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INVESTIGATION OF AN IRRIGATION DAM SITE ON THE COAL RIVER NEAR BADEN

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INTRODUCTION

The Rivers and Water Supply Commission is exploring the possibility of the construction of a reservoir on the upper reaches of the Coal River near Baden and Tunnack. The reservoir is

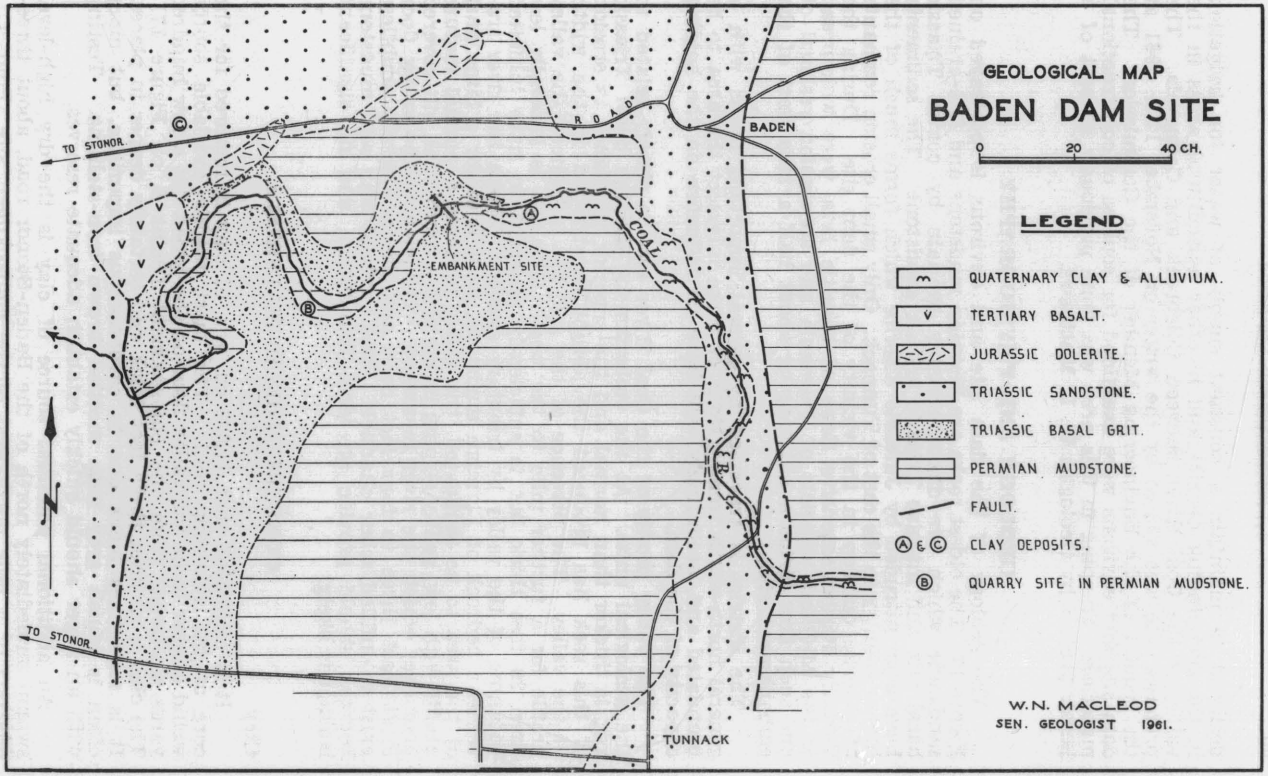

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FIGURE 17.

designed to maintain a constant supply of water for irrigation in the surrounding district and in other agricultural areas in the valley of the Coal River between Colebrook and Campania. The proposed site was visited by the writer on November 13th, 1961 at the request of the Engineering Member of the Commission. The dam site and environs were examined for sources of constructional materials. Mapping in this area was done previously as part of a larger project by Geologist W. L. Matthews.

