UR1981-51

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1981/51. Further drilling for groundwater, Mt William National Park

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Abstract

A further six shallow holes were drilled in the Mt William National Park to test groundwater prospects at campsites. One production spear bore was installed and pump tested at each of four campsites to provide water for campers. Water from each of these bores was sampled and analysed.

INTRODUCTION

Following the recommendations of an earlier investigation in April, 1981 (Moore, 1981), a further three days (6-9 October, 1981) were spent completing the groundwater investigation of the coastal sands in the Mount William National Park. During this time a further six exploration holes were drilled (fig. 1). Two holes were drilled at the Stumpys Bay Campsite area in the northern section of the park, with the remaining four in the southern coastal section of the park between the Picnic Rocks and Eddystone Point Campsites.

As well as the exploration drilling, four production spear bores were installed with the help of the Park Rangers, Messrs Harmon and Le Fevre. This completes the project, with water now available at each of the campsites and with the park staff now capable of installing any further spears which may be required.

INVESTIGATION DRILLING

Stumpys Bay Campsite; Holes 9 and 10

As recommended at the end of the previous investigation (Moore, 1981), two further holes were drilled at this campsite (fig. 1). These holes were drilled on the same east-west longitudinal dune that the original hole (Hole 7) was drilled. It was suspected that the low yield of Hole 7 was due to the thinness of the coastal sand aquifer at this locality, with the groundwater draining rapidly to the sea by way of the narrow coastal beach.

Hole 9 was sited on the coastal side of the swamp formed from the old coastal lagoon behind the existing beach. In this hole the sand aquifer was four metres thick below the water table. Hole 10 was on the eastern margin of the swamp at the base of the dune 100 m inland from Hole 7. The thickness of the sand below the water table was seven metres. The lithological logs of these holes are shown in Appendix 1. In both of these holes the aquifer is thicker than the 1.7 m encountered in Hole 7. As well as having a greater aquifer thickness, the water quality of Holes 9 and 10 was better than that in Hole 7, with conductivity measured at 650 µS/cm and 100 µS/cm respectively, compared with 800 µS/cm for Hole 7.

Because of its greater aquifer thickness and better water quality, only Hole 10 was pump tested, being pumped for two hours at 18 *l*/min with a drawdown of less than one metre. The water level recovered fully in less than ten minutes.

Picnic Rocks Campsite; Holes 13 and 14

Two further exploration holes were drilled in the vicinity of the

northern campsite and north of the small bridge between the sites (fig. 1). The coastal sand above the granite in both these holes was too thin to allow the accumulation of any worthwhile supplies of groundwater. The water quality appeared suitable from conductivity testing, giving values of 600 µS/cm for Hole 13 and 300 µS/cm for Hole 14.

Eddystone Point Campsite; Holes 11 and 12

Hole 12 was sited on Eddystone Road and encountered 9.8 m of sand above granite, with the water table at 3.7 m. The groundwater in this hole was a dark brown colour and brackish, with a strong odour. The water was so unsuitable no sample was collected.

Hole 11 was drilled one kilometre south of Eddystone Road at the foot of the coastal dunes, close to two coastal lagoons (fig. 1). The sand was 4.5 m thick with the water table at 0.5 m depth. The water quality was good, giving a conductivity value of 280 µS/cm. The clarity was reasonable.

The water was of a suitable quality and the hole appeared to have the potential for a production bore, but it was not pump tested as public access to this section of the park was not considered desirable by the rangers at this stage of development of the National Park. If the production bore at Deep Creek Campsite was found to be incapable of supplying the campers at Eddystone Point as well as Deep Creek, the park staff could install a production bore at this site at a later date.

PRODUCTION BORES

Four production bores were installed at the Musselroe, Stumpys Bay, Boulder Point, and Deep Creek Campsites. These spear bores were installed in holes augered to the basal clay or rock, with the spears installed by hand bailing 100 mm plastic casing to this level. A 50 mm PVC spear and connecting pipe were installed inside the casing and then gravel packed for the entire depth of the casing. The casing was then withdrawn and the spear was pumped until the water clarified and sediment reduced to acceptable limits. The water from Hole 10 took the longest to clarify, being pumped for over two hours.

The spears were of 50 mm PVC pipe, 1.5 m in length, and with five rows of 12 mm holes drilled at regular intervals. Overlying the pipe was a layer of fine fibreglass mesh. A plastic cap covered the base of the spear.

Hole 8 was pumped for approximately 120 minutes at 25-27 *l*/min; Hole 10 at 18-20 *l*/min for 165 minutes; Hole 6 at 11-12 *l*/min for 90 minutes; and Hole 3 at 9-10 *l*/min for 60 minutes. Water samples were collected and analysed (Appendix 2).

REFERENCE

MOORE, W.R. 1981. Groundwater investigation, Mount William National Park, north-east Tasmania. *Unpubl.Rep.Dep.Mines Tasm.* 1981/30.

