

1981/2. Geological investigation of past quarry site, Poets Road, West Hobart

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Abstract

It is proposed to subdivide 1.7 ha of land occupied by disused quarries at Poets Road, West Hobart.

The site is underlain by siltstone and sandstone of Triassic age. A total sequence about 45 m thick is exposed at the site, consisting of fine-grained micaceous sandstone, and medium- to coarse-grained quartz sandstone. Sandy clay and fill overlie the rocks. Three main defect sets occur. Infill seams and open joints occur close to the surface.

The rock faces are not threatened by major failures but fences are recommended as a protection from minor rock falls that will continue to occur. Some sections of loosened rock should be barred down.

INTRODUCTION

It is proposed to subdivide about 1.7 ha of land between Poets Road and Rennie Street in West Hobart [EN251516]. The site is occupied by several disused quarries with unsupported rock faces up to 14 m high.

In a letter dated 1 October 1980 the Hobart City Engineer asked the Department of Mines to investigate the geology of the area and to advise Council of any measures considered necessary to ensure the safety of the occupants of the proposed allotments.

The investigation consisted of geological mapping and the survey of seven sections of rock faces. This report describes the results of the investigation.

RESULTS OF INVESTIGATION

Geological setting

The project area is underlain by siltstone and sandstone of Triassic age. These rocks were originally deposited in freshwater. The sequence is several hundred metres thick. Residual soils consisting of silty clay and silty sand have developed overlying the rocks. The project area occupies a south-east facing slope overlooking a tributary of the Hobart Rivulet. Natural slopes are in the range of 10° to 20°, but are locally as steep as 40°.

The rocks in the project area are bedded, and the bedding dips towards the south-west at angles between 5° and 10°.

Rock and soil types and their distribution

Leaman (1976) has described the Triassic rocks of the Hobart area. The sequence exposed in the disused quarries represents part of 'Assemblage 4' of the 'Quartz Association'. Leaman describes Assemblage 4 as follows:

'Thinly bedded, generally fine-grained micaceous quartz sandstone containing some mudstone and shale, and often plant remains. The sandstone-mudstone ratio is often greater than 4:1. Coarser sandstone may be inter-

bedded with the fine-grained sandstone and the feldspar content of the sandstone may exceed 10%. The sequence may exceed 90 m.'

The continuous exposures in the quarry faces have enabled the detailed sequence to be ascertained. A total sequence of about 45 m is exposed, the details of which are given in Table 1.

Table 1. ROCK SEQUENCE EXPOSED AT POETS ROAD

Unit No.	Estimated thickness (m)	Description
7	16 +	Mainly thinly bedded, fine-grained, micaceous sandstone.
6	9	Cross bedded, medium- to coarse-grained quartz sandstone (with beds of siltstone up to 0.5 m thick).
5	0.6	Siltstone
4	1.2	Thinly bedded, fine-grained, micaceous sandstone.
3	0.6	Siltstone
2	8	Thinly bedded, fine-grained, micaceous sandstone.
1	10 +	Massive (not bedded), medium- to coarse-grained quartz sandstone, mottled grey-white and red-brown.

Units 1 to 6 are exposed in the main quarry at the eastern end of the site, while Units 6 and 7 are exposed elsewhere.

All of the rocks exposed at the surface and in the quarry faces are highly weathered. Most of the rocks are yellow-brown, although some rocks in Unit 1 and Unit 6 are mottled grey and red-brown. The micaceous sandstone (Units 2, 4 and 7) and the coarser sandstone of Unit 6 are of medium to high strength, while the coarse sandstone of Unit 1 is of low to medium strength. The siltstone units and most of the micaceous sandstone units 'fret' or 'slake' on exposure to air, i.e. they break up into platy shaped fragments about 10 to 30 mm thick.

The soils overlying the rocks are up to one metre deep, but are often less than 0.5 m. The soil consists of medium plasticity, yellow-brown sandy clay with angular rock fragments. Some of the soil is dispersive (breaks up in water) and water running over the steeper slopes has eroded the soil, forming gullies in part of the site. On parts of the natural slope at the western end of the site there are patches of grey silty sand topsoil. This topsoil may have been more widespread before excavation of the quarries.

Fill occurs on the quarry floors. It consists of soil, gravel, bricks, rock fragments and concrete.

Defects in the rock mass

Defects in the rock mass at the site consist of joints and infilled seams. One sheared zone (fault) was observed in the main quarry.

Apart from the joints parallel to the bedding, most joints and infill seams are near vertical. The rose diagram (fig. 1) shows the main joint directions for the project area. Although five or six steeply dipping joint sets occur, two main sets dominate, which, with the joints parallel to bedding (not shown on the rose diagram) make up the three main defect sets shown in Table 2.

Table 2. MAIN DEFECT SETS IN PROJECT AREA

<i>Set No.</i>	<i>Attitude</i>	<i>Description</i>
1	Parallel to bedding, strike 120° to 160°, dip 5° to 10° towards south-west.	Joints of large extent (greater than 10 m), usually planar but sometimes irregular, surfaces rough.
2	Strike 130° to 150°, near vertical or dipping steeply north-east.	Joints of large extent (greater than 5 m), planar with rough surfaces.
3	Strike 040° to 060° near vertical.	Joints of large extent (greater than 5 m), usually planar sometimes irregular, rough surfaces.

The spacing of the defects varies. For Set 1 and 3 spacing is generally 0.3 to 1.0 m and for Set 2 generally 1 to 3 m. Locally joints are much closer.

Infill seams are joints which have opened and been filled with grey, high plasticity clay. These infilled seams may be seen in the cliff faces up to four metres below the natural surface. Open joints occur close to the quarry faces.

