

TR17.157-159

35. Groundwater prospects, Nine Mile Beach.

W.C. Cromer

A request for an investigation into the availability of underground water supplies on Lot 209, Dolphin Sands subdivision, Nine Mile Beach was made by Fowler, England and Newton, Consulting Engineers of Hobart. A caravan park with separate washing and toilet facilities is proposed for the site.

Nine Mile Beach is a large sand-spit with active dunes bordering the sea to the south and vegetation-tied dunes to the north where Lot 209 is situated. The spit was the subject of a groundwater survey conducted by the Department of Mines in 1968 (Stevenson, 1969). At that time, some thirty 4-inch holes were drilled to a maximum depth of 4 m at 800 m intervals along two parallel E-W lines. Water was struck at depths ranging from 0.6-4 m. Its quality varied considerably from 200 ppm of total dissolved solids at the centre of the spit, to a maximum 2000 ppm at the eastern end. Over most of the area however, qualities of 800 ppm or less can be expected.

SEISMIC SURVEY

Refraction seismic methods were used in the present survey. A single traverse with geophone spacing 3 m, designed to indicate the position of the water table, was laid in a low lying site bordering the road and between peg Nos. 208/209 and 209/210.

Results

At least two layers were indicated by the seismic results:

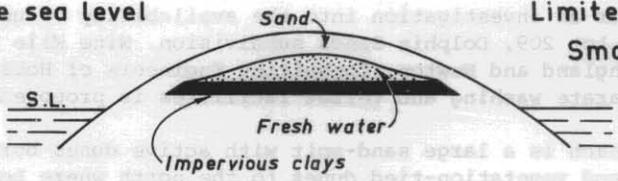
- (1) A top layer up to 2 m in thickness, with seismic velocities in the range 435-360 m/s, is indicative of dry sand becoming progressively wetter with depth.
- (2) A second layer at least 12 m in thickness with a seismic velocity of approximately 1600 m/s. Interpretation of this velocity is uncertain, as experience has shown that such a velocity may be indicative of clay, wet sand, or a mixture of both.

Because of this ambiguity in the seismic results, one of a number of possible geological conditions may exist. These are diagrammatically shown in Figure 40. In Figure 40a clay is present above sea level and a perched water table condition exists. Drawdown is limited, and only small water reserves may be available. A bore which penetrates the clay and passes below sea level will tap salt water. In situations such as in Figure 40a spear bores will probably meet with limited success and larger diameter excavations (e.g. wells, trenches) may be necessary. In the situation in Figure 40b reserves are larger but puncturing of the clay will result in sea water contamination.

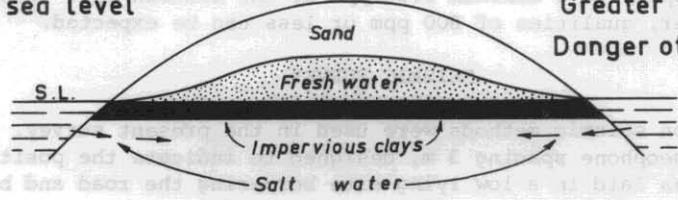
The conditions at Dolphin Sands are probably represented by possibilities (c) or (d) where clay is present below sea level. A fresh water lens is bounded by, or floats on, a body of salt water. The possibility of contamination is enhanced if excessive pumping of a bore occurs, as shown in Figure 40a, d. In both cases however, a bore will yield larger quantities of fresh water than in situations (a) and (b), as a greater thickness of water is intersected.

V.C. Cross

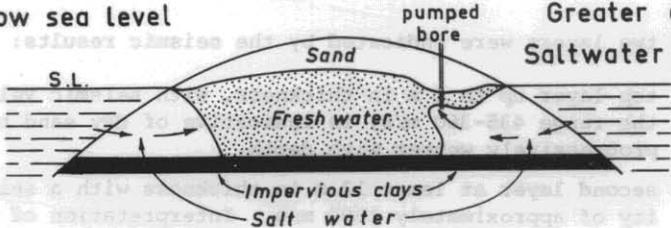
(a) Clay above sea level Limited drawdown Small reserves



(b) Clay at sea level Greater drawdown Danger of puncture



(c) Clay below sea level Greater drawdown Saltwater intrusion



(d) Clay below sea level Greater drawdown Saltwater intrusion

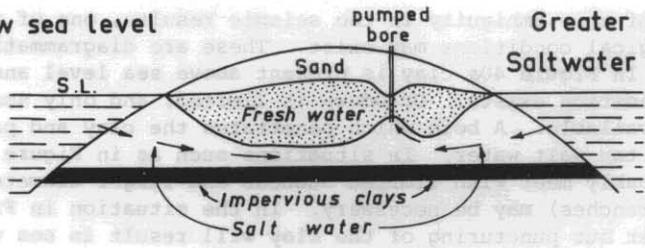


Figure 40. Possible water table conditions in coastal areas (diagrammatic).

DRILLING

The Department of Mines Gemco drilling rig fitted with hollow augering equipment was used to sink an exploratory bore on the property. The drilling site was placed some 3-4 m above sea level on slightly elevated land at the western end of the lot. The water table was intersected at 3 m and fresh water was present to a depth of at least 15 m. No salt water contamination was observed.

Drill hole log

<i>Depth (m)</i>	<i>Description</i>	<i>Water quality (ppm T.D.S.)</i>
0-3	Medium-grained buff coloured sand, becoming wetter with depth. Water table at 3 m.	350 at 3 m 560 at 8 m 530 at 10 m
3-15	Medium-coarse dark grey sand, containing shell fragments below 10 m.	525 at 11.5 m 420 at 13 m 380 at 15 m

CONCLUSIONS

The water may be extracted by either (or both) the following methods:

Drilling. The site may be drilled and a screen of appropriate slot size installed well below the summer water table level. The remainder of the hole should be cased. Yields of the order of 30-40 l/min can be expected.

Spear point. A spear point (or battery of spears each consisting of an appropriate screen attached via a riser pipe to a central suction pump) may be jettted or rammed to at least 3 m below the summer water table level. Yields of the order of 20-30 l/min/spear are possible. Any number of points may be used, preferably in a circular arrangement with about 10 m separating each.

It is unlikely that pumping by either method will result in salt water contamination.

REFERENCE

- STEVENSON, P.C. 1969. Groundwater prospects at Nine Mile Beach. *Unpubl. Rep. Dep. Mines Tasm.* 1969.