TR12-86-89

22. PROPOSED JERICHO DAM SITE – JORDAN RIVER

by W. R. Moore

LOCATION

The site proposed for the Jericho dam is one mile downstream from the Jordan road bridge on the Midland Highway. At this point the Jordan has cut a narrow shallow gorge between Northumbria Hill and Spring Hill. The area to be flooded consists of river flats and will be bounded by the dam and the Midland Highway to the W and E and by two river terraces, about thirty feet high, to the N and S.

DAM SITE GEOLOGY

The dam site is on vertically jointed dolerite which forms continuous cliffs about ten feet high. These cliffs occur on both banks twenty to thirty yards upstream and downstream from the centre line of the dam. On the N bank of the river the outcrops are less continuous than on the S bank, but isolated outcrops ten to twenty feet high are present from the river to the top of Northumbria Hill.

Northumbria Hill is a fault-tilted block with a scarp face to the N and a steep back slope. It is formed by a thick sill of dolerite, which dips at 40° towards the Jordan River where it is faulted against Triassic sediments. This E-W fault passes close to the S abutment of the proposed dam. Vertical jointing in a N-S direction becomes more intense towards the fault, and fine crystalline dolerite forming an irregular chilled zone is present near the faulted contact. The E-W fault was not seen at the dam site but is exposed in a small quarry half a mile to the W on the Rutland-Jericho Road. Here shattered Triassic mudstone is intruded by a small dolerite dyke. Close to the dam site, at a bend in the road, Triassic mudstone and feldspathic sandstone are exposed and as these sediments are neither shattered nor baked, a fault crush zone, if present, is expected to be narrow. Upstream from the dam site, the E-W fault terminates against a dyke of closely jointed dolerite which forms a low narrow NW-SE ridge twenty to thirty feet high along the margin of the southern terrace. This dyke is thought to have intruded along a NW-SE Jurassic fault.

To the S, approximately 150 feet above the dam site, Tertiary basalt overlies Triassic sediments. The basalt is the northern section of an extensive plateau which slopes down towards the Jordan River from Spring Hill.

