

1983/51. Groundwater prospects at Keenan's property, South Arm

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Abstract

Clayey sand and sandy clay at South Arm, which form part of a 10 m terrace level adjacent to South Arm Road, are unreliable sources of underground water.

The quantity and quality of water from shallow auger holes is generally poor while deeper bores in Permian mudstone show similar results.

No water was found in shallow auger holes at Keenan's property, South Arm, and a deeper water bore is not advised.

INTRODUCTION

A request for an investigation into groundwater prospects at a property at South Arm was received from R.A. Keenan. The property is located on the eastern side of South Arm Road, some 350 m north of Saltair Crescent [EN341368].

MORPHOLOGY

The property is located to the rear of the narrow coastal dunes, on the southern base of Jims Hill. The area to the east of South Arm Road is part of a distinct terrace level about 10 m above sea level. Keenan's property is located at the northern end of this terrace. The approximate boundary between the terrace and the more recently formed dunes and beach sand area is shown in Figure 1.

GEOLOGY AND HYDROLOGY

Previous investigations at Calvert's to the south and at Grubb's on the northern side of Jims Hill have shown that the sediments forming the 10 m terrace are mainly clay, sandy clay and clayey sand, considered by some workers as being typical of backswamp and lagoonal type deposits formed at the rear of developing beaches and sand dunes. It appears more likely that these deposits are older, formed at a time when sea level was higher during the Last Interglacial. A thin veneer of windblown sand covers the terrace to the south at Calvert's property.

Some groundwater is present in the lower sediments but due to the clayey nature of the sand, the permeability is low, resulting in an extraction problem when using spear bores. Calvert's dam to the south is believed to be partially fed by water from the clayey sediments. Tests indicate that this water has a salinity of about 2500 mg/l. Grubb's property has a similar topography and geology to Calvert's.

In summary the terrace has clayey sediments of low permeability, and contains minor quantities of moderately saline groundwater.

The Saltair Crescent area to the south has proved to be a more reliable area, as several residences have spear bores which provide reasonable quantities of good quality groundwater. This area has high permeability marine and windblown sands of suitable thickness to enable water extraction by spears. The approximate landward boundary of this area has been shown on Figure 1 and is evident on the ground as a fairly distinct break of slope.

AUGER HOLES

The most favourable location for an investigation auger hole appeared to be adjacent to South Arm Road, close to the marine and wind-blown sand area. Auger hole SA1 was drilled to a depth of six metres; the drill log is given in the Appendix 1. In summary the materials encountered were clayey sand to a depth of at least six metres. No water was struck in this hole. A further hole, SA2, adjacent to the neighbouring orchard produced identical results. It therefore appears that the sediments underlying Keenan's property do not contain any quantities of underground water which may be extracted by spear boring.

The results of drilling deeper bores in the South Arm area are not encouraging. Records show that bores in the Permian mudstone have produced poor quantities of poor quality water. A deeper water bore can therefore not be recommended, particularly since drilling is likely to be quite expensive.

CONCLUSIONS

Keenan's property is underlain by clay and sandy clay to a depth of at least six metres, forming part of a regional 10 metre terrace level. The terrace sediments have a variable clay content resulting in a low permeability. Underground water in the area is therefore variable in its occurrence, with poor quality and quantities common. No water was found in the investigation auger holes.

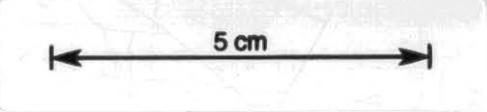
Mudstone and siltstone beds of Permian age probably occur at depth. Water bores in this rock type have generally produced poor quantities of poor quality water and therefore the drilling of a deep water bore is not recommended.

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Figure 1.



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borehole no. SA1
sheet 1 of 1

ENGINEERING LOG - BOREHOLE

project R.A. KEENAN	location SOUTH ARM ROAD, SOUTH ARM
co-ordinates EN341368	drill type TRIEFUS drill method AUGER
B.L. ≈ 12 m inclination 90° bearing	hole commenced hole completed drilled by M.T. logged by D.J.S. checked by

penetration 1 2 3	support water	notes samples, tests	metres R.L. depth	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	hand penetr- ometer kPa 25 100 200 400	structure, geology
			0		SM	SILTY SAND: Brownish black. Medium quartz sand.	D	L		
			1.0		SC	CLAYEY SAND: Bright yellowish brown-dull yellow-orange. 20%-30% fine-medium quartz sand.	M	L		
			2.0		CH	CLAY: Moderate plasticity, yellow-brown	M	St		
			3.0		SC	CLAYEY SAND-SANDY CLAY: Yellowish brown. Moderate plasticity clay and approx. 50% medium quartz sand.	M	L		
			4.0		SC	CLAYEY SAND: Dull yellow-brown. Medium quartz sand. Approx. 30% clay.	M	L		
			5.0		SC					
		END	6.0		SC					