[11 November 1981]

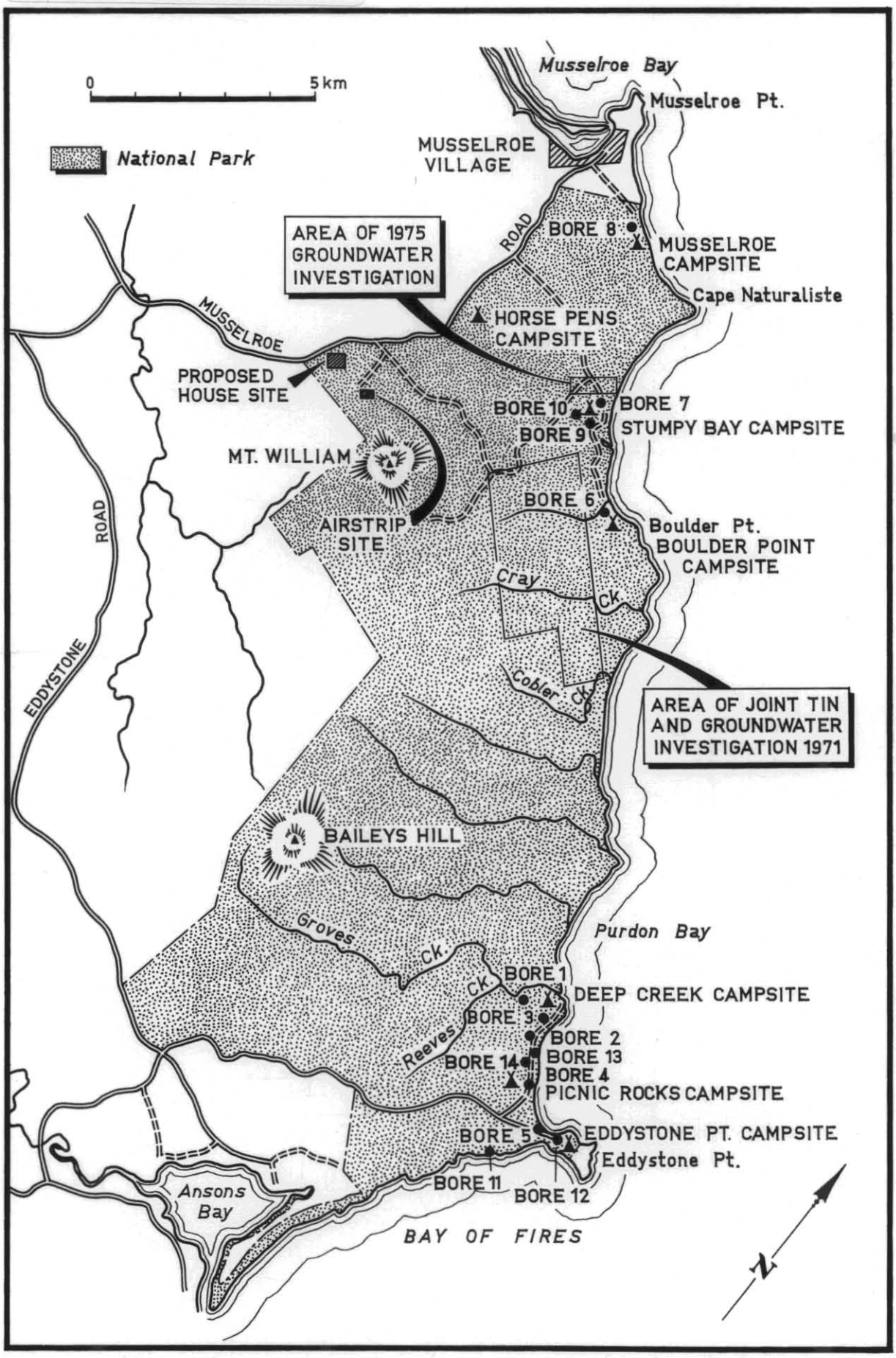

Figure 1. *Location of investigations, Mt William National Park.*

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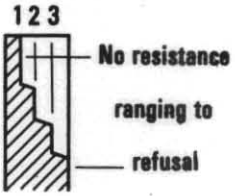
EXPLANATION SHEET FOR ENGINEERING LOGS

Borehole and excavation log

Penetration



Water

Notes - samples and tests

U50	Undistributed 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

Fluid 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 1×10^{-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.

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5 cm

borehole no. 9

sheet 1 of 1

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ENGINEERING LOG – BOREHOLE

project: Groundwater investigation, Mount William National Park

location: Stumpys Bay Campsite, SE of track at edge of swamp

co-ordinates: FQ025746

R.L.: Approx. 4m A.S.L.

inclination: Vertical

bearing: --

drill type: Triefus

drill method: Auger

drill fluid: Nil

hole commenced: 6.10.81

hole completed: 6.10.81

drilled by: M. Triffitt

logged by: W.R.M.

checked by: R.C.D.

