

Groundwater prospects, Ricketts Farm, North Scottsdale.

W.R. Moore

At the request of Mr Ricketts a groundwater investigation was undertaken on his property at North Scottsdale. The farm is located in the upper reaches of Surveyors Creek one kilometre south of the Waterhouse-Scottsdale road [EQ466459].

GEOLOGY

In this area upper Surveyors Creek flows in a north-easterly direction in a narrow, flat, alluvial valley situated between the low hills of North Scottsdale and Mount Stronach. The hills of North Scottsdale form the divide between Tuckers Creek and Surveyors Creek valley. These hills are capped by red soil derived from the weathering of basalt. The red soils overlie thin Tertiary gravel and granodiorite. Quaternary alluvial sand is exposed on both banks of Surveyors Creek. Tertiary sand and gravel are exposed in two small pits on the access road to Ricketts farm on the western side of the valley. The steep lower slopes of the granite hill of Mount Stronach form the eastern side of the valley.

GEOPHYSICAL WORK

The area is one of geophysical interest. In 1970 a resistivity traverse and probe [EQ476473] were undertaken across the upper Surveyors Creek valley on the Waterhouse-Scottsdale road. The resistivity traverse extended from the basalt outcrop on the road to the west to the granite outcrops to the east. No granite basement was recorded. As granite outcrops were close, it was assumed that basement was not reached because of poor current penetration rather than a thick sequence of Tertiary sediments underlying the alluvial sands.

In 1973 when the Surveyors Creek lead of the Scottsdale basin was being traced southwards by drilling, a bore was scheduled to be drilled in the vicinity of this probe. Owing to problems of land ownership the hole (Bore 36) was sited [EQ463459] 2 km to the south-west near the Tertiary outcrops on the access road to Ricketts farm.

The bore penetrated 30 m of Tertiary sand, gravel with some clay beds and was in a weathered and decomposed granite to 45 m. This thickness of Tertiary sediments indicated that the bore had penetrated into the Surveyors Creek lead (buried valley) at this locality. The lead swings to the south-west at the top of the Surveyors Creek valley beneath the basalt to reappear in the upper Surveyors Creek area at Bore 36.

In an attempt to find the bore position within the lead a 300 m seismic spread [EQ466459] was fired in an E-W direction across the alluvial flats at upper Surveyors Creek. The geophone spacing was 15 m and the west shot point was 100 m from Bore 36 and east shot point within 100 m of granite outcrops.

Three seismic velocity layers were present: a surface layer, V_0 , (1500 m/s), an intermediate layer, V_1 , (3000-3300 m/s) and a third layer, V_2 , (4600 m/s at the east end and 7600 m/s at the west end of the spread). The surface layer is Tertiary gravel, sand, and clay, and any deeply weathered and decomposed granite that might be present. The second layer is granite and third layer very tight and hard granite.

The depth of the Tertiary sediments and decomposed granite was deeper at the western end of the spread with a calculated depth of 40-47 m which

correlates closely to 45 m to hard granite found in Bore 36. The surface layer thins to the east with a calculated thickness of 23-28 m. The depth to the V_1/V_2 interface which has a slope down to the west is calculated to be 50-65 m. The eastern edge of the buried valley appears to be close to granite that crops out at the foot of Mount Stronach and the western edge is probably beneath the area of red basalt soil. As in lower Surveyors Creek the buried valley is still wide and has a minimum width of 400 m.

GEOHYDROLOGY

Rotary Bore 36 pumped 110 l/min during a 5-hour pump test with a draw-down of 11 m from a standing water level of 1.4 m. The water quality was good (total dissolved solids 120 ppm). The quality of water was typical of that for Tertiary sediments in the Scottsdale area. The yield was lower than what would be expected for a bore with 29 m of Tertiary sediments below the standing water level. Clay was present in interbedded layers and mixed with gravels in the bore and this is thought to account for the low yield.

RECOMMENDATIONS

A bore drilled at the western end of the seismic spread is anticipated to give a yield equal to and possibly better than that obtained from Bore 36 on Campbell's property, in which slotted casing was used. If well screens are used in place of casing higher yields are more likely.

The Tertiary sediments are easy to drill: rotary drilling has been found to be the most economical method. Such a plant will drill over 30 m per day in such sediments. If a rotary drilling machine is used the mud cake created on the side of the bore during drilling must be removed either by jetting or surging. Over-pumping for 1-2 days is recommended after the screens have been emplaced to remove as much of the clay as possible. If the yield declines during this pumping the screens should be removed and cleaned. When the screen is re-inserted pumping should be continued until the yield becomes stabilised.

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