DISCUSSION

It is our opinion that the rock faces in the old quarries are not threatened by major failures. The major defects are near horizontal or near vertical and thus do not dip into the excavations. However gradual deterioration of the rock faces will continue to occur. Some of the rocks break up on exposure to air, and the action of weather and vegetation will cause some joints to open and rock falls will result. Most falls will be very small but blocks weighing several tonnes have fallen in the past and similar falls could occur in the future. The risk of larger falls could be minimised in the short term by barring down several sections of loosened rock. However in the longer term rock falls will continue to occur.

The soils overlying the rock have been subject to gullying erosion in places on the site and in neighbouring subdivisions. If vegetation and topsoil are removed on the sloping allotments, it is likely that further erosion will occur.

CONCLUSIONS AND RECOMMENDATIONS

There is no risk of major failure of the cliff faces and therefore no major remedial works are required. It is recommended that some loosened sections of rock on the higher cliff faces be barred down. These sections can be indicated on a joint site inspection.

In view of the continual risk of minor rock falls it is recommended that two metre high chain link fences be constructed at the base of the higher cliff faces. These fences will take the impact of any rock fall and also prevent children climbing on the cliff. Similar fences at the top of the cliff would also prevent accidents. The location of the fences could be discussed on a joint site inspection.

It is recommended that disturbance of the soil and vegetation on the natural slopes be kept to a minimum as gully erosion may occur. New topsoil and vegetation should be established quickly on any areas that have to be cleared.

REFERENCE

LEAMAN, D.E. 1976. Geological atlas 1:50 000 series. Sheet 82 (8312S). Hobart. *Explan.Rep.Dep.Mines Tasm.*

[12 January 1981]

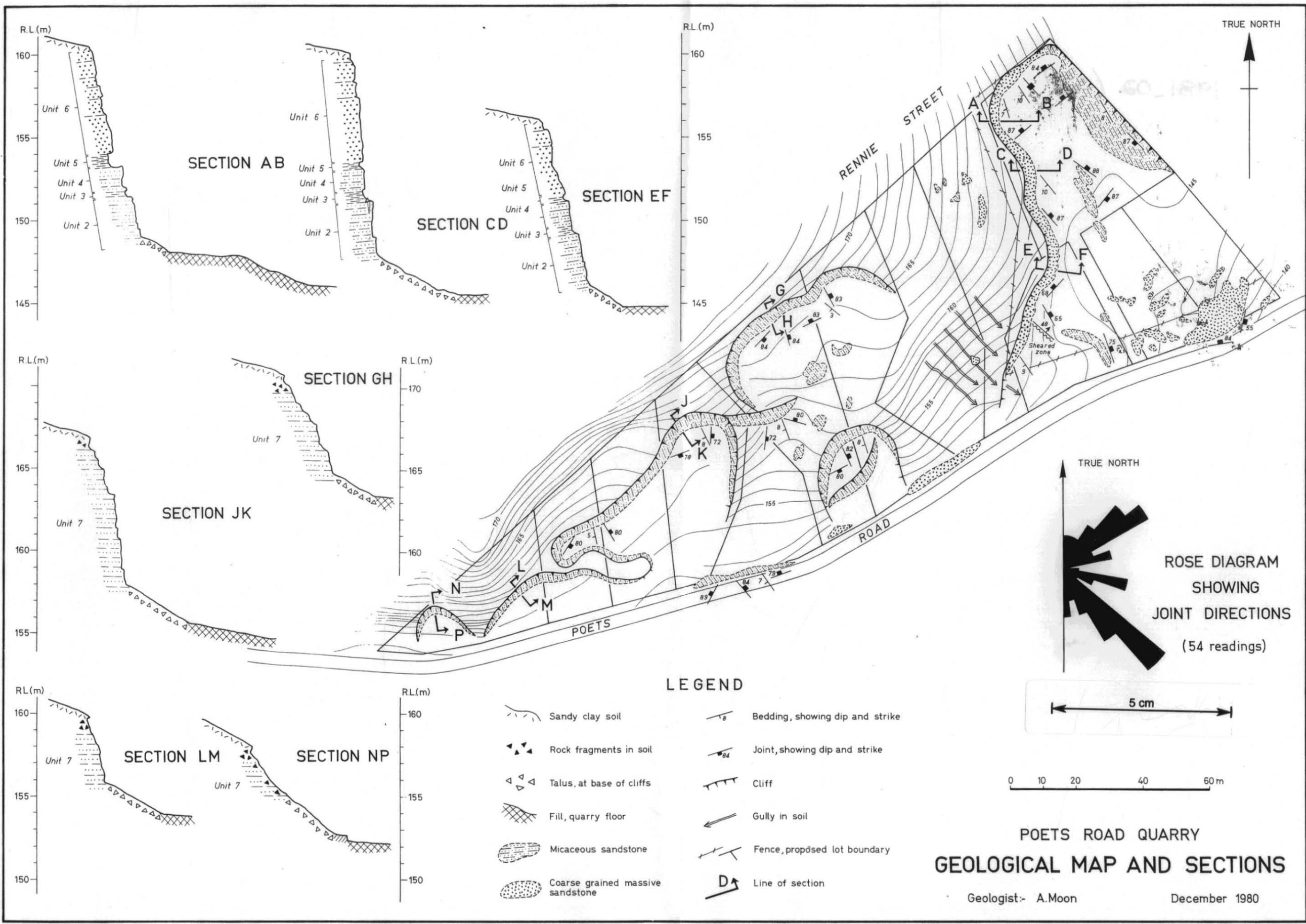


Figure 1

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