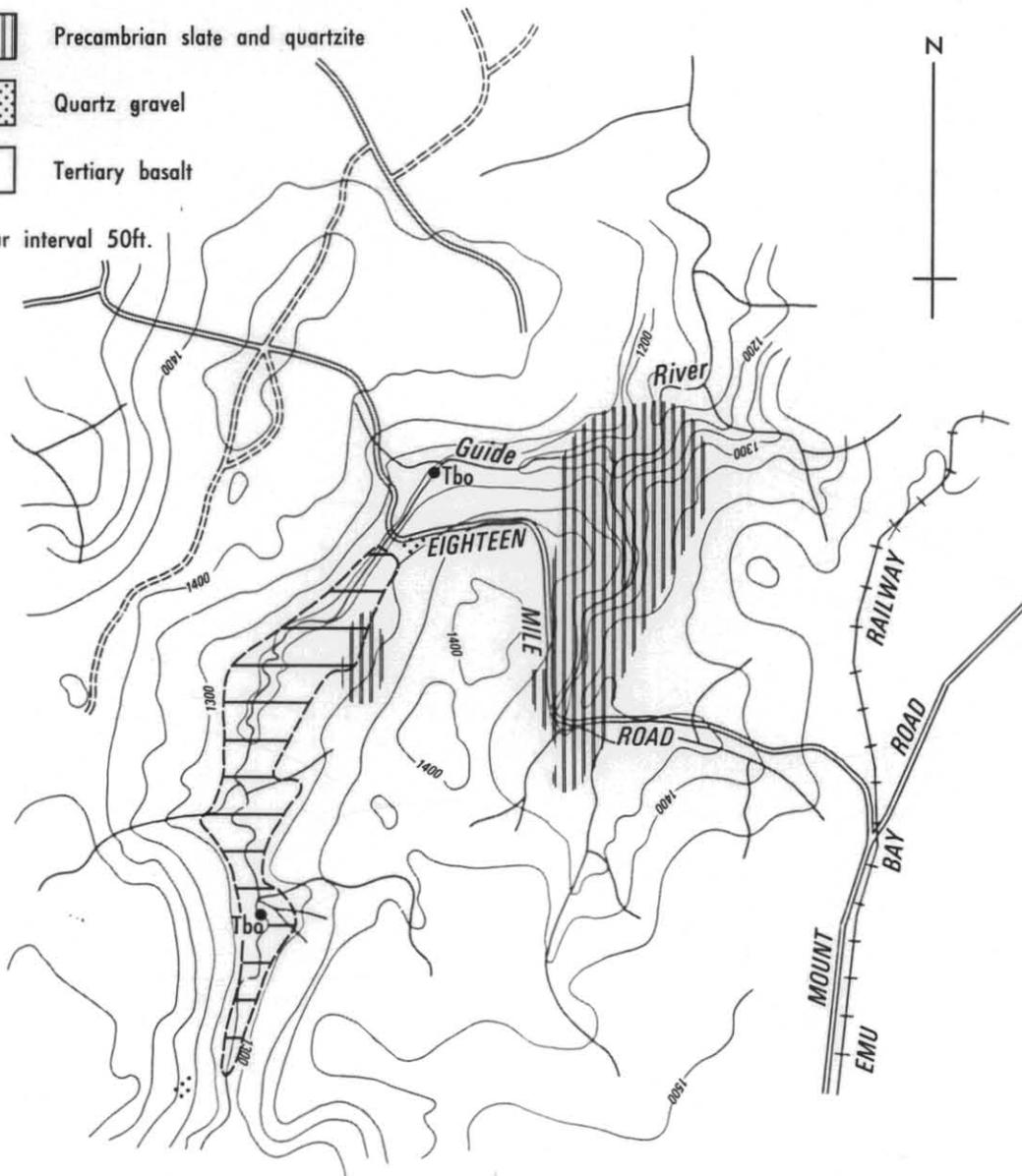
The basalt was extruded over an uneven surface cut into the Precambrian rocks, filling the existing valleys and extending to higher levels than the divides between streams. A plateau of basalt was formed over a wide area. Subsequent erosion has exposed some of this former topography by eroding down to the Precambrian rocks, but the present day streams do not occupy the same channels as the pre-basalt streams and much of the pre-basalt topography remains buried. It is apparent from the rock distribution that one of these pre-basalt valleys extended across the Guide River between the two zones of Precambrian rock marked on Figure 1 (i.e. across

# GEOLOGY AROUND PROPOSED DAM SITE GUIDE RIVER

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-  Tbo Basalt outcrops in river
  -  Proposed storage area (approximate)
  -  Precambrian slate and quartzite
  -  Quartz gravel
  -  Tertiary basalt
- Contour interval 50ft.

