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Groundwater investigation on I. Farquhar's property, Winnaleah.

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A groundwater investigation was carried out at the request of I. Farquhar on his property on Racecourse Road [EQ728527] approximately 6 km from Winnaleah towards Pioneer.

GEOLOGY

The area selected as the most suitable site for further geophysical investigation and drilling was near the top of the valley of a headwater tributary of the Little Boobyalla River 800 m north-east of Wagners Hill. No outcrops were seen in this valley. The soil was a red clay containing grains of quartz. The soil was apparently derived from the weathering of basalt. The basalt forms a plateau area approximately 20 m above the valley. The valley has been incised into the edge of this plateau by the headward erosion of the stream into the underlying unconsolidated Tertiary sediments which lie beneath the basalt. This headward erosion and soil creep down the sides of the valley have deposited a thick layer of red soil on the valley floor. The shot holes, which were one metre deep, did not reach the base of the soil layer. Several springs indicate the approximate position of the contact between the Tertiary basalt and the sediments on the valley sides.

GEOPHYSICAL WORK

A N-S seismic spread, 365 m in length was fired with geophone spacings of 15 m and a 550 resistivity probe was undertaken using a Wenner configuration.

The seismic results showed that three velocity layers were present with the following calculated thicknesses.

Layer	*Seismic velocity (m/s)*	*Thickness (m)*	*Remarks*
V_0	610-760	43-49	4-6 m thicker to the south.
V_1	1520-1680	67-73	V_1/V_2 interface is deeper at the south end.
V_2	5030-6100		

The resistivity results showed three layers with interfaces at depths of 43-55 m and 130-134 m. These depths coincide reasonably with the depths indicated by the seismic data.

The geological interpretation of the three layers is as follows: a surface layer of sand, gravel and clay of Tertiary age lying above the water table; an intermediate or second layer of the same material overlying deeply weathered and decomposed granite. The third layer is 'hardrock' (unweathered granite). The geophysical boundary between the second and third layer is not likely to coincide with the geological boundary between the Tertiary sediments and the granite.

GEOHYDROLOGY

The amount of groundwater obtainable from this type of Tertiary sediment/granite sequence depends on the total thickness of the Tertiary sediments below the water table compared with the weathered granite, and the amount of clay mixed with the sand and gravel in these sediments.

The valley on Farquhar's property is situated on the western margin of an extensive area of Tertiary sediments that extend east to beyond Pioneer and north to Mount Cameron. Five holes have been drilled by the Department of Mines for groundwater in this Tertiary area along the Old Port Road, from Herrick to the junction with the Endurance track to South Mount Cameron. In all five holes the weathered granite layer was of considerable thickness. The Tertiary sediments (sand and gravel) contained a high proportion of clay. Three holes were dry and the two closest to Farquhar's property gave 910 *l*/min of good quality water.

In Bore Winnaleah No. 6 [EQ745522], the closest of the series to Farquhar's property, and situated 1.6 km to the east at the junction of Racecourse and Old Port Road; 35.6 m of Tertiary sediments were drilled followed by 25.3 m of weathered granite. The water table was at a depth of 16.2 m, with a drawdown of 2.7 m for a five hour pump test at a pumping rate of 910 *l*/min. The water, when tested, contained 113 ppm of dissolved salts (mainly calcium bicarbonate and calcium carbonate).

CONCLUSIONS

A bore drilled on Farquhar's property should give a yield similar to or better than Winnaleah No. 6, although the height from which the water will have to be lifted will be greater. The yield will be increased by the use of screens rather than slotted casing as was used in Bore No. 6.

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