UR1984_05

# Groundwater prospects at Ocean Drive, Beaumaris

*D.J. Sloane*

*Abstract*

A narrow coastal sand and shingle body in the Scamander-Beaumaris area contains useful supplies of good quality groundwater. Quantities obtained are generally suitable for domestic purposes. A small escarpment defines the western margin of the sand body at Beaumaris. A useful domestic supply has been obtained from a spear bore on the escarpment slope. No suitable quantities have been found to the west where a terrace level is underlain by clayey Tertiary sediments. The topography of the area is a useful indicator of the success of spear bores.

## INTRODUCTION

A request for a groundwater investigation at 27 Ocean Drive, Beaumaris [FQ064137] was made by Mr W. Mitchell. A domestic spear bore water supply is required for a proposed residence. The adjoining property has a suitable supply of good quality groundwater.

## TOPOGRAPHY

The area under investigation is located on a small escarpment to the west of the Tasman Highway. Seaward of this sloping region, in the area of the Highway itself, and backing on to the beach and dune area is a low lying depression approximately six metres above sea level. The depression extends to the rear of the single frontal dune ridge which backs the present beach. To the west the escarpment rises to an undulating plateau, approximately 30 m above sea level.

## GEOLOGY

The Holocene coastal sand body in the Beaumaris Beach area is narrow and elongate, and is about 300 m wide. A thin veneer of windblown sand covers marine sands with shingle layers. Windblown sand forms a single dune ridge at the rear of the present beach. A major shingle horizon appears to be present about four to five metres below the ground surface near the Highway. The terrace to the west is underlain by Tertiary clay, gravel and sand (Groves *et al.*, 1977). Hillslopes inland from this terrace have exposures of Mathinna Beds, predominantly mudstone and quartzwacke. The terrace may be erosional in nature, accordant in height with similar terrace levels at St Helens. At Beaumaris the terrace may have a rock core, as drill refusal occurs at about six metres from the ground surface. In some areas a thin veneer of windblown sand laps on to the terrace.

## RESULTS OF INVESTIGATIONS

Two shallow investigation holes were drilled with a Triefus trailer-mounted auger drill. Auger logs are presented in Appendix 1. Hole BM1 encountered predominantly clayey sand with drill refusal on bedrock(?) at a depth of 4.5 metres. Due to the clayey nature of the sediments and a measured standing water level of 3.2 m from the ground surface, groundwater extraction by spear bore was not considered feasible. The sand in hole BM2 was much cleaner and extended to a depth of 5.5 m with a standing water level at 2.8 m after drilling. The presence of 2.7 m of saturated sand

indicated that a spear should be installed and pump tested. After a 50 mm diameter, 600 mm long, 0.04 mm stainless steel screen was jetted into the auger hole, pump testing gave a yield of about 5 *l*/min (70 gal/hr) of good tasting water. Testing with a field conductivity meter gave a Total Dissolved Salts reading of 200 mg/*l*. Laboratory analysis of bore water from the adjacent allotment, about 20 m to the east, shows that the water has a low hardness and is predominantly a sodium chloride type with a TDS of 260 mg/*l*.

