

TR12.89-93

23. EXE RIVULET DAM SITE

by W. R. Moore

LOCATION

The proposed dam site is situated on the Jordan River 30 chains downstream from the junction of the Jordan River and Exe Rivulet. In this region, the Jordan River has cut incised meanders into soft Triassic sandstone and so formed a narrow trench-like valley with cliffs of sandstone present on both sides.

The Exe Rivulet dam site is situated on one of these meanders with the slip-off slope forming the western abutment and the undercut slope of sandstone cliffs forming the eastern abutment of the proposed dam. The water will flood back up the narrow Jordan valley into the Exe valley, above the now cut-off meander of the Jordan River, and into the large erosional basin present above the old junction of the Jordan and the Exe. This basin will provide the major storage area for this dam.

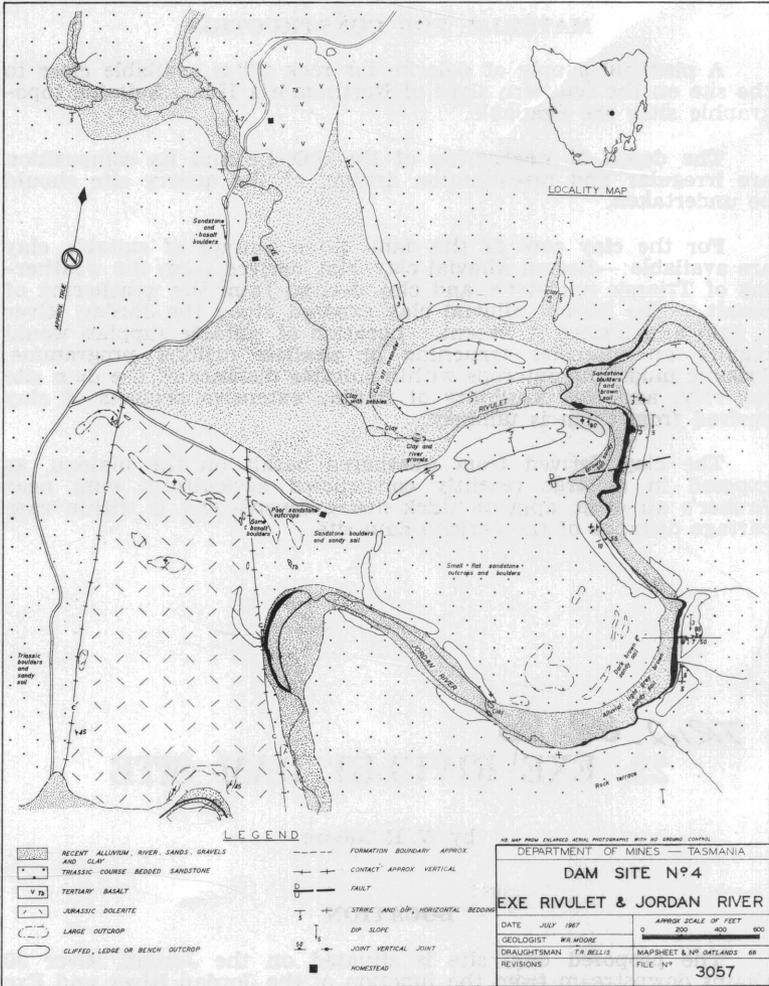
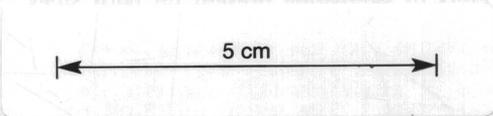


