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24. LOWER MARSH ROAD – RUTLAND DAM SITE

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LOCATION

This dam site is located on the Jordan River at the entrance of a narrow gorge, 50 chains downstream from the Rutland bridge on the Lower Marsh Road. The reservoir will extend from this gorge up to the Rutland bridge, the ultimate level of the storage being determined by the level of the road.

GEOLOGY

The Jordan River flows in a deep, narrow gorge and has three tightly curved incised meanders in an uplifted, tilted fault-bounded block of Triassic sandstone. As far as can be determined none of the faults which form the boundaries of this block cross the dam site or enter the reservoir area. The proposed site is situated on the Jordan River where it crosses a more resistant band of Triassic sandstone which, to the N and S of the site, forms a conspicuous ridge striking NE-SW. At this point ten feet high outcrops of cross-bedded sandstone form continuous exposures along the river banks. The sandstone is strongly jointed with open joints, 10 to 15 feet apart trending N-S, E-W. Close by, on both banks are 60 feet high cliffs of coarse bedded sandstone dipping at 5°-7° to the SE. Similar cliffs of sandstone with continued uniform SE dips form almost continuous exposures through the long winding gorge downstream from the dam site.

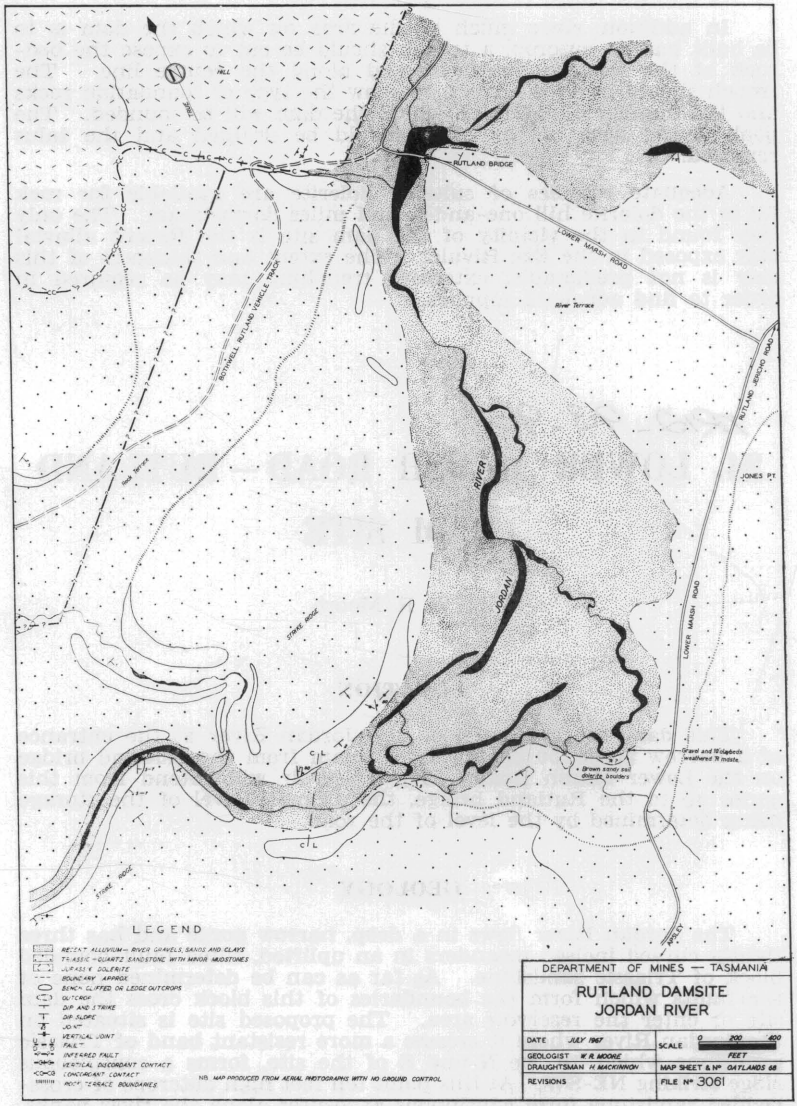

FIGURE 26

5 cm

The sandstone beds exposed in these cliffs appear lithologically similar to those seen along the Jordan River in the Exe Rivulet area. A small stream enters the Jordan River immediately below the dam site and, along the base of the hill, on the S side of this stream, beds of coarse grit and sandstone four feet thick outcrop close to chilled, closely jointed dolerite. To the S of the Rutland-Jericho and Lower Marsh Road junction similar coarse sandstone and grit form the basal bed of a thick sandstone sequence with a very low angle of unconformity (1°) overlying the Permian mudstone. From the lithological similarity and stratigraphic sequence exposed, it would appear that the sandstone of both the Rutland and Exe Rivulet areas may be correlated with the basal beds of the Triassic sequence.

The wide flood plain composed of alluvial clay and sand together with some thin dolerite gravel, will be the main area flooded. The thickness of Recent sediments on the flood plain is unknown but is not expected to be very great.

Outcrop is poor on the low river terrace to the S and E of the flood plain but it appears to be entirely Triassic sandstone and mudstone. On the SE margin of this terrace dolerite boulders occur, but as the soil is sandy the boulders are thought to have come from talus derived from the low dolerite hills E of Lower Marsh Road.