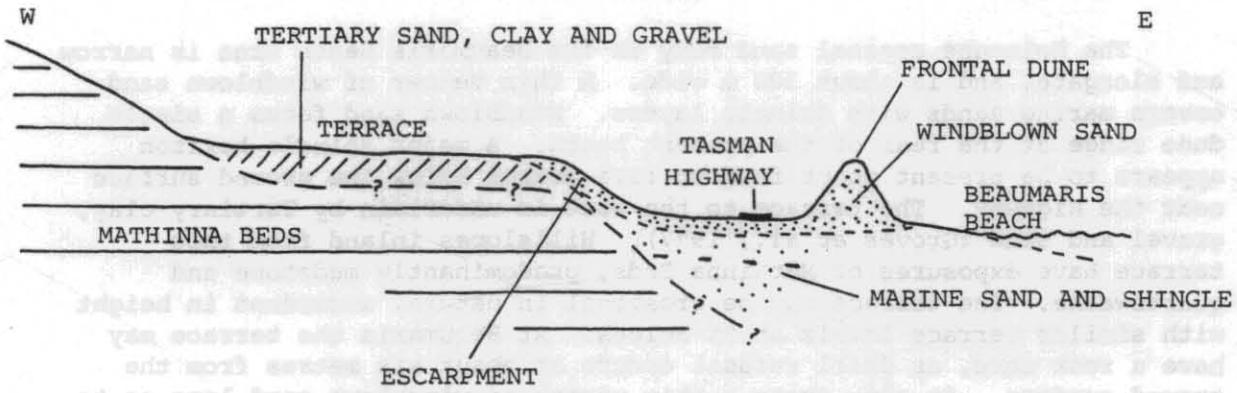
## CONCLUSIONS

Close to the eastern boundary of the Mitchell property, 5.5 m of medium to fine-grained quartz sand overlies bedrock(?). At the time of investigation, the water table was 2.8 m from the ground surface and 2.7 m of saturated sand yielded 5 *l*/min of good quality groundwater from a 0.04 mm stainless steel screen, 600 mm long and 50 mm in diameter. The groundwater is considered suitable for a domestic supply. A water sample should be submitted to the Department of Health for bacteriological examination.

## REFERENCE

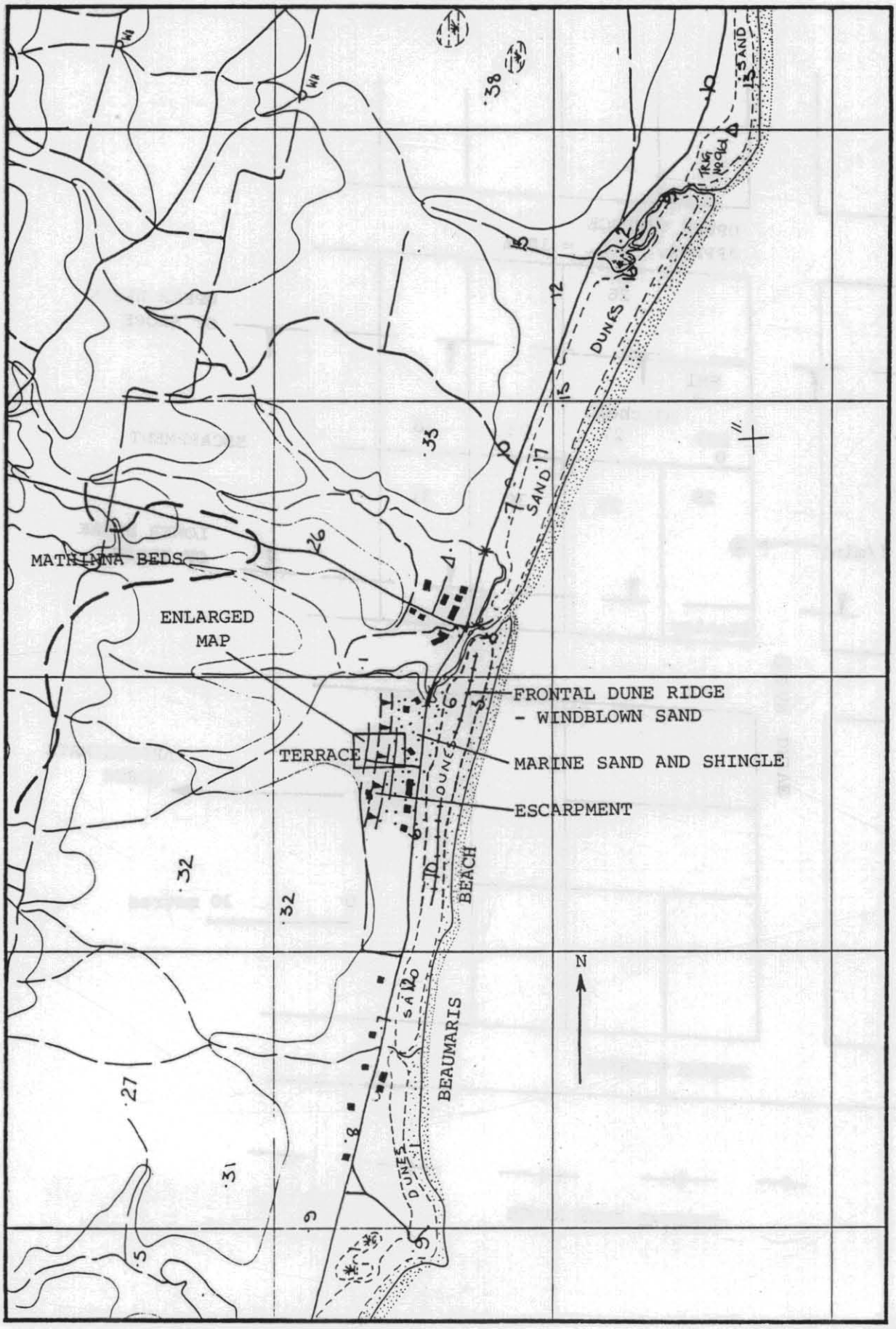
GROVES, D.I.; COCKER, J.D.; JENNINGS, D.J. 1977. The Blue Tier Batholith. *Bull.geol.Surv.Tasm.* 55.