FIGURE 24



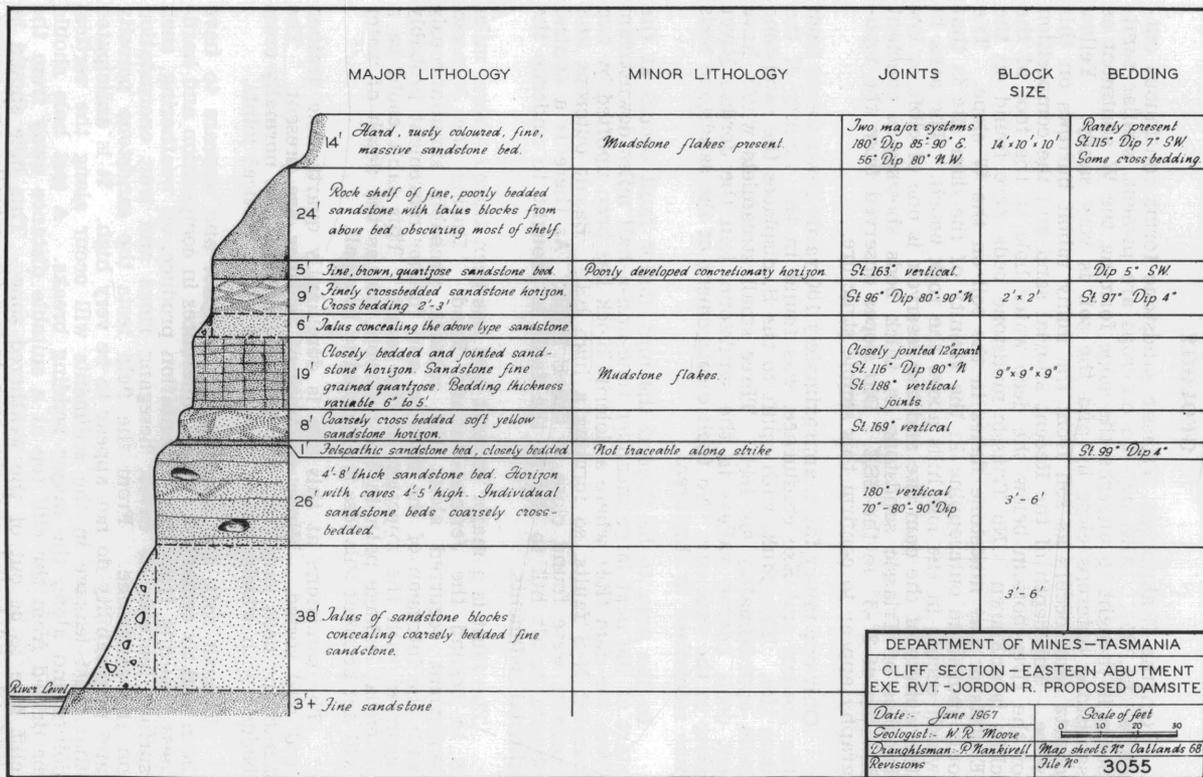


FIGURE 25

GEOLOGY

On the E abutment, Triassic sandstone forms continuous outcrops (fig. 25). Although no outcrops are present, similar sandstone is thought to underlie the slope forming the W abutment as sandstone outcrops close by and the soil is very sandy. Yellow quartz sand occurs as soil from the many rabbit burrows on this slope. The depth of the Recent alluvial sand and the composition of the river bottom below the deep water hole at the foot of the cliffs is unknown. No Triassic mudstone beds were found on the E cliffs or any mudstone flakes in the soil on the W slope. The only mudstone outcropping in the vicinity of the dam site is that which occurs in the low hills above the rock bench. The area in the vicinity of the dam site and the reservoir is one of cliffs or low benches of Triassic sandstone in thick beds showing a constant low dip of 3° - 5° to the SSE. Dip slopes observed from the topography appear to confirm this simple structure.

Only one minor fault, approximately 100 yards downstream from the Jordan and Exe confluence, was found in the vicinity of the dam site. This fault, with uplift to the S, displaces the sandstone beds approximately six feet. Three small streamlets which have cut deep, narrow valleys in the sandstone, join the Jordan River close to the dam site. No fault displacement of the sandstone beds was recognised in this area.

In the area to be flooded the only major fault occurs at the start of the next large meander (one-and-a-half miles downstream from the dam site) where a dolerite block has been uplifted by two parallel N-S faults, so forming a high hill. Basalt outcrops and boulders were found close to the E fault. As there is a conical shaped basalt hill to the N, the fault is thought to underlie the alluvial sediments.

The fault is a major contact and has been traced several miles S to beyond the Jericho-Rutland Road. During the Jurassic, movement occurred along the contact, probably simultaneously with the intrusion of the dolerite, and further movement probably occurred with the injection of the basalt. This fault could be a potential leakage path in the reservoir, but as the depth of water will not be great this loss is expected to be small.

The sandstone at this site is dominantly quartz, fine grained and well sorted. Minor amounts of feldspar are present. The sandstone beds vary from 4 to 15 feet thick and are normally cross bedded with widely spaced, but regular open, vertical joints.

Though soft, the sandstone is compact and appears to have been slightly cemented. Small differences in composition and hardness resulting from this cementation produce, on weathering, such surface features as caves, liesegang rings and iron encrustation on the sandstone. From the field tests the sandstone porosity and permeability do not appear to be very high. It is anticipated that most leakage in the sediments will occur along the vertical joints and along the major bedding breaks. A test hole should be drilled from the cliff top at a suitable distance away from the cliff face to be out of the weathered zone. This hole should be pumped and tested and the core tested for porosity and permeability.

In addition, since much of the area on which the dam is to be built has no outcrop, a trench should be cut to expose the bedrock at the western abutment and along the centre line. The trench should be wide enough to show the type of foundation rocks and the number of joints on which the dam will be founded. The pool at the base of the cliffs should be drained and the talus removed.

Adequate supplies of suitable dolerite are available for rock fill in the dolerite hill one-and-a-half miles downstream. The only clay found in the vicinity of the dam site is the Recent alluvial clay exposed in the Exe Rivulet. The extent and thickness of this clay is not predictable, extensive trenching may be required in order to find adequate supplies.