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Groundwater investigation at 'Melford', Nabowla, north-eastern Tasmania.

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At the request of Mr T.E. Timperon a groundwater investigation was undertaken of his property 'Melford' at Blumont Siding 3 km east of Nabowla.

GEOLOGY

The farm comprises the lower north-eastern slopes of the Blumont scarp and is drained by a small tributary of the Brid River. South of the homestead this tributary flows in a narrow N-S valley. At the homestead and south of it large rounded isolated blocks of granodiorite crop out on the ridges and the valley sides. Wide vertical joints form a noticeable feature of many of these granodiorite outcrops.

In the valley floor, the stream has a narrow alluvial flood plain that widens to the south to the junction of the farm access road and the Lilydale-Scottsdale highway 800 m to the north, where it forms a small basin filled with alluvium. There are no exposures on this flood plain south of the homestead. Where there has been some recent clearing along the farm access road some poor exposures of gravel and sand were seen and these sediments appeared to be of Tertiary age.

GEOPHYSICAL WORK

Two resistivity spreads [EQ351426] were undertaken below some granodiorite blocks on the eastern farm boundary ridge that separates the unnamed tributary of the Brid River from Sawdust Creek to the east. One resistivity spread was run parallel with the jointing and another across the jointing direction. The direction of jointing was not apparent in the results of the two resistivity probes. The resistivity values were high and no resistivity layering was apparent in the profile.

A seismic spread 183 m in length with a geophone spacing of 7.6 m was fired on the alluvial flats below the homestead [EQ350430]. The spread was parallel to a small tributary which was fed from a small spring near the base of the eastern valley slopes.

A surface layer (V_0 = 1520-1670 m/s) was underlain by a second layer (V_1 = 4570-6100 m/s). The V_0/V_1 interface sloped steeply down to the north. This interface was sharp with a distinct velocity contrast between the two layers. The depth to this interface was surprisingly great, giving a calculated thickness of 37-43 m for the Tertiary sediments overlying granodiorite.

The V_0 velocity for the surface layer confirmed that the poor outcrops along the access track were Tertiary gravel and sand. The thickness of these sediments indicates that they were deposited in a Tertiary drainage system, probably a western tributary of the Jetsonville 'lead' system of the Scottsdale Tertiary basin 3 km to the east. As found elsewhere in the Scottsdale basin the relief of the granodiorite when the Tertiary sediments were deposited was high and abrupt in the upper reaches of these 'leads'.

When this considerable thickness of the Tertiary sediments was indicated by the seismic investigation a resistivity probe was run at this locality. The resistivity values were high and the resistivity profile showed the existence of three layers. A dry surface layer 6 m thick lying above the water table, was underlain by 43 m of Tertiary gravel and sand overlying granite.

It has been found that depth calculations from the resistivity probes

are not reliable in the Scottsdale area, although this method does indicate qualitatively the type of rocks that are likely to occur at depth. The results obtained, however, confirm the above seismic interpretation. The resistivity values do not indicate a thick horizon of clay within the Tertiary sediments overlying the granodiorite.

Unfortunately neither the seismic nor the resistivity methods are able to indicate the amount of clay mixed with the Tertiary gravel and sand or the presence of any thin beds of lenses of clay within them. The presence of clay appears to control the amount of groundwater present within these Tertiary sediments.

RECOMMENDATIONS

At this locality the granodiorite, with its wide open vertical joints at outcrops, is an attractive drilling target, although at this stage the Department of Mines groundwater investigation programme it is considered too costly and bears too high a risk factor to be undertaken by a private farmer. The only bore drilled to date in the granitic rocks of the Scottsdale-Waterhouse area, although a very high yielding bore, may not be indicative of the groundwater potential of this rock type.

A bore on the alluvial flats into the Tertiary buried valley appears to be more reliable source of supply for groundwater. The bore should be drilled to the granodiorite (37-43 m). The hole will need to be cased for its entire length.

It is difficult to predict the yield as the clay content is unknown and as this locality is near the top of the Tertiary valley where the groundwater may drain quickly. A yield of less than 75 *l*/m is unlikely, and if the bores of the nearby Jetsonville area are taken as a guide it could be more than 380 *l*/m. Water quality in all the Tertiary bores in the Scottsdale area has been very high and there is no reason to suspect a different result in the Nabowla area.

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