[6 January 1984]

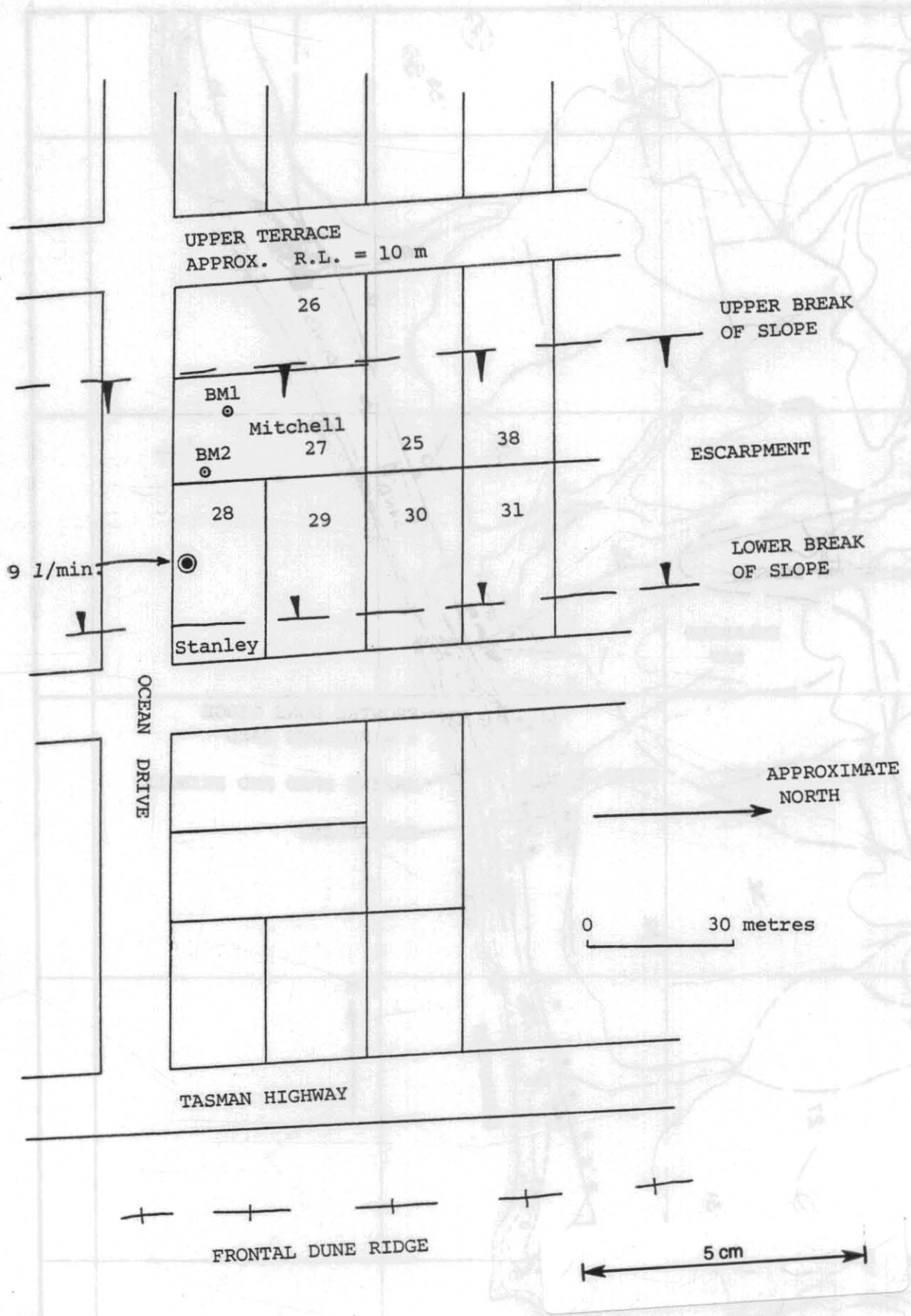



DIAGRAMMATIC CROSS-SECTION OF COASTAL SAND BODY

NOT TO SCALE




*Location map and morphology, Beaumaris*

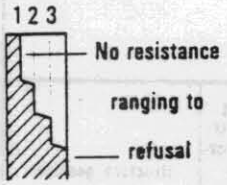

UPPER TERRACE
APPROX. R.L. = 10 m
26
UPPER BREAK
OF SLOPE
BM1
Mitchell
BM2
27
25
38
ESCARPMENT
28
29
30
31
9 l/min
LOWER BREAK
OF SLOPE
Stanley
OCEAN DRIVE
APPROXIMATE
NORTH
0
30 metres
TASMAN HIGHWAY
FRONTAL DUNE RIDGE
5 cm

TASMANIA DEPARTMENT OF MINES

# EXPLANATION SHEET FOR ENGINEERING LOGS

## Borehole and excavation log

### Penetration




### Water

22 Jan, 80 Water level on date shown.

Water inflow.

Water outflow.

### Notes - samples and tests

| | |
|---|---|
| U50 | Undisturbed sample 50mm diameter. |
| D | Disturbed sample. |
| N | Standard penetrometer blow count for 300mm. |
| N* | SPT + sample. |

### Material classification

Based on Unified Soil Classification System.

In Graphic Log materials are represented by clear contrasting symbols consistent for each project.

### Moisture content

| | |
|---|---|
| D | Dry, looks and feel dry. |
| M | Moist, no free water on hand when remoulding. |
| W | Wet, free water on hand when remoulding. |
| LL | Liquid limit. |
| PL | Plastic limit. |
| PI | Plasticity Index. |

eg. M > PL – Moist, moisture content greater than the plastic limit.

### Consistency

| | | hand penetrometer (kPa) |
|---|---|---|
| VS | Very soft. | < 25 |
| S | Soft. | 25 - 50 |
| F | Firm. | 50 - 100 |
| St | Stiff. | 100 - 200 |
| VSt | Very stiff. | 200 - 400 |
| H | Hard. | > 400 |
| Fb | Friable. | |

Notes: X on log is test result

— is range of results.

### Density index

| | | % |
|---|---|---|
| VL | Very loose. | 0 - 15 |
| L | Loose. | 15 - 35 |
| MD | Medium dense. | 35 - 65 |
| D | Dense. | 65 - 85 |
| VD | Very Dense | 85 - 100 |

## Cored borehole log

### Case - lift

Casing used.

Barrel withdrawn.

### Fluid loss

No loss

50% loss

100% loss.

