UR1974_38

Groundwater investigation, 'Woonalee Park', Mount Direction, East Tamar.

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A groundwater investigation was undertaken on the property 'Woonalee Park' [EQ046377], Mount Direction at the request of the Luck brothers. The farm is situated on the northern side of the Mount Direction-Bangor road 3.5 km east of its junction with the old George Town road.

GEOLOGY

The arable section of the farm consists of the alluvial plain of gravel and sand of Biddle Creek. No outcrops were found on these flats and it was on this section of the property that a bore would be most advantageous to the owners.

A low NW-SE ridge forms the eastern boundary of the farm; outcrops of Permian mudstone have been reported on this ridge. South of the Bangor road the land rises steeply to form the northern end of the Dismal Range. Dolerite, underlain by Triassic and Permian sediments, forms the northern portion of this range (Marshall *et al.*, 1965).

GEOPHYSICAL WORK

An E-W seismic spread of 328 m was fired west of Biddle Creek to the east of the farm out-buildings; the geophone spacing was 7.6 m. A 250 m N-S resistivity probe using a Wenner configuration was undertaken.

The seismic spread showed a surface velocity layer (V_0) of 920-1520 m/s. The thickness of this layer was 9-12 m. Below this surface layer was a thick second velocity layer (V_1) with a seismic velocity of 2130 m/s. A third velocity, V_2, of 3960 m/s was only recorded from the furthest shot (121 m from the first geophone at the eastern end of the spread). The depth to the interface between the V_1/V_2 layers was calculated as 70 m.

The surface layer velocities are the same as those found for Tertiary sandstone and mudstone exposed in the cutting for the old George Town road underpass beneath the Bell Bay railway at Mount Direction (Moore, 1973). The thick intermediate layer is thought to be Permian mudstone underlying the Tertiary sediments.

Two sub-layers (with seismic velocities of 910 m/s and 1520 m/s) could be distinguished within the surface layer from the results of a weathering seismic spread and the 15 m shot from the west end of the geophone line. The thickness of the 910 m/s layer was calculated to be 4.5-6.0 m; the base of this layer is thought to be the level of the water table in the Tertiary sediments.

The resistivity probe gave a simple two layer curve indicating a dry surface layer overlying a wet zone with the water table at 5-6 m.

GEOHYDROLOGY

The Department has no records of the high-yielding bores reported by the Luck brothers on the adjoining properties of Messrs Brown and Archer. Records exist for a group of four bores on D. Miller's property 5 km north of 'Woonalee Park' and a bore on Morgan's property 6 km to the north. Both properties are on the same alluvial flat as 'Woonalee Park' along the old George Town road.

Miller had four bores drilled in 1968 to depths ranging between 6 and 15 m. The yields ranged from 15 *l*/min to more than 30 *l*/min using bail tests for 90 minutes. The greatest drawdown for any of these holes was 2 m; the sediments drilled were reported to be clay and mudstone with some possible dolerite in two of the holes. Water quality was good with the water table level ranging from 1-5 m.

Morgan's hole was drilled in 1972 to a depth of 21 m in clay and mudstone. The reported yield, using a compressed air testing method, was 128 *l*/min with a drawdown of 20 m.

If the same sediments continue north under the alluvial flats from 'Woonalee Park' to where these bores were drilled it would appear that none were drilled deep enough to obtain their maximum yield.

CONCLUSIONS

The seismic and resistivity results indicate that a bore should be drilled to a minimum depth of 30 m and to a depth of 60 m to obtain the maximum yield. The yield is difficult to predict because no adequate pump tests have been carried out in the area and the existing bores appear to have been drilled to too shallow a depth. Yields of 50-200 *l*/min should be possible in these Permian sediments.

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[21 May 1974]