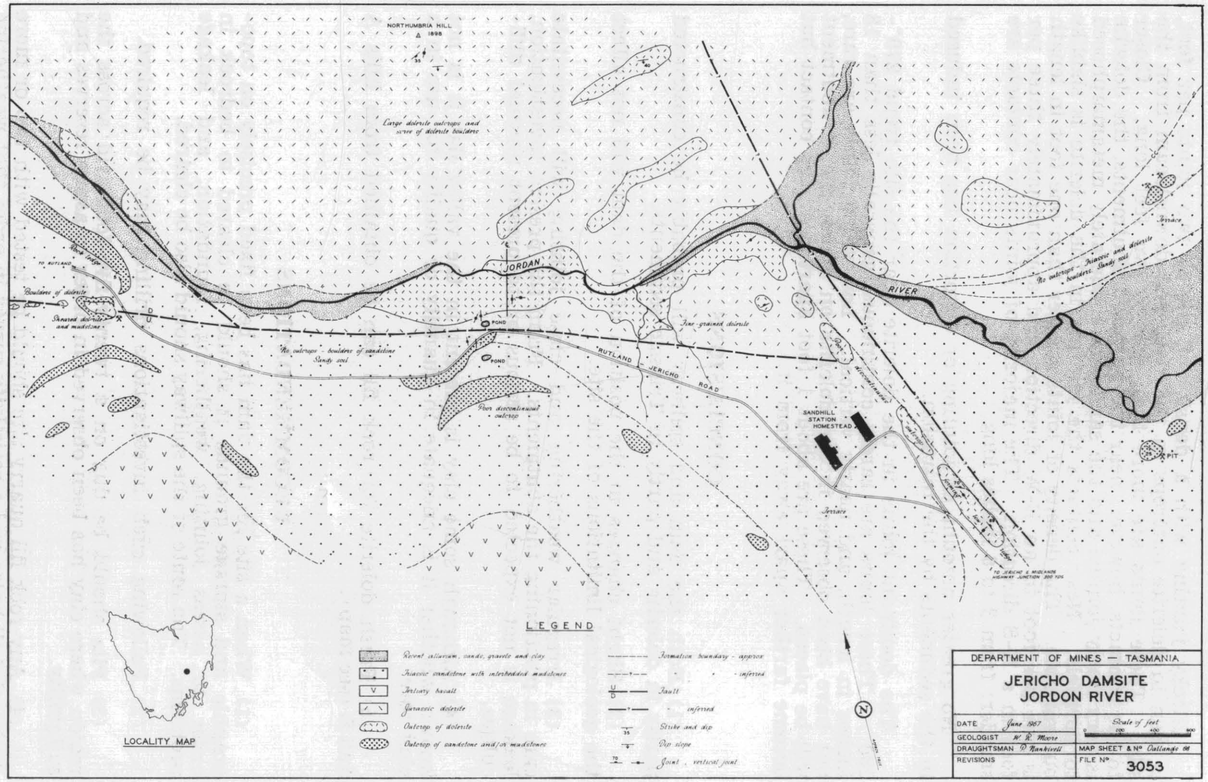

FIGURE 23

GEOLOGY OF THE RESERVOIR AREA

The river flats, which form most of the reservoir area, have superficial alluvial deposits of sand, gravel, and clay of unknown thickness. In some of the deeper water holes of the Jordan River clay four to five feet thick underlies the present soil horizon. Around the margins of the alluvial flats, along the southern bank, Triassic sandstone is exposed in two shallow pits. In a drill hole near Mr Edwards' homestead on the northern bank (just E of the map edge (see fig. 23)), ten feet of Triassic sandstone was encountered at a depth of 25 feet.

Near the Jericho church, along the E margin of the reservoir, poor outcrops of dolerite, and clay derived from it, occur close to Triassic sandstone. Across the Midland Highway, at the Jericho Hall, Triassic sandstone and dolerite outcrop in two adjoining pits. These sandstone and dolerite outcrops are thought to be associated with a large NW-SE fault that runs along the foot of the dolerite and Triassic scarp of Northumbria Hill.

FOUNDATION AND LEAKAGE AT THE SITE

Even though the dolerite at the dam site is a compact and dense rock, it has very close vertical joints. Near the two faults these are commonly less than an inch apart. The joints are tight when unweathered but are more open when weathered. To reduce leakage to a minimum and provide better foundations, it is suggested that the weathered dolerite at the site be stripped before the dam is constructed.

A spring reported to have a plentiful supply of water is located near the end of the S abutment. At present it is pumped to fill ponds near the dam site. The position of this spring near the E-W fault indicates that the dolerite acts as a barrier to the underground flowing water from Spring Hill into the Jordan River. This E-W fault may also act as a leakage path downstream though no springs have been found. To the W of the dam site and at the quarry where the fault is exposed no springs were found but this might be explained by heavy pumping during a long dry period in 1966-67 which may have used all the available supply of water moving along a narrow leakage path. If such a leakage path is present along the E-W fault it would appear to be cut off by the NW-SE dyke upstream which will prevent any serious leakage from the reservoir.

Both the E-W and NW-SE faults present near the Jericho dam site are part of a Jurassic system of E-W, NW-SE and NNE-SSW faults found throughout the area between Jericho and Rutland. On some of these faults there is evidence of rejuvenation with movement occurring again in Tertiary times. Tertiary movement occurred along the NW-SE fault at the foot of the northern scarp of Northumbria Hill uplifting the hill to its present altitude and tilting the dolerite sill that caps it to its present dip of 40°.

Though no evidence for any Tertiary movement was found near the dam site along the E-W fault, this contact should be drilled to establish if a narrow crush zone is present.

