1977/48. Groundwater possibilities at the Trebilcock Rest Home, Carlton.

W.C. Cromer

The Department of Construction requested an examination of groundwater potential at the Trebilcock Rest Home [EN520540], which presently relies almost exclusively on rainwater for its domestic needs. Additional supplies are available from an existing bore on the property, but there is concern that reserves are insufficient for fire fighting purposes. The Home was visited on the 28 September and again on 12 October, when a survey was made, aimed at determining the pumping potential of the existing bore and the groundwater possibilities of the superficial unconsolidated sand which covers the site.

The Home extends over about 5 ha of gently undulating land, sloping to the south-west from a frontage on Carlton Road. Natural surface drainage is absent (or has been diverted), but a few ephemeral soaks and springs occur on adjacent properties.

GEOLOGY

The underlying basement rock in the area is Upper Parmeener non-marine sandstone and mudstone. Surface outcrops are rare and where they occur, the mudstone is often weathered to a yellow-brown clay containing friable rock fragments. Sandstone was exposed in a shallow trench near the sewage treatment plant at the southern end of the site and small patches of weathered mudstone occur in a small road cutting near the entrance of the Home. The basement rock in the Carlton area is covered by a variable thickness of coloured sand and sandy clay, most of which is probably derived directly from weathering of the underlying parent material. The sand may have been partially transported by aeolian processes. In places, the veneer of sand is less than one metre thick; in others, it is at least 7 m thick. The generalised sand sequence is known from mechanically augered holes at the Home itself and on the neighbouring properties to the west.

Top	- Grey-dark brown sandy loam - Dark brown-orange medium-grained quartz sand
Thickness variable; 1 m to at least 7 m	- Orange-yellow slightly clayey medium grained quartz sand - Pale yellow-buff slightly clayey quartz sand - Dark grey clayey fine-medium-grained quartz sand
Bottom	- Stiff blue-grey clay, or weathered quartz sandstone

The sand thickens to the west and south-west (where in places it is probably more than 10 m thick) and from a hydrological viewpoint, much of the water-bearing material lies outside the property boundaries in these directions.

AUGERING

Three mechanically augered holes were drilled on the western side of the property (where the sand is thickest). Two (holes 1 and 2) were sited within the boundary of the Home and the third (hole 3) was drilled on private land 50 m west of the western boundary, near the Carlton Road.

The logs were:

Hole 1; near Carlton Road, adjacent to western boundary fence.

Depth (m)	*Description*
0-0.2	grey sandy loam
0.2-4	brown and buff medium-grained slightly clayey quartz sand. Clay content increases slightly with depth.
4	Stiff grey-blue clay containing fragments of weathered mudstone (basement)

The hole was dry.

Hole 2; near western boundary fence, 150 m up slope from sewage treatment plant.

Depth (m)	*Description*
0-0.2	grey sandy loam
0.2-3	buff-brown medium-grained quartz sand
3-6	grey medium-fine-grained slightly clayey quartz sand

Water was struck at 3 m.

Hole 3; On adjacent private land, 75 m west of hole 1.

Depth (m)	*Description*
0-0.1	grey sandy loam
0.1-1	orange-brown medium-grained quartz sand
1-2	orange-yellow medium-grained quartz sand
2-3	cream medium-grained quartz sand
3-4	yellow-brown slightly clayey medium-grained quartz sand
4-7	buff-yellow slightly clayey quartz sand

Water was struck at 3.5 m.

GROUNDWATER IN THE UNCONSOLIDATED SAND

It is difficult to estimate the potential for obtaining water from the unconsolidated deposits within the boundaries of the Home, because of the extreme range in thickness of the sand and its rapid lateral lithological variation. The clay content of the saturated material also precludes the efficient withdrawal of water. It is evident from the augered holes that there are pockets of dry sediment adjacent to thicker deposits containing limited quantities of water and an extended augering programme is needed to delineate promising areas. Much of this augering would need to be done on private land bordering the western boundary of the Home, where conditions seem more favourable for successful spears. It is probable that small amounts of water (probably about 4-10 *l*/min) could be pumped from a spear installed in hole 2, but it is doubtful whether the supply would be continuous or useful. [Cromer (1974) reported on investigations carried out on Mr. E.J. Miller's property west of the Home, where a spear has been operating successfully for some years in unconsolidated sand.]

