

UR 1974-63

Groundwater investigation, North West Bay Golf Club, Margate.

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A groundwater investigation of the North West Bay Golf Club was undertaken at the request of the club committee. The golf course [EN223385] is situated about 4 km south of Kingston on the Channel Highway on the southern slopes of Doctors Hill overlooking North West Bay (fig. 1).

The groundwater survey covered only the higher ground of the northern section of the golf course as it was only in this area that groundwater supplies would have any advantage over surface dams on Coffee Creek. No geological mapping was undertaken as the golf course area had been mapped in detail during a dam site investigation at Whitewater Creek (Moore, 1972).

Two E-W constant spaced resistivity traverses, 685 m in length with stations at 7.6 m intervals, were undertaken. A seismic traverse was undertaken along the northern C.S.R. traverse with a geophone spacing of 7.6 m. A N-S seismic spread was fired south of the above traverse with a geophone spacing of 15 m. The seismic investigation was followed by two resistivity probes of 365 m in an E-W and N-S direction along these seismic lines.

GEOLOGY

Although there are few exposures of rock on the course the area is known to be geologically complex. Most of the area is covered by superficial grey sands with a few silcrete boulders cropping out in the south-eastern section of the course. Basalt and Triassic sandstone crop out in the western tributary of Coffee Creek near the Channel Highway. Basalt also crops out further east in this tributary at Hazell's quarry and at the confluence of this western tributary with the main stream. South of this confluence basalt and silcrete crop out along Coffee Creek to the bridge on the Howden road. Sand and clay of Tertiary age crop out at the western abutment of the bridge. Along the Howden road between the Channel Highway and the bridge, a Tertiary valley has been located by geophysical exploration and confirmed by the drilling of the two Department of Mines bore holes, Howden 1 and 2. This valley is thought to pass beneath the golf course and was probably encountered in a bore drilled by Mono Pumps Ltd on Kievit's property about 600 m north of the golf course. This valley continues to the north to the col between Parks Hill and Doctors Hill and bifurcates near the upper dam site on Whitewater Creek.

GEOPHYSICAL WORK

The two constant spaced resistivity traverses located the Tertiary valley. The Tertiary sediments filling the valley produce a large resistivity anomaly compared with the Triassic rock into which the valley was originally cut.

The seismic velocity layers are present in all the spreads. An upper layer ($V_0 = 1220-1520$ m/s) of Tertiary sediments overlying a second layer ($V_1 = 2130-2740$ m/s) of Triassic sediments. The thickness of the Tertiary sediments in the valley is calculated to be 9-16 m for the E-W seismic traverse. The velocity inversion at the western end of this traverse indicates that the western edge of the valley is very steep.

The N-S seismic spread indicated that the Tertiary valley drained to the south although the calculated thickness of these sediments was only 9-12 m. It appears that the deepest section of the valley did not coincide with the direction and position of this spread. It is suspected that the valley

south of the northern E-W C.S. resistivity and seismic traverse swings to the south-east towards Coffee Creek as indicated by the offsetting to the east of the resistivity anomaly in the southern C.S.R. traverse.

The two resistivity probes indicate that most of the Tertiary valley sediments at this locality contain a very high percentage of clay and little sand. No thick sand horizons would appear likely to be encountered.

GEOHYDROLOGY

The presence of clay makes it unlikely that the Tertiary sediments in this part of the Tertiary valley system will contain large quantities of groundwater.

Kievit's bore is reported to have been drilled to 33.5 m with 6 m of clay underlain by clay and sandstone. The bore pumped 23 l/min with a draw-down of 18 m. The duration of pumping is not known. The water quality was very poor (dissolved salt content, 4510 ppm of which 80% is common salt).

In Howden Bore 1 the water quality was very good (120 ppm of dissolved salts) and the water table was at the ground surface; this was a diamond drill hole and could not be pump tested. At this bore a lens of fresh water probably overlies salt water which has infiltrated from North West Bay.