GEOLOGY AND PHYSIOGRAPHY

The geology of the dam site and environs is portrayed on Figure 17. The oldest rocks are Permian mudstone and fine-grained sandstone which are disconformably overlain by coarse Triassic basal grit and massive Triassic arkosic sandstone. The sediments have been intruded by Jurassic dolerite which forms much of the higher country to the east of Tunnack. Only small erosion remnants of dolerite outcrop in the vicinity of the dam site. During the Tertiary Period extensive flows of basaltic lava were widespread in the Midlands districts of Tasmania and an erosion residual of one such flow forms a hill capping about half a mile west of the embankment site.

The district is traversed by several important faults with a general north-south trend. None of these intersect the area to be inundated and, accordingly, will have no influence on the holding capacity of the dam.

The valley profile of the Coal River can be closely related to the geological units. At the embankment site the basal Triassic grit is thicker than normal and the superior resistance to erosion of this rock has produced the abrupt constriction in the width of the valley. The presence of the grit has influenced the valley profile for a further mile to the west. The grit is generally less than 20 feet thick but is sufficiently resistant to have inhibited widening of the valley by tributary erosion. Where the river traverses a bedrock of Permian mudstone, as it does for a large part of the area to be inundated, the valley presents a normal mature profile with low, gently sloping banks and a broad, flat, silt-covered floor over which the river meanders. The clay in the valley floor is at least three to four feet deep and deeper pockets doubtless exist in infilled scour channels. The surficial clay and mudstone bedrock should provide an ideal foundation, and no significant leakage is likely.

CONSTRUCTIONAL MATERIALS

Clay

It is estimated that 11,000 cu. yds. of clay is required for the core of the retaining wall. The most readily available source would appear to be the valley floor on the broad flat a few hundred yards upstream from the embankment (Point A on Figure 17). The clay is at least three feet thick and certainly deeper in places. It is sometimes black due to carbonaceous impurities, but more often is bluish grey with mottled brown iron-staining. Testing with an auger should quickly establish adequate reserves.

An additional potential source of clay is the dry high-level swamp immediately north of the Baden-Stonor road, about three-quarters of a mile north-west of the embankment site (Point C).

Boring with an auger revealed at least two feet of clay beneath a thin sandy cover. The swamp is about 20 acres in extent and thickness of clay up to 10 feet could be reasonably anticipated.

Earth and Rock Fill for Retaining Wall

If earth fill is to be used for the retaining wall about 35,000 cu. yds. is required. Unfortunately, only a shallow mantle of soil and gravel is to be found on the nearby hillsides. The Permian mudstone decomposes to fine clay which either washes away or accumulates in the valley floors, and the Triassic grit and sandstone produce a shallow gritty soil generally less than two feet deep. Numerous small quarries have been opened in the district for road materials and all these showed a similar shallowness of surficial deposits over the parent bedrock. To obtain the required amount of earth fill would entail wholesale stripping of large areas.

If it were decided to use rock fill instead of earth, a quarry could be opened in the Permian mudstone a short distance downstream from the retaining wall. The mudstone is bedded in units up to a foot in thickness with more fissile intercalations. The close and persistent vertical jointing in conjunction with the close bedding would greatly facilitate quarrying. A suitable quarry site (Point B) is indicated on the accompanying plan.

The mudstone is moderately resistant to weathering and larger slabs could be used as pitching stones for the facing of the embankment. The Triassic basal grit weathers to angular and thick slabby boulders and could be used equally well for rock fill. This, however, is rarely more than 10 feet thick and a relatively limited quantity is available in any one locality.

Gravel

The Triassic grit weathers to a coarse siliceous gritty soil which would provide an adequate gravel after screening. Unfortunately, no great thickness of this material was located or seems likely to occur. However, a reasonable gravel could be obtained by screening the detrital soil overlying the Permian mudstone on the lower flanks of the valley walls downstream from the embankment. The detritus contains an abundance (probably nearly 50 per cent by volume) of angular mudstone fragments of $\frac{1}{8}$-$\frac{1}{2}$ inch size and a lesser proportion of siliceous grit which has been washed down from the overlying basal grit. The mudstone is low in mechanical strength but would probably suffice for use in the embankment. Much surficial material would have to be stripped in course of construction of the spillway and screeing of this would provide some gravel.