TR6-69-72

A PROPOSED RESERVOIR SITE ON DULVERTON RIVULET NEAR OATLANDS

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INTRODUCTION

The Dulverton Rivulet rises near Oatlands township and flows west to join the Jordan River. The Rivers and Water Supply Commission proposes to build a reservoir on the rivulet about four miles west of Oatlands to regulate the flow of the Jordan. A geological investigation of the site was made on November 28th, 1961 at the request of the Engineering Member of the Commission. (See Figure 18).

GEOLOGY AND PHYSIOGRAPHY

Dulverton Rivulet is a mature stream of low gradient. For the greater part of its course it traverses country underlain by Triassic sandstone and Jurassic dolerite. The sandstone is less resistant to erosion and weathers to low mesaform hills whose slopes are punctuated by benches of massive sandstone. In general the sandstone weathers to broad, level-floored basins several hundreds of feet lower than the surrounding dolerite-capped hills. The basin to be inundated provides an example of this morphology.

The dolerite is intrusive into the sandstone but the intrusive pattern is irregular and complex. In places it is flat-lying and sill-like with base and capping of sandstone; in other areas it is steeply dipping and transgressive to the flat sediments. The topography is locally controlled by the attitude and level of the dolerite and this feature strongly influences the valley profiles. The area to be inundated is underlain by Triassic sandstone, and such low relief features as exist in the basin are determined by benches of sandstone. At the dam site, near the western end of the basin, the river has been superimposed on the resistant dolerite and cut a steep-walled gorge which extends for a considerable distance to the west.

Two alternative sites for the dam are available. Both are situated on dolerite, and, from the geological viewpoint, are equally suitable for the construction of a dam.

At Site A (see Figure 18) the dolerite is closely jointed with the main joint system trending north-west, roughly parallel to the trend of the valley. The dolerite gives every indication of being fresh and unweathered in depth and, in all likelihood, the joints would be sealed once the fresh rock was encountered. Here the spillway would be on the south side of the valley and the excavation would be in dolerite.

At site B near the entrance of the gorge, the dominant joint direction trends slightly west of north and dips to the west at a high angle. This system has actually determined the alignment of the spur on to which the northern end of the dam wall would be keyed. The spur appears to be composed of solid dolerite and its form lends itself to the construction of a spillway north of the dam wall.

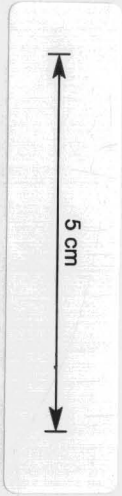
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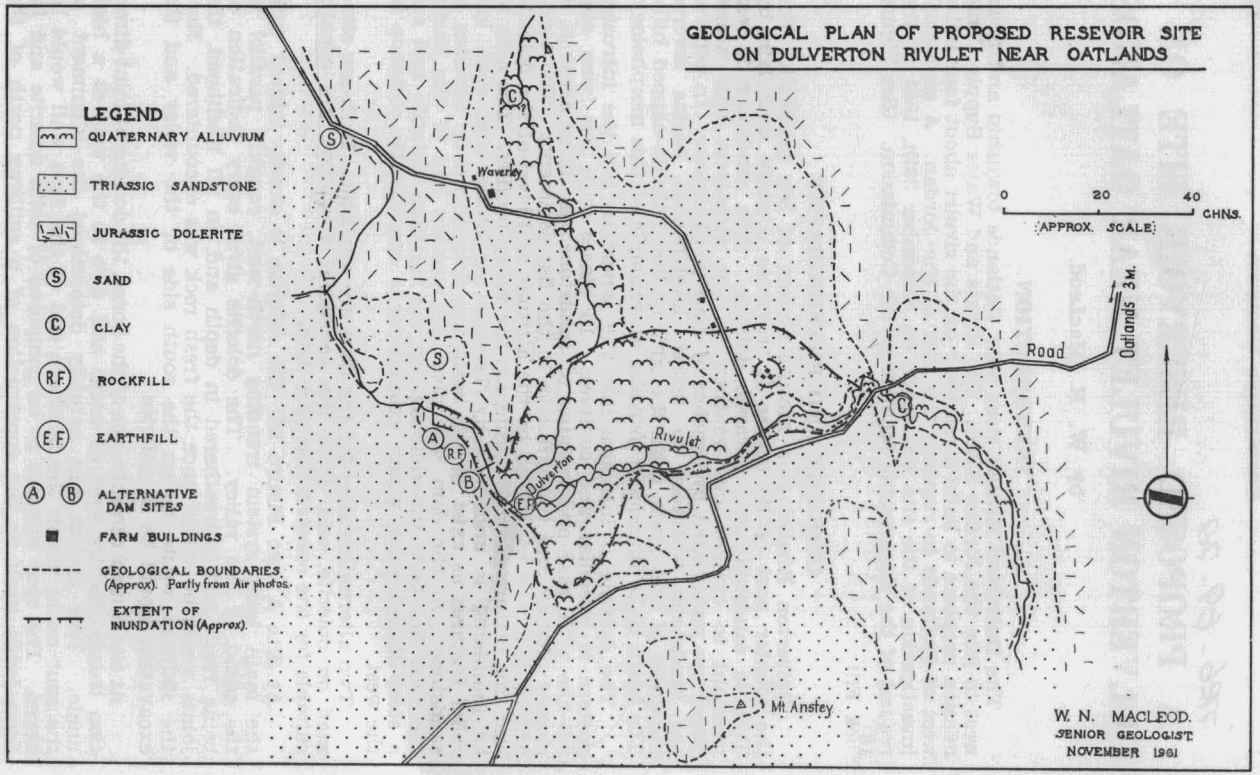
FIGURE 18.


