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Preliminary examination of a site for a tailings dam near Heybridge.

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Smith and Sale, Consulting Engineers, requested a preliminary report on the geology of an area intended as a tailings dam for Tioxide Australia Pty Ltd.

The area lies high in the headwaters of an unnamed tributary of the Blythe River [DQ122509]. The dam is intended to cover an area about 100 m (across stream) by 200 m; the wall is intended to be about 16 m high and of earthfill construction.

The country rock is Proterozoic Burnie Quartzite and Slate, an almost unmetamorphosed quartzwacke turbidite sequence. It is poorly exposed at the site but is known to consist of a series of fine, hard impure quartz sandstones separated by beds of finely banded indurated siltstone and mudstone as exemplified by the quarry on the access road to the Round Hill lookout. At the site and on Minna Road nearby the mudstone-siltstone phase predominates, the sandstones forming 20-25% of the whole, in beds 1-3 m thick. The rocks strike NE-SW and dip steeply south-east or north-west.

At the site no clear outcrops are seen and the whole sequence has been deeply weathered so that the rocks now appear as a series of soft sandstones and mudstones. The depth of this weathered mantle is greater than 3 m near the creek bed as is shown by the trial pit sections, but pits higher on the valley slopes showed the presence of harder and less weathered material at this depth. The weathering decreases gradually with depth but even where well preserved rock is present appreciable weathering is apparent and no rock that could be described as unweathered is seen at the site.

The site is steep and a thickness of up to 2 m of soil creep material is present. This consists of soft weathered fragments of rock in a matrix of sandy clay. Where the source rock is a sandstone thin clayey sand is predominant but this only occurs in limited zones. When examined heavy prolonged rain had rendered the soil cover very wet and the pits were flooded, but their sections could be appreciated from the spoil heaps.

SUMMARY

The whole site is underlain by steeply dipping quartzites and low grade metamorphosed mudstones in discrete beds.

The rocks are weathered to at least pit depth (3 m?) to soft sandstones and structured clays.

Extensive soil creep on steep slopes has thickened the soil cover near the creek and thinned it on slope crests.

CONCLUSIONS

The material mantling the lower slopes appears suitable for an earthfill dam if care is taken to exclude the minor sandy portions and the moisture content is optimum. In this case a clay core may not be needed. The mudstone excavated from the lower trial pits appears capable of easy compaction and in the process will readily form clay if the moisture content can be controlled. Excavation of the lower slopes will increase the storage volume although more slight additional soil creep from above is to be expected. The dispersive properties of the clays have not been examined but do not appear to present a problem.

The location indicated on the consulting engineers' drawing 7410/1 appears to be quite suitable as very little variation in the geology is apparent and the topography appears excellent.

The presence of the weathered layer of mudstone will do much to reduce water loss from the storage area. Nevertheless the hard rocks beneath are well fractured and may be regarded as a good hard rock aquifer. The water table is likely to be at some depth at this high site and any surface water is either losing to the formation or is perched on the impermeable weathered layer. An infiltration test on a shallow bore hole in weathered rock (or the existing pits) and another on a deep bore hole into the hard country rock would give information as to their relative permeabilities and allow the loss to formation to be assessed.

No additional geophysical testing is recommended as it appears that the pitting methods already used and the bore hole suggested above will adequately solve the problems of the site.

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