

TR 12-83-85

21. GEOLOGICAL SURVEY - KEMPTON DAM SITE

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INTRODUCTION

A dam site has been proposed on the Jordan River about one mile NW of the town. Geological examination was requested by the Rivers and Water Supply Commission.

The dam envisaged for the site is a rock fill dam possibly with a clay core, some 50 feet high. The site itself is located at the eastern end of a narrow gorge.

The topographic relief of the area is generally less than 200 feet and there is no marked relation between topography and rock type as is indicated in the sections accompanying fig. 22. The dolerite however has considerable influence.

GENERAL GEOLOGY

The geology of an area surrounding the dam site is shown on fig. 22. The sedimentary rocks present are Lower Triassic quartz sandstone and mudstone. There is a dominance of sandstone, which in part contains considerable numbers of clay pellets. These rocks are intruded by Jurassic dolerite. The intrusion appears to be a large sheet passing beneath this area with offshoots upward in such a way that most of the sedimentary outcrops present are inclusions or pieces remaining on the irregular roof.

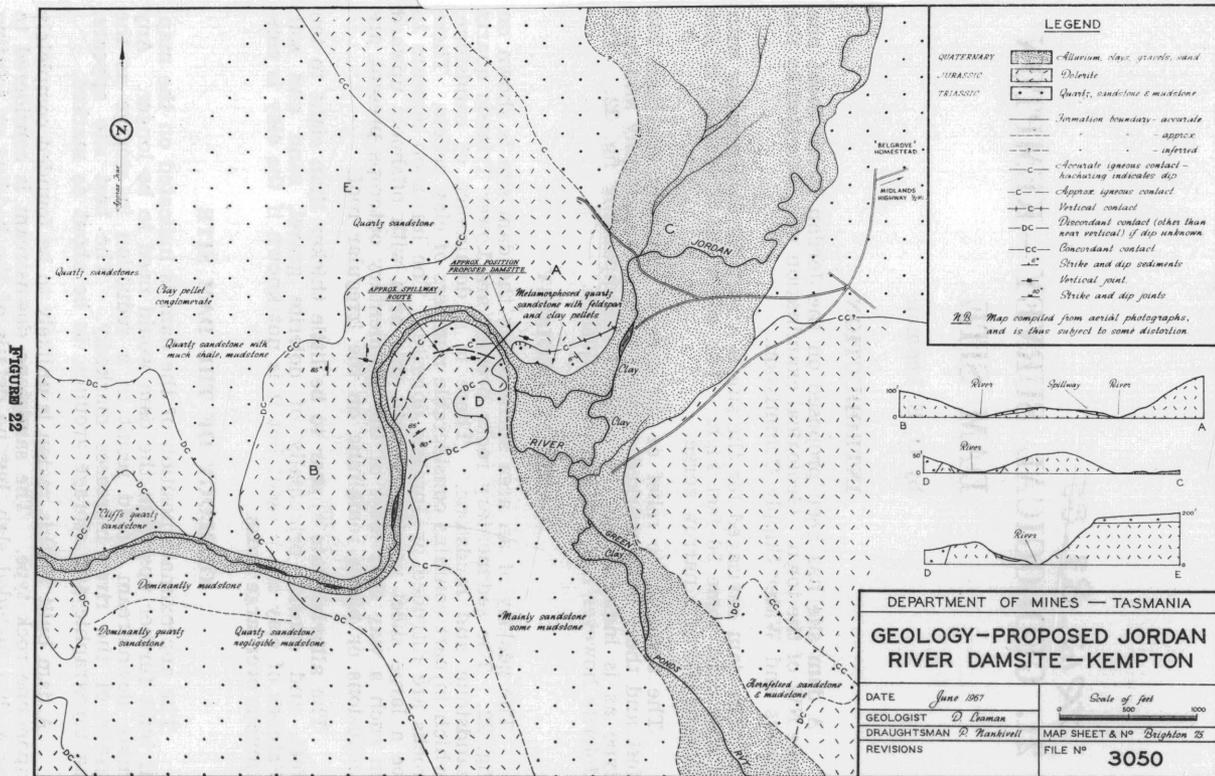
The alluvial flats appear to be little thicker than eight to ten feet, and consist principally of dolerite gravel, sand and soil. Patches of clay are present but it is not known if the clay is continuous over large areas.

GEOLOGY OF THE DAM SITE

The approximate position of the dam is indicated on the map. If built further upstream the dam would need to be longer. Any move downstream would result in a reduction in storage as the grade of the river increases markedly. The best site appears, on topographic and storage grounds, to be about as marked.

A dam built in this region is unlikely to be founded completely upon one rock type. The sandstone downstream is considered to be a thin included slab, but no details of the bedding or jointing are available for it. Section A-B suggests the probable structure.

5 cm



Blocky jointing with a density of one to two joints per foot, is seen in dolerite outcrops in the river bed downstream from the site. These joints are more than one to two feet long. Closer to the contacts, however, near the proposed abutments, the dolerite is very finely jointed and the sandstone moderately metamorphosed to hornfels. Near contacts the jointing in the dolerite is slablike but variable. The density of joints greater than one foot in length is one per foot in an E-W direction and approximately three per foot in a N-S direction. The majority of joints near contacts are smaller; from 3 to 6 inches long.

No greater amount of jointing or distortion has been induced in the sediments by the intrusion.

The dominant joints in the dolerite near the site trend 270° - 280° . These joints are rarely continuous, generally less than 18 inches in length, and nearly vertical. Low angle joints are rare, but have been observed in the dolerite on which the N abutment will be placed. These are about 1 foot apart near the contact but become farther apart away from it.

CONCLUSIONS

(1) Both the dam and spillway will probably be constructed partly in dolerite and partly in Triassic sediments.

(2) Slight changes in the position of the dam will not affect the geological limitations of the site.

(3) Irregular weathering and close jointing will necessitate care in positioning the abutments. From the present investigation, leakage is not expected to be serious or to present unusual difficulties.

(4) Although some clay is present in the valley flat it is not known whether it is adequate in quantity or quality for use in a clay core.

(5) Fresh dolerite for rock fill can be obtained from hills A and B (see map).

RECOMMENDATIONS

(1) When a site for the dam has been fixed precisely on topographic and storage grounds it should be cleared to bedrock in order to assess jointing, weathering, foundation, and leakage problems. The route of the spillway should also be cleared.

(2) Following such investigations drilling may be required.

(3) Pits should be dug on a twenty-five-foot grid across the region where clay has been observed in order to assess reserves and suitability.

(4) Any rock fill quarry site should be tested with two or more diamond drill holes and a resistivity survey in order that weathering may be assessed.