0 1 km.



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Figure 1

5 cm

the proposed damsite). From the positions of exposures, there must have been at least 50 m of relief in the area. It is not known exactly where the centre of this valley is located, but if the valley was symmetrical the centre line would be downstream from the damsite.

The presence of gravel beds interbedded with basalt suggests that there were at least two flows of basalt with a period of erosion between flows. It is possible that these sediments are post-basalt and have been over ridden by basaltic material from further upslope by landslip action. This appears to be more likely for the gravel near the damsite than for the exposure near the southern end of the proposed storage area.

PROBLEMS AT THE DAMSITE

The brief examination of the area indicates some possible problems associated with the site, including the presence of weathered basalt in the damsite area. Weathered and also fresh basalt is known to be fairly permeable in many parts of Tasmania as water bores drilled in basalt are usually successful. Unweathered basalt without vesicles may have a lower permeability. The depth to unweathered rock is unknown, but it seems unlikely that it will be shallow enough for a cutoff to be extended to rock. A seismic traverse across the damsite would determine approximately the level of unweathered rock. If it is shown that it is outside the practical depth of a cutoff, then the permeability of the weathered basalt will be an important part of any investigations. If solid basalt is closer to the surface than expected, permeability tests will need to be conducted in the fresh rock also. The presence of gravel bands between basalt flows is also a possible cause for large scale leakage and the distribution of these would need to be determined in investigations.

The contact between the Precambrian rocks and the basalt upstream of the damsite slopes under the damsite. It is possible that there is rubble along this contact which could allow leakage over this surface.

Apart from possible loss at the dam, loss from the storage area into nearby basalt areas may also be a problem. It is probable however that the water table will rise to higher levels under the surrounding slopes than the level of the dam in most places and this would prevent lateral loss. The possibility should be examined.

On the eastern abutment, the slopes above the level of the dam rise to a hummocky bench which may have been caused by landslips. Drilling may determine whether landslips have taken place, particularly if a bed of quartz gravel extends through the area which could be examined for abrupt disruptions. There is a bench on the western abutment at approximately the same level, suggesting that both benches are normal erosion features rather than due to landslip.

CONCLUSIONS AND RECOMMENDATIONS

The damsite is situated in an area underlain by weathered basalt filling a valley between two areas of Precambrian rock. Basalt in its weathered state or when fresh can be quite permeable and possible serious leakage could take place. This possibility should be investigated. It is likely that the weathering will be too deep for a cutoff to be extended to solid rock. Leakage may take place through gravel beds that appear to be present; the extent of these should be investigated.

A traverse across the damsite using seismic refraction methods would approximately indicate the depth of the unweathered basalt. When the

seismic work is completed, recommendations for subsurface investigations can be made; this would include drilling and test pits to examine the material and permeability tests. Some more detail of the surface geology may be possible with a more intensive examination.

A site in Precambrian rocks downstream from the present site would be less likely to have leakage problems and investigation of the site would be much easier. However a dam here would have to be wider and perhaps higher to store the same quantity of water and this may interfere with quarrying operations in the area.

Precambrian rocks occur on the eastern side of the Guide River just upstream from the proposed damsite. A brief inspection on the west bank failed to locate any signs of Precambrian rocks, although it is possible that they are covered by basalt debris. If Precambrian rocks occur at shallow depth, it may provide an alternative site if the present site proves unsuitable.

#### REFERENCE

GEE, R.D.; GULLINE, A.B.; BRAVO, A.P. 1968. Geological atlas 1 mile series. Zone 7 Sheet 28 (8015N). Burnie. *Department of Mines, Tasmania.*

[19 January 1979]