The predominance of clay in the Tertiary valley beneath the golf course indicates a groundwater situation similar to that in the Kievit's bore rather than that in the Howden bores. Clay was dominant in the Tertiary sediments of the Howden bores although several thick horizons of sands were encountered.

RECOMMENDATIONS

By correlating the geophysical evidence with that of the bore holes in the area it appears unlikely that any bores drilled at the golf course will give yields of more than 23 l/min. The quality of the groundwater is also likely to be poor. It would be impracticable to obtain the amount of water required by the golf club from such low yielding bores. The committee should investigate the flow of Coffee Creek and any possible dam sites on this stream. Because of the complex nature of the geology of the area any proposed dam site would require a site investigation, including drilling.

REFERENCES

LEAMAN, D.E. 1973. Geological atlas 1:50 000 series. Sheet 82 (8312S) Hobart. Department of Mines, Tasmania.
MOORE, W.R. 1972. Whitewater Creek dam sites and the buried Tertiary channels of the Kingston area. Unpubl.Rep.Dep.Mines Tasm.

[12 August 1974]

Parks Hill

Kievit's Bore

Doctors Hill

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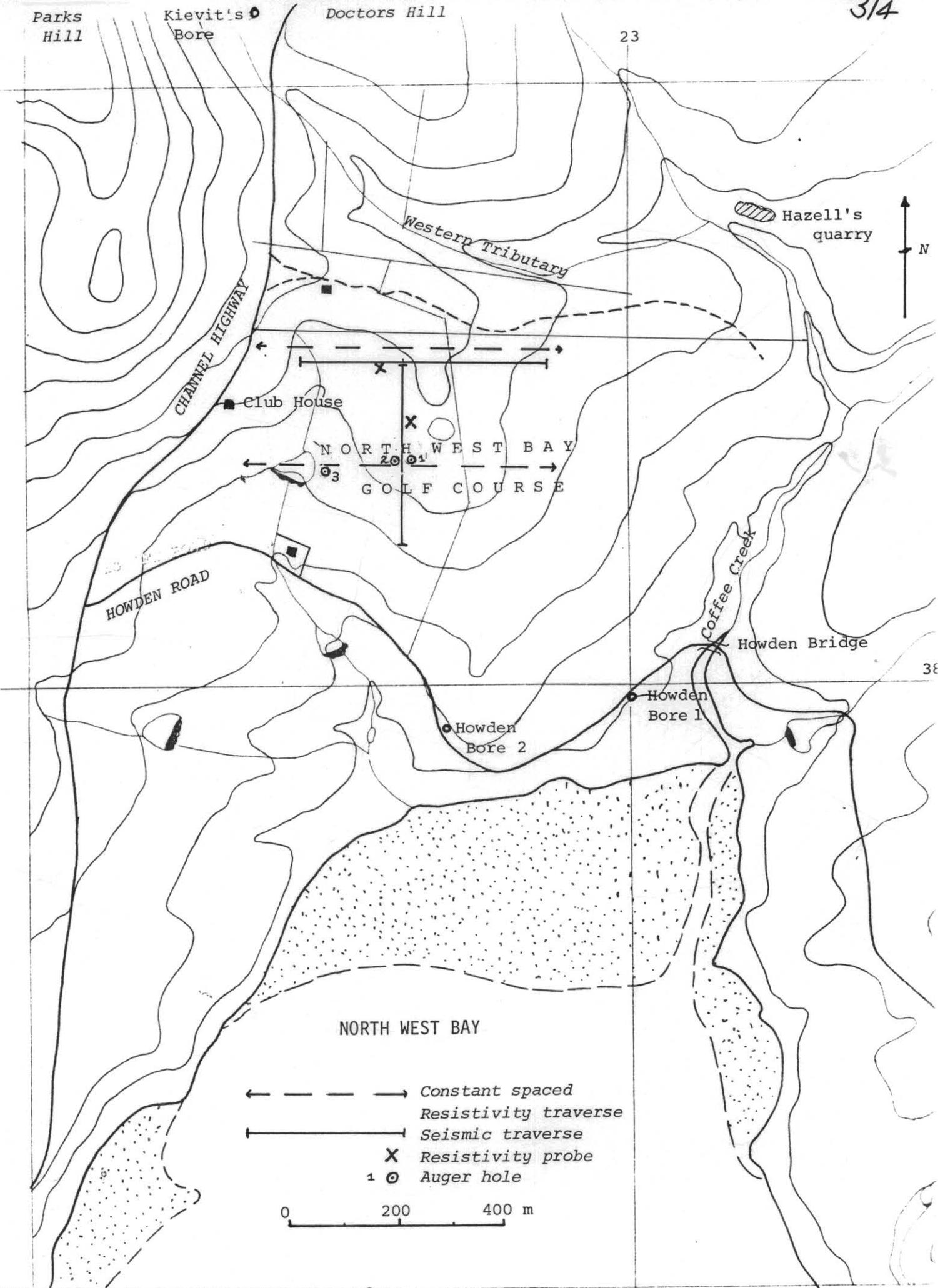
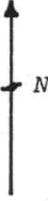
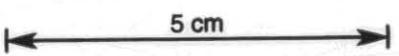


