

1977/51. Preliminary report on an alternative groundwater scheme for the town water supply at Gladstone.

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A preliminary investigation of the proposed scheme for obtaining a higher quality water for the town of Gladstone [EQ850650] has been completed. The existing town supply is taken from the Mount Cameron water race. The scheme under investigation proposes to collect the groundwater by either a screened bore or horizontal screen collector placed in the sluice mine tailings on the aggraded floodplain of the Ringarooma River. The mine tailings would act as a natural filter to the normally turbid water of the Ringarooma River as it infiltrates through the tailings.

#### PRELIMINARY INVESTIGATIONS

A preliminary investigation was required to attempt to answer the following questions before feasibility testing using a trial bore with a screen could be undertaken.

- (a) Do the type of coarse quartz sand and fine gravel mine tailings seen on the surface of the Ringarooma River floodplain extend to the original level of the river bed before tin sluicing commenced in the Gladstone area?
- (b) Do these tailings extend laterally over the present river floodplain to its banks?
- (c) Do the tailings allow an adequate supply to be pumped for the towns requirements?
- (d) Do these tailings act as an adequate filter to clarify the underground water, compared with the normally turbid Ringarooma River water, its original source?
- (e) Is the quality and clarity of the groundwater from the tailings better than the existing town supply?

Three auger holes approximately 5 m apart were drilled from the waters edge to the eastern bank on the floodplain of the Ringarooma River, near the junction of the river and Tamar Creek. Coarse sand and tailings extended to depths in excess of 10 m in all holes. Two further holes were drilled on the western bank, immediately north of the bridge on the Cape Portland road. These holes encountered black organic mud with strong smelling poor quality groundwater. Two further holes were drilled south of the bridge where sand overlies yellow clay and weathered slate of the Mathinna sediments. Clear water was obtained from both holes. The ferrous ion content of the water was so high that the water rapidly became discoloured on exposure to air and a rusty iron slick covered the surface of the water within thirty minutes.

Three further holes were drilled between the eastern abutment of the old Ringarooma bridge and to within 5 m of the waters edge. The holes were drilled along the line of the piles of the old bridge. These holes encountered bedrock at 9-10 m, with one metre of organic mud occurring in the hole closest to the bank. The remaining thickness comprised fine gravel tailings and coarse sand.

Three spears were bailed down to 2-3 m depth along this line, with the first spear approximately 5 m from the waters edge. The water clarity for all spears was noticeably better than the river water and the town supply.

Some persistent cloudiness was present in the water from all three spears. No difference in the water clarity existed between the spears, nor did it change with pumping. The slight turbid discolouration did not settle in the samples taken for chemical analysis. The water was soft, with 63 and 58 p.p.m. salt. The iron content is high for a town supply with 2.5 and 1.6 p.p.m. The chemical analyses of the water (Table 1) are from a spear located near the pier of the old bridge, with samples taken at the beginning and end of a two hour pump test. The hole yielded 42 l/min (550 gal/hr).

No measurement of the drawdown was possible at the spear being pumped, but no change in level was observed in the other two spears during pumping. The recovery in the pumped bore was very rapid, with the original water level being reached in the time it took for the short suction hose to be withdrawn and the level to be measured.

These spear tests indicate that an adequate amount of water is available. With a 125 mm (5 inch) screen, either placed vertically or horizontally, the tailings would supply ample water for the requirements of Gladstone. The water clarity was better than that of the Ringarooma River, even while tin sluicing was being carried out upstream.

The groundwater from the tailings lacked the brown colouration evident in the town supply, despite its high iron content. The groundwater remained turbid even after centrifuging and it is considered doubtful whether completely clear water could be obtained, even at depth, while sluice mines are operating in the area.

#### CONCLUSIONS

Although complete water clarity remains a problem, the next stage of the investigation appears to be warranted. This will require the drilling of a bore, either from a stage built on the existing bridge or from a stage or temporary embankment built from the eastern abutment to the first pier of the old bridge. This hole should be drilled to bedrock and cased using the 150 mm (6 inch) casing. A 125 mm (5 inch) screen should be set at the 6-9 m level and the casing back jarred to expose the screen. The bottom of the screen should be capped with a one metre length of casing at its base. This level should be pump tested for a minimum of four hours, with 50 mm (2 inch) spears set as observation bases in a circle of 3 m radius. Grain size samples should be collected at every metre, if possible, when drilling. Water samples should be collected at the beginning and end of each test and any changes in the clarity of the water noted.

The test should be repeated with the screen set at the 3-6 m and 1-4 m levels. This drilling should be undertaken in summer, when the flow of the Ringarooma River is at its lowest. It is estimated that the time for the whole study will be about one week, using a cable tool plant.

From these tests, it should be possible to decide which of the two alternative methods, a production screen bore or a horizontal screen set in a gravel packed trench cut by drag line or back hoe, is the best. It should also be possible to accurately cost the alternative schemes for comparison with the existing water supply and with the knowledge of what quantity and quality water can be anticipated from each alternative.

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Table 1. ANALYSIS OF WATER SAMPLES, GLADSTONE

Registered No.	771358 (before test)	771359 (after test)
pH	5.8	5.5
Conductivity	78 S	73 S
	<i>ppm</i>	<i>ppm</i>
CO <sub>3</sub>	nil	nil
HCO <sub>3</sub>	8	7
Cl	18	18
SO <sub>4</sub>	<5	<5
SiO <sub>2</sub>	8	9
Ca	1.4	1.4
Mg	1.8	1.8
Fe	2.5	1.6
Al	2.0	1.2
K	1.0	0.9
Na	17	17
TDS	63	58
Hardness (as CaCO <sub>3</sub> )	27	21
Alkalinity (as CaCO <sub>3</sub> )	6	5

Analysis by Department of Mines Laboratory, Launceston.