GEOLOGICAL PLAN OF PROPOSED RESEVOIR SITE
ON DULVERTON RIVULET NEAR OATLANDS
LEGEND
QUATERNARY ALLUVIUM
TRIASSIC SANDSTONE
JURASSIC DOLERITE
SAND
CLAY
ROCKFILL
EARTHFILL
ALTERNATIVE DAM SITES
FARM BUILDINGS
GEOLOGICAL BOUNDARIES (Approx). Partly from Air photos.
EXTENT OF INUNDATION (Approx).
Waverley
Rivulet
Dulverton
Road
Oatlands 3 M.
Mt Anstey
0
20
40
CHNS.
APPROX. SCALE
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Further downstream, near the recording station, the valley is floored with dolerite but has walls of massive Triassic sandstone which is porous and strongly jointed and not as favourable as the dolerite for dam construction.

The broad valley floor which would be inundated to the east of the dam is covered with alluvium, probably up to ten feet deep, composed of sandy clay with pebble and boulder lenticles. This should serve as a reasonably impermeable seal above the porous sandstone bedrock and no serious leakage is anticipated. Lakes Tiberias and Dulverton are both underlain by the same sandstone and presumably have similar alluvial deposits in the floors.

CONSTRUCTIONAL MATERIALS

Rock Fill

The most suitable and accessible source of rock fill would appear to be the southern side of the valley between dam sites A and B (see Figure 18). The dolerite is closely jointed here and should be easy to quarry. An adequate yardage is available close to the construction site.

Gravel

There are no suitable sources of natural gravel close to the dam site. The dolerite weathers to coarse pebbles and clay and the Triassic sandstone to fine sand and clayey sand. Accordingly, if long haulage is to be avoided, the most economical sources of gravel would be crushing and screening of the dolerite obtained from the rock fill quarry or the spillway excavation.

Sand

Exploratory boring showed that thicknesses of up to six feet of fine and fairly clean sand occur as infillings of hollows in the Triassic sandstone country. One such locality is conveniently close to the dam site (see Figure 18) but some further boring would be necessary to establish reserves. Another pocket was located close to the road about one mile NNW of the dam site and here the sand was at least six feet deep over a limited area. Doubtless similar pockets exist elsewhere close to the site and adequate quantities should be available. When fresh the Triassic sandstone contains a moderate proportion of clay derived from decomposition of feldspar, but, fortunately, in the residual surficial sands most of this clay is leached out leaving a fine unconsolidated sand of uniform grain size. The rotten friable sandstone immediately above the hard bedrock contains more clay and would be unsuitable for concrete.

Clay

The alluvium in the valley east of the dam site proved disappointing as a source of clay. Eight holes were sunk at widely spaced points and a similar succession of clayey sand and lenses of pebbles was encountered in each. This material would be suitable as earth fill and a very large yardage is available, but it is doubtful whether the material would be sufficiently impermeable to serve as a clay core.

Good quality clay was located close to the road from Oatlands, about 1½ miles east of the dam site. Here a dolerite dyke cuts across the valley and provides a local base level for the rivulet

which has deposited clay upstream from the bar. Boring showed a depth of three to four feet of sticky clay with a pebbly base. It would appear that there are at least three acres of this material, perhaps a yard deep, to provide reserves of the order of 15,000 cu. yds. Further boring upstream within the limits of the creek meanders may establish larger reserves. The alluvial flats in the tributary valley north of Waverley farm may contain clay and merit examination.