On the NW margin of the reservoir area, W of the junction of the Lower Marsh Road and the Bothwell-Rutland track, there is a high hill of dolerite. This block is bounded by vertical faults against the Triassic sandstone ridge on which the dam is to be built.

MATERIALS OF CONSTRUCTION

In the past there has been a small dolerite quarry for the production of road metal on the Bothwell-Rutland track. The quarry is near a faulted, chilled margin of dolerite where there is intense vertical jointing so blocks of appreciable size are not readily obtained. Drilling and detailed mapping of this dolerite hill is required in order to locate a suitable site for the quarrying of the required size of rock-fill. Three possible sources of clay are available for use in the core of the dam. These are Recent alluvial clay, clay derived from the weathering of Triassic mudstone, and clay derived from the weathering of dolerite.

The clay derived from dolerite occurs in a small agricultural dam in a valley 250 to 300 feet above the Bothwell-Rutland track between the Triassic sediment and the dolerite. This deposit does not appear to be within economical transporting distance of the site. Clay derived from the weathering of Triassic mudstone outcrops on the margins of the terrace both downstream and upstream from the Rutland bridge and appears to be worth investigation. The Recent alluvial clay on the flood plain of the Jordan River may provide an alternative source although the only outcrops found are above the Rutland bridge.

In order to increase the capacity of this dam it may be desirable to move the dam site downstream below the next bend. In this position the dam would have increased capacity and would also collect the water from the stream which flows E along the Bothwell-Rutland track.

If the present site is preferred on other grounds it would be possible to avoid the limitations imposed by the Rutland bridge by re-routing the Lower Marsh Road across the top of the dam to join the Bothwell-Rutland track.

CONCLUSIONS

(1) An alternative site, which would provide greater storage without risk of flooding the Rutland bridge, is available for the dam.

(2) Geologically the sites are similar, the abutments being in unfaulted Triassic sandstone with widely spaced joints. No faults are thought to occur within the reservoir area.

(3) A source of dolerite rock-fill could be located close to the site. Clay is available in the area but the quantity and qualities are unknown at present.

RECOMMENDATIONS

(1) The abutment and foundation areas of the dam need clearing so that a close examination of the condition of the rock can be made.

(2) Diamond drilling or other methods are required in order to locate an adequate reserve of suitable dolerite rock-fill.

3. Clay reserves suitable for the construction of the core wall need investigation by trenching, power augering or other methods.