### Lugeons

Lugeon units (μL) are a measure of rock mass permeability. For a 46 to 74mm diameter borehole 1 Lugeon is defined as a rate of loss of 1 litre per metre per minute. 1 Lugeon is roughly equivalent to a permeability of $1 \times 10^{-4}$ mm/sec.

### Graphic log

No core.

Rock substances represented by clear, contrasting symbols consistent for each project.

### Weathering

| | |
|---|---|
| Fr | Fresh. |
| SW | Slightly weathered. |
| HW | Highly weathered. |
| EW | Extremely weathered. |

### Strength

| | | point load strength index $I_{s(50)}$ (MPa) |
|---|---|---|
| EL | Extremely low. | < 0·03 |
| VL | Very low. | 0·03 - 0·1 |
| L | Low. | 0·1 - 0·3 |
| M | Medium. | 0·3 - 1 |
| H | High | 1 - 3 |
| VH | Very high. | 3 - 10 |
| EH | Extremely high. | >10 |

Note: X on log is test result.

### Significant defects

Significant defects shown graphically.

Joint.

Sheared zone.

Crushed seam.

Infill seam.

Extremely weathered seam.

6/7

TASMANIA DEPARTMENT OF MINES

# ENGINEERING LOG – BOREHOLE

borehole no. BM1
sheet 1 of 1

project MITCHELL — location BEAUMARIS – 27 OCEAN DRIVE

co-ordinates
R.L. ≈ 8m
inclination 90°
bearing

drill type TRIEFUS
drill method AUGER SCREW
drill fluid

hole commenced 12/12
hole completed 12/12
drilled by BC
logged by DJS
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 penetrometer kPa (25 50 100 200 400) | structure, geology |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | | SW | SAND: Medium-fine quartz sand. Bright yellowish brown. Some clay layers or lenses? Occasional ironstone particles to 5cm dia. Organic enriched upper 0.2m | M | L | | |
| | | | | 1 | | SC | CLAYEY SAND: Dull yellow orange medium quartz sand. Approx 30% clay. | M | L | | |
| | | | | 2 | | SW | SAND: Medium-fine quartz sand. Light grey. Some quartzite pebbles to 1cm dia. well rounded, moderate sphericity. | M | L | | |
| | | ▼ | SWL 12/12 | 3 | | SC | CLAYEY SAND: Fine-medium quartz sand. Light grey. Approx 20% clay. | W | VS | | |
| | | | | 4 | | SC | CLAYEY SAND: Fine-medium quartz sand Light grey. Approx 40% clay. Some well rounded, moderate sphericity quartzite pebbles to 1cm diameter. | W | S | | |
| | | | REFUSAL | | ? | | | | | | |
| | | | | 5 | | | | | | | |



5 cm

TASMANIA DEPARTMENT OF MINES

# ENGINEERING LOG – BOREHOLE

borehole no. BM 2
sheet 1 of 1

project MITCHELL — location BEAUMARIS – 27 OCEAN DRIVE

co-ordinates
R.L ≈ 8m
inclination 90°
bearing

drill type TRIEFUS
drill method AUGER SCREW
drill fluid

hole commenced 12/12
hole completed 12/12
drilled by BC
logged by DJS
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 penetrometer kPa (25 50 100 200 400) | structure, geology |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | | SW | SAND: Fine quartz particles. Light grey. Dark grey brown organically enriched topsoil to 0.2m | D | L | | A1 SOIL HORIZON |
| | | | | 1 | | | | M | L | | A2 SOIL HORIZON |
| | | | | | | SW | SAND: Fine – medium grained. Dull yellowish brown. Some brown mottles and iron cementation | M | L | | B2 SOIL HORIZON |
| | | | SWL 12/12 | 2 | | | | | | | |
| | | | | 3 | | SW | SAND: Dull yellow brown fine – medium grained quartz sand | M | L | | |
| | 0.04mm SCREEN | | | 4 | | | | | | | |
| | | | REFUSAL | 5 | | | | | | | |
| | | | | | ? | | | | | | |
| | | | | 6 | | | | | | | |



5 cm