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29. Report on the groundwater potential for town supply, Gladstone, north-eastern Tasmania.

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At the request of the Gladstone water committee, a groundwater investigation was undertaken in order to evaluate its potential as an alternative supply for this small township [EQ850650]. The above committee states that the town uses 380 *l*/min in the peak period of summer.

The existing town supply comes from the Mount Cameron water race and is piped across the Ringarooma River at the road bridge on the Ansons Bay-Cape Portland road to a small dam on the eastern side of the town. It is then pumped up a low hill on the south of the town where the pump station is situated. This gives the town supply some pressure before being reticulated. The present supply is unfiltered, frequently discoloured and with a reported high bacterial count. Because of the limited financial resources of the town, the areas in which the bores could be sited are restricted to areas where the existing water supply passes from the water race to the pump station.

The area in the immediate vicinity of the township is geologically complex, with granites of varying type cropping out in a complicated pattern within metamorphosed sediments of sandstone and mudstone locally termed slate. These sediments are metamorphosed to a considerable degree and belong to the Mathinna Beds of Silurian age. Overlying these basement rocks are patches of Tertiary sediments, of gravel, sand and clay. The Tertiary sediments are more extensive and thickest on the eastern banks of the Ringarooma River. Elsewhere in the north-east as determined by the regional groundwater survey (Moore, 1977), the Tertiary sediments of the same lithological type have provided the high yielding bores with very good quality groundwater. In Gladstone much of these sediments have been removed by tin mining sluicing. As a consequence the groundwater potential of the sediments was destroyed. Of the Tertiary areas still present in the vicinity of the pipeline, the remaining thickness of these sediments is not great enough to produce the amount of groundwater required.

Of the two hard rock aquifers, the granites are considered too costly to drill to guarantee the amount of water required. To date no evaluation of their groundwater potential is possible other than by drilling in the north-east investigation programme. The Mathinna sediments have been found to be the north-east's most reliable low yield rock aquifers. Good bores in these sediments produce 230-380 *l*/min and poor bores 38-53 *l*/min. At present 23 bores have been drilled by the Department of Mines or by contractors. The only dry bore to date in these sediments is situated on H.A. Green's property at Gladstone. This bore drilled to a depth of 45.7 m produced less than 7.6 *l*/min. The bore was drilled to test new drilling equipment and no previous geophysics was undertaken.

It is becoming apparent from the groundwater survey that groundwater is accumulated in the Mathinna sediments in an intermediate zone beneath the weathered surface layer and the hard rock. Presumably in a layer where the joints or fissures in these rocks are open and not clay-filled as in the surface rock, or closed as in the hard rock layer. These layers coincide approximately with the seismic velocity layers and where a thick intermediate layer of a velocity range of 1800-3000 m/s occurs, the bore yields in the Mathinna sediments are higher.

Three seismic spreads were fired in Gladstone, one at Green's bore, and the others at the reservoir and the pump station which are all situated on Mathinna sediments. The seismic velocity layering and their estimated depths

Table 1. SEISMIC RESULTS, GLADSTONE

Spread No.	*Location*	*Direction and length (m)*	*Velocity Layering (m/s)*	*Depth of layers (m)*	*Character of velocity plot*	*Slope direction and interface*	*Remarks*
1	Green's bore Ringarooma west bank	E-W 244	West End V_0 1067 V_1 1524 V_2 3353 V_3 6096-7620	V_0/V_1 7.6-9.1 V_1/V_2 20.7-22.9	Asymmetrical	V_0/V_1 shallows to the east. V_0 layer thickens to the west.	Topographic slope down to the east. V_1 at the eastern end speeded up and becomes artificially fast.
			East End V_0 1220 V_1 2438 V_2 3353	V_0/V_1 12.8-13.1 V_1/V_2 28.3-32.0			
			If calculated as 2-layer case. V_0 1219-1524 V_1 3353-3800	V_0/V_1 25-32			
2	Reservoir	N-S 175	V_0 1220 V_1 4415-4880	V_0/V_1 17-22	Symmetrical	Shallower at the southern end.	
3	Pump station	E-W 181	West End V_0 1370 V_1 3810 V_2 6100-7620	V_0/V_1 12-13.7 V_1/V_2 Not calculated	Asymmetrical	Top layer thickens to the east	Topographic slope to the east
			East End V_0 1370 V_1 3810	V_0/V_1 18-22			

are shown on Table 1. The geophone spacings for all three spreads was 8m.

In none of the three spreads does a well developed intermediate layer with a seismic velocity in the range of 1800-3000 m/s occur. There is only one recorded velocity within this range in the three spreads and it occurs at the eastern end of Green's bore (spread 1) with the shot point located on the banks of the Ringarooma River. Here a topographic slope and thickening of surface layer to the west gives an artificially high V_1 layer of 2,438 m/s.

CONCLUSION

All three locations show extremely high bottom velocities close to the surface for the Mathinna sediments with depths of less than 30 m. It must be concluded that the other two suitable locations if drilled, would give similar results to that of Green's bore. Therefore on this evidence no drilling can be recommended in the immediate precincts of the Gladstone township.

REFERENCE

MOORE, W.R. 1977. The groundwater potential of north-eastern Tasmania. *Tech.Rep.Dep.Mines Tasm.* 20:249-251.

[4 April 1975]