Figure 1. Groundwater investigation, North West Bay Golf Course.



APPENDIX 1

Results of auger holes and water analysis.

Three auger holes were drilled at the golf course on 5-6 November 1974 to test some new equipment and as a further stage in the groundwater investigation. The holes were drilled to confirm the presence of the Tertiary sediments indicated by the previous geophysical investigation and to obtain a sample of the groundwater.

The location of these auger holes is shown in Figure 1. Holes 1 and 2 were drilled on the western flank of the N-S spur close to the intersection of the constant spaced resistivity traverse and the N-S seismic spread. Hole 1 was drilled to a depth of 5.4 m in orange and grey Tertiary clay containing ironstone fragments. At 5.4 m hard rock (ironstone?) was encountered and the drill could not penetrate further. Hole 2 was drilled further down the slope but close to Hole 1. It reached 7.6 m after passing through similar clay and could not penetrate further. The water table was not reached in either of these holes although Hole 2 was left open overnight and made some water.

Hole 3 was drilled near the valley floor to a depth of 11 m. In this hole 9 m of clay similar to that in Holes 1 and 2 were encountered overlying one metre of clay and sandy, which overlay deeply weathered Permian siltstone. The hole was pumped at 30 l/m (minimum throttle) and the water level fell from one metre to 6.5 m (the maximum lifting capacity of the pump) within 10 minutes. Recovery was rapid, the water level returning to 3 m within the time taken to withdraw the pump (c. 35 s). With more suitable pumping equipment it is probable that this bore would yield 15-23 l/m and if the hole was drilled into the Permian siltstone below to a depth of 30 m its capacity could be increased possibly to 75-100 l/m.

The chemical analysis of the water sample is given in Table 1. With 510 mg/l of dissolved solids the groundwater is suitable for irrigation of pasture although the high iron content (6.5 mg/l) could be expected to cause problems with the irrigation equipment due to precipitation.

Table 1. ANALYSIS OF GROUNDWATER FROM HOLE 3, NORTH WEST BAY GOLF CLUB

	mg/l		mg/l
pH	4.8	Fe	6.5
CO ₃	nil	Al	1.0
HCO ₃	-	K	6.6
Cl	-	Na	38
SO ₄	-	Total dissolved solids	510
SiO ₂	15	Hardness (as CaCO ₃)	90
Ca	8		
Mg	17		

The sample (Reg. No. 742646) was too small for further determinations. T.D.S. includes some filtrate solids.

Analyst: Department of Mines Laboratories, Launceston.

[2 January 1975]