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REPORT ON PROPOSED DAM SITE ON THE DERWENT RIVER.

The Hydro-Electric Department are at present surveying a proposed hydro-electric power scheme on the Derwent River which would involve the construction of a dam on the river. The visit of inspection with which this report is concerned was made to determine the geological features in the vicinity of the dam site, and to ensure that there were no disadvantages from the geological view point.

The proposed site is some 10 miles south of the Derwent Bridge on the West Coast road. The road is left some 3 miles south-west of the bridge; a bush road 2 miles in length followed to the Navarre River; and a track followed for 7 miles, the Guelph River being crossed at 6 miles.

After leaving the road, the route passed over plain-like country on the western side of the Derwent River. The plain is studded with sub-angular and rounded diabase boulders up to several feet in diameter. Occasionally boulders and pebbles of quartz schist or quartzite, quartz, granite, basalt &c. are seen. These represent the boulders derived from the weathering of Pleistocene fluvio-glacial or glacial deposits. At the Guelph crossing these deposits can be seen in situ in the river bed. At the Derwent Bridge, sandstones and clayey sandstone outcrop in the river bed and have been exposed in quarries on the banks. Pebbly beds occur above them. At the Navarre crossing, pebbly beds outcrop in the river bed and the surface is strewn with the larger diabase boulders. It seems likely therefore that the boulders are derived from the weathering of coarser beds overlying the finer ones.

The plains continue to 1¼ miles beyond the Guelph River where high ridges terminate them. The ridge on the east is a spur from the Wentworth Hills, while that on the west is one from Mt. Hobhouse. These ridges are composed of diabase and the Derwent River cuts through them in a narrow, rocky gorge.

The dam site is at the entrance or northern end of the gorge. It is proposed to build a dam 120 feet high and the site of this was examined in detail. Solid diabase outcrops in the river bed at the site and also up and down stream. The eastern side is very steep and solid diabase outcrops along most of the way, while the amount and depth of diabase detritus is comparatively small.

On the western side, diabase outcrops to 20 feet above the river, and also near and above the 120 foot level. Diabase boulders and detritus occupy the greater part of the distance. An occasional pebble of white quartz schist or quartzite are visible and it is just possible that a small patch of Pleistocene boulder beds may have existed, although if they did the amount remaining is probably small due to denudation. The ground is in the form of two crude terraces which may possibly represent remnants of these boulder beds. It is impossible to judge the thickness of the detritus and boulder beds and it will be necessary to sink shafts to determine the depth to bedrock.

The other factors connected with the dam site are:

(1) Foundations. The diabase is a hard and strong rock and should provide excellent foundations from the viewpoints of strength and stability. It is very resistant to weathering and would therefore not change, but would last as long as any dam erected on it.

(2) Downstream Erosion. As stated above the diabase is resistant and durable and erosion of the rock downstream from the dam would be extremely slow and not likely to affect the permanence of the dam. Further hard fresh rock is exposed at the surface and there is no soft rock which could be quickly eroded.

(3) Leakage. The diabase is an impervious rock and permits no passage of water through it. Jointing would have enabled water to traverse the rock. The main jointing is a system of irregular vertical prismatic joints with horizontal jointing much less common. The major joints near the surface might allow some leakage of water, but at a depth of 30 feet, to which depth it is stated that the fundations would be taken, these joints will be practically closed and little or no leakage would occur.

If at any place, the joints appeared somewhat open at the bottom of the foundations, the foundations could be taken somewhat deeper. It is not anticipated, however, that such conditions will be found, or that deep foundations will be necessary.

Even if a small leakage did occur, the hard and resistant nature of the rock would prevent enlargement of the joints and consequent larger leakage and instability of the foundation.

It is evident therefore that the diabase at the site will provide a strong, permanent and satisfactory foundation and that the only points requiring attention are:

(1) Depth of detritus, and possibly boulder beds on the western side. This will be determined by shafts and only affects the site in that the depth of excavation to bedrock may be large and therefore costly.

(2) Nature of joints at bottom of foundations. It is not anticipated that any serious defects will be found, but it will be advisable to note the nature of the joints and have slightly deeper foundations if the joints are open at any place.

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