TEST ON EXISTING BORE AT THE HOME

Spears tap shallow groundwater in unconsolidated surface deposits; in contrast, deeper drilled (and cased) bores derive their supplies from groundwater stored in fractures in solid rock, physically separated(in this instance) from the overlying groundwater by a relatively impermeable clayey confining bed. The Department of Mines drilled two percussion boreholes in the area in 1964. Details are given in Table 1.

The standing water level in the Home bore was 18 m on 28 September and 14.6 m on October 12. The difference is probably due to pressure variations in the aquifer itself and to the effects of recent pumping. The water level in the Y.M.C.A. bore (182 m east and at the same topographic level) was 7.3 m on October 12.

A five hour pump test was conducted on the Home bore on October 12. The pump rate of 6-7 *l*/min (considerably less than its reported yield of 19 *l*/min soon after installation) produced a total drawdown of 6.0 m. Despite the low calculated transmissivity (3.1 m^2/day) of the aquifer, the remaining potential drawdown (20 m) indicates that the bore is capable of pumping 6-7 *l*/min continuously for extended periods (months). The reduced yield indicates that the bore (and probably the pump) is performing inefficiently; yield could probably be restored to near its initial value by surging and cleaning the hole, but the casing may have rusted beyond repair and need replacing. These remedial measures would require the use of a drilling rig and the economics of the exercise may indicate it is better to use the hole in its present condition. The bore is thus presently capable of supplying enough water for fire fighting purposes (water would need to be stored in reserve tanks), but the poor quality of the water limits its use to this purpose. No analysis has been made, but the water (and that of the neighbouring Y.M.C.A. bore) contains objectionable amounts of iron, which on contact with the air, rapidly oxidises and stains tanks and domestic facilities. The source of much of the iron may well be due to the deterioration of the bore casing itself. Despite the presence of the iron, the groundwater is saline and unfit for human consumption.

RECOMMENDATIONS

The existing bore should be utilised to its fullest extent. It is capable of supplying a low (6-7 *l*/min) yield for long periods. The yield may be improved by remedial measures, but these may be prohibitively expensive.

A second bore is not recommended at this stage unless the yield from the existing bore is considered too low for pumping to a storage tank for fire fighting purposes. (It would require weeks of pumping to fill a suitable tank). A second bore would probably be successful (on the basis of previous drilling) but its yield cannot be expected to exceed 20 *l*/min, and the groundwater quality would be unimproved.

The prospect of obtaining shallow groundwater in useful quantities from spears on the property is not favourable. Conditions are more promising west of the Home on private land, but additional augering (followed by spear testing) would need to be done to confirm this. Any such groundwater is likely to be of better quality than that from the bore and would be suitable for general domestic purposes. Over short periods, yields would also be higher than the existing bore. Any decision to investigate further the possibility of using spears should take into account the

necessity of acquiring adjacent private land to the west of the Home (and not necessarily that piece already suggested for purchase).

REFERENCE

CROMER, W.C. 1974. Groundwater investigations, Carlton. *Unpubl.Rep. Dep. Mines Tasm.* 1974/31.

[13 October 1977]

Table 1. DETAILS OF TREBILCOCK HOME AND YMCA BORES.

	Trebilcock Home bore	*YMCA bore*
Date drilled	November 1964	December 1963
Total depth (m)	40.8	38.1
Diameter (m)	0.125	0.125
Casing	Solid, 0-27 m	Solid, 0-6.1 m
Depth water struck (m)	10.7	16.6
Yield (*l*/min)	19	15-19
Water quality (ppm TDS)	1570	-
Geological log (depths in m)	0-6 sand; 6-11 clay and weathered sandstone; 11-40.8 sandstone.	0-5.5 sand; 5.5-38.1 sandstone.
Standing water level (m) September 1977	18	7.3