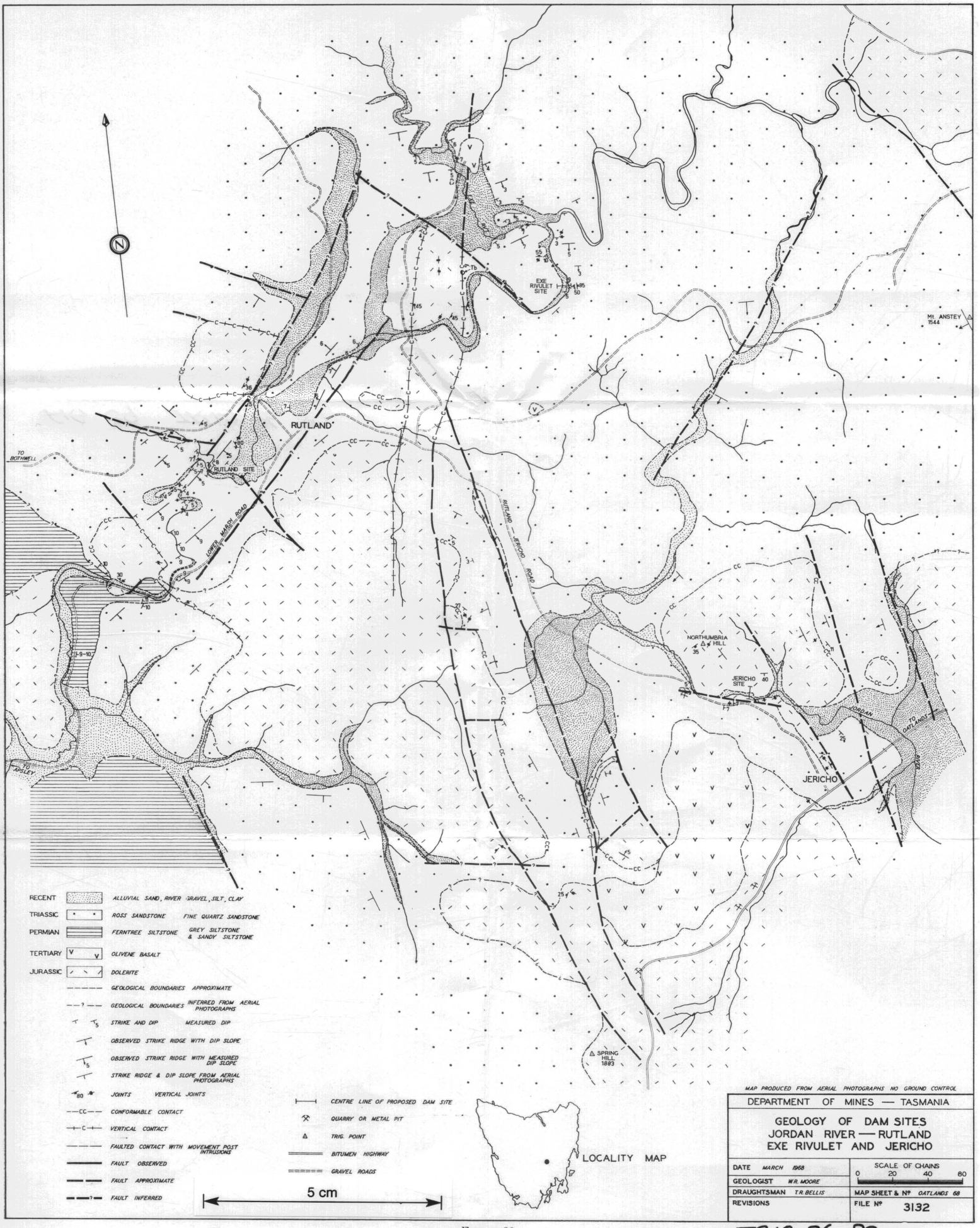

FIGURE 39

TR12-86-89

MATERIAL FOR CONSTRUCTION

A plentiful supply of dolerite for rock fill is available close to the site on the southern slope of Northumbria Hill. Suitable topographic sites are available.

The depth of weathering of the dolerite and its composition are irregular and investigation drilling of the quarry site should be undertaken.

For the clay core of the dam, three sources of suitable clay are available:—Recent alluvial clay, clay derived from the weathering of Triassic mudstone, and clay derived from the weathering of basalt. The Recent alluvial clay exposed along the Jordan River is thin and limited in extent. Location of suitable supplies would require an intensive trenching or shallow drilling programme. Triassic mudstone outcrops within suitable distance of the dam site are rare, and the possibility of finding extensive deposits of clay derived from them is unlikely.

The clay derived from weathered basalt on the plateau, as exposed in a large recently constructed agricultural dam near Archer's air-strip, appears thick and extensive and is within easy cartage distance of the Jericho dam site.