UR 1946/70-72

UNDERGROUND WATER SUPPLIES AT SWANSEA

Introduction:

Early in September, at the request of the Water, Sewerage and Drainage Board, an investigation was undertaken to determine the prospects of obtaining, for Swansea, a suitable water supply from underground resources, with a daily maximum of 250,000 gallons.

Geology:

With the exception of two small outcrops of a grey mudstone, which can be seen outcropping in the Meredith River near the road bridge on the Tasman Highway and near W. Lynne's river pump and referred to the Triaasic coal measures on purely lithological considerations, the area drained by the Meredith is largely occupied by Mesozoic dolerite. The whole of the area within the watershed was not examined, but as the valley fill material is predominately coarse doleritic gravels and pebbles it is reasonable to assume that if sedimentary rocks do occur they would be insignificant in extent. The valley fill material has been spread over the flood plain of the Meridith for 1½ square miles and is in part overlain by sand dunes.

The general set up is an ideal one for ground water supplies, with an upper valley, in virtually impervious rocks, giving excellent run-off conditions discharging into a lower, wide, open valley with first-rate underground storage conditions.

There is little evidence of the sub-surface structures of the two rock types represented in the area, but there is topographic evidence suggesting that a fault extends from just west of the W. Lynne's river pump in a south-wasterly direction to Saltwater Creek.

The evidence for the existence of this fault is not strong, but when the tend of the major faults of Tasmania is considered it appears as if this is possibly, part of the Ben Lomond fault[1]. In which case the down-throw is to the south-west, with a north-easterly tilt on which a greater accumulation of sediments would be deposited against the fault. There is little or no evidence of a rock wall on the up thrown side but this may be due to the presence of the softer mudstone which has been denuded subsequently.

There is some evidence of an interruption of the drainage system causing a sudden change in direction of flow of both the Meredith River and the Saltwater Creek. The east-west ridge of heavy wash which flanks the eastern boundary of the aerodrome and the crescent shaped pools of water at the eastern end of this ridge are usually indicative of abandoned sections of the old river course and, in general, the water in these may represent perched water tables held up by layers of clay that have gradually accumulated on the floor, but in view of their persistence for some time during the summer months, it rather suggests that the water table is at ground level.

Ground Water Resources:

The ground water with which this report is concerned occurs in the unconsolidated valley fill, through which it moves slowly from the intake areas within the watershed to the lower parts of the valley, where the water table reaches the

1 The Coal Resources of Tasmania, Mineral Resources No. 7, 1922, P. 205.

surface, or nearly so, and where the water escapes into the atmosphere by evaporation and transpiration.

The gravel and pebbles which constitute this valley fill are the materials through which water moves most rapidly and consequently gives up its water most readily when tapped by wells.

The main source of the water in the valley fill is the precipitation in the hilly areas that are drained by the Meredith. The only rainfall records available are those at Swansea, where the average annual is 24 inches, and this is most probably lower than the greater part of the area within the watershed. No records of stream flow and seepage losses exist.

The floors of all except the smallest creeks are occupied by unconsolidated material, which extends far up into the hills. In the main valley of the Meredith River which is an intermittent perennial stream there is doubtless considerable underflow through this material which joins the ground water of the valley without appearing at the surface.

Although precipitation is relatively high the rate of evaporation will be relatively high due to the shallowness of the soil and alluvium in the interstream areas, so that probably not more than ten percent of the precipitation in the valley is added to the ground water supply.

The depth to the water table ranges from only a few inches in the lower parts of the valley to at least twelve feet on the northern edge of the plain. Lack of sufficient data prevents an accurate plotting of the depth to the waterhole throughout the valley.

Discharge of groundwater :

It is known over what proportion of the area that the watertable is sufficiently close to the surface to be drawn by capillarity as well as by transpiration of plants. No adequate estimate can be made as to the quantity of ground water discharged annually by evaporation and by transpiration of plants.

As the central portion is relatively flat a slight lowering of the watertable may result in a large decrease in loss by evaporation. However, if the Ben Lomond Fault does exist in the area, deeper ground may exist south-west of the fault.

Quantity of Water :

As the amount of underground water available is a function of the quantity of rainfall, it is necessary to arrive at a safe and reliable figure. For this purpose the lowest mean average rainfall of three consecutive dry years is the usual figure adopted, which is, in this case, 16.21 inches for the years 1906-8, compared with mean annual average for the past 50 years of 24 inches.

These rainfall figures relate to Swansea, only, so as the greater proportion of the catchment area is in the highlands flanking Mount Tooms the general average over the catchment area would be somewhat higher.

The catchment area of the Meredith River is approximately 30 square miles so that taking an annual rainfall of 16 inches the total precipitation for the year would be 25,600 acre-feet.

Allowing ten per cent of the total precipitation as the annual recharge into the alluvial flood plain then the daily average recharge would be of the order of 190, 000 gallons.

Assuming twelve feet as the average depth of the valley fill material and 20 percent porosity, the effective storage available to a line of wells in a north-western direction from the proposed well would be 720 acre-feet. If it is further assumed that only the bottom two feet remains saturated, then the effective storage available would be 120 acre-feet or 32,000,000 gallons, or sufficient for 128 days, without any recharge whatever. So that given adequate collecting facilities, a daily draw down of 250,000 could be maintained without any difficulty. It is recognised that the above calculations are based on assumptions that are not adequately supported by observed facts and that the chance for error is large. Obviously no great accuracy can be claimed for the results. However, the known facts seem to warrant the statement that the average daily recharge to the supply of ground water in the Meredith Valley is of the order of 1,900,000 gallons.

Quality of ground water :

This is the most important factor in the question of a public water-supply but with a total absence of existing wells in the area there was no opportunity of obtaining samples of ground waters for the purpose of determining its suitability for domestic use. In view of previous knowledge of underground waters derived from dolerite catchments I would anticipate that the main mineral substances likely to be present are calcium carbonate and to a much lesser extent magnesium carbonate and I expect that the water would contain a greater proportion of magnesium salts relative to the calcium salts, because the calcium salts are much less soluble and more readily deposited as incrustations.

However, there will be sufficient underflow to prevent any great concentration of mineral matter and I anticipate that the water will be of fair quality.

Conclusions and Recommendations :

There is little doubt that an adequate supply of underground water to meet anticipated requirements exists in close proximity to Swansea, and all that remains to be done is to establish the quality of the water and actual rate of flow.

To achieve this it will be necessary to sink a test well near the eastern corner of a small paddock (approximately four acres) adjoining the aerodrome, as indicated on the accompanying plan.

In view of the heavy wash in this boulder ridge I am of the opinion that satisfactory results will not be obtained by hand drilling and the sinking of a test well will be necessary.

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3rd October, 1946.