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
						CH CO	Organic clay with some sand, (10%). Clay, dark grey, high plasticity. Sand fine, well sorted, poorly graded	M	SF		Lagoonal clay
				1		CH	Sandy clay, clay, brown, high plasticity. Moisture greater than plastic limit. Sand very fine grey. Well sorted.	M	SF		Sandy clay
				2		SP	Fine sand with trace of clay, <5%. Sand dark grey, well sorted, poorly graded. Clay, thin beds, black. Low plasticity. Organic				Fine sand
	None			3			No recovery in this section as augers washed clean. Suspected to be as above.				No recovery
				4							
				5							
				6		CL	Clay, grey micaceous, low plasticity Hole stopped. Micaceous clay is above granite and no water.	F	F		Micaceous clay

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5 cm

ENGINEERING LOG – BOREHOLE

borehole no. 10

sheet 1 of 1

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Groundwater investigation — Stumpys Bay Campsite

project Mount William National Park — location At base of dune below track

co-ordinates FQ023746 — drill type Triefus — hole commenced 6.10.81

drill method Auger — hole completed 6.10.81

R.L. Approx. 5 m A.S.L. — drilled by M. Triffitt

inclination Vertical — drill fluid None — logged by W.R.M.

bearing -- — checked by R.C.D.

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
						SP	Fine sand with some clay. Sand black organic, well sorted poorly graded clay >5%; black low plasticity	M	SF		Surface beach sand
				1		SP	Med.-fine sand with trace of clay. Sand brown, quartz well sorted poorly graded. Clay % almost nil.	M	SF		Medium to fine sand
				2		SP	Fine sand, light brown-fawn, poorly graded, well sorted - dilates. No clay.	W	S		Fine sand
							Fine sand with some silt. Sand black, well sorted - dilates.				
				3		SP	Fine sand grey, well sorted, poorly graded. No clay present. Black organic sand layers		S		Fine sand
				4			*No core recovered.* Augers washed clean. Sand appears to change from fine to medium grain size.				
				5							No core recovered
				6							
				7							
				8							
						Cl	Clay with gravel. Clay micaceous low plasticity. Quartz, angular grains. Drilled to refusal.	M	S		Deeply weathered granite.

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5 cm

ENGINEERING LOG – BOREHOLE

borehole no. 11

sheet 1 of 1

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project Groundwater investigation, Mount William National Park

location 1 km south of Eddystone Road on landward side of coastal dunes.

co-ordinates FQ118606

R.L. Approx. 2 m A.S.L.

inclination Vertical

bearing --

drill type Triefus

drill method Auger

drill fluid None

hole commenced 6.10.81

hole completed 6.10.81

drilled by M. Triffitt

logged by W.R.M.

checked by R.C.D.

penetration 1 2 3	support	water	notes samples, tests	metres R.L	metres 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
							SP	Silty sand, silt 20%. Sand dark grey fine, poorly graded, well sorted. Silt dark grey.	M	SF		Dune sand
	None				1		SP	Medium to fine sand. Sand, grey, well sorted, poorly graded, quartzose, fine-grained. [Samples not continuous as much of the material washed off the augers as each flight pulled. Recovery sufficient to indicate sand throughout and no clay present].				Beach sand
					2							
					3							
					4							
					5	+ + + + + +		Drill stopped at refusal.				Presumed granite

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5 cm

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borehole no. 12

sheet 1 of 1

ENGINEERING LOG – BOREHOLE

project Groundwater investigation Mount William National Park

location Eddystone Road, Close to park boundary

co-ordinates FQ123610

R.L. 10 m A.S.L. (Approx.)

inclination Vertical

bearing --

drill type Triefus

drill method Auger

drill fluid None

hole commenced 6.10.81

hole completed 6.10.81

drilled by M. Triffitt

logged by W.R.M.

checked by R.C.D.

penetration 1 2 3	support	water	notes samples, tests	metres R.L.	metres 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
	None				1		SP	Fine sand, light grey and white. Well sorted, poorly graded, quartz.	D	L		Windblown dune sand
					2							
					3		SP	Medium to fine sand, grey massive, well sorted, poorly graded.	D-M	L		Dune sand
					4		SP	Medium to fine sand with some silt. Sand dark grey-black, well sorted poorly graded. Silt black, organic. Core recovery very poor. Samples washed off augers. Water, brackish.	M	L		Dark grey sand with thin bands of black organic silt.
					5							
					6							
					7							No core recovered.
					8							
					9							
				9.8		++		Drilled to refusal				Granite

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ENGINEERING LOG – BOREHOLE

borehole no. 13 9/11

sheet 1 of 1

project	Groundwater investigation Mount William National Park	location	Picnic Rocks. North campsite Draped sand, north side of granite knol		
co-ordinates	FQ110620	drill type	Triefus	hole commenced	8.10.81
		drill method	Auger	hole completed	8.10.81
R.L.	3 m A.S.L.			drilled by	B. Cox
inclination	Vertical	drill fluid	None	logged by	W.R.M.
bearing	--			checked by	R.C.D.

penetration 1 2 3	support	water	notes samples, tests	metres R.L	metres 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
					1		SP	Medium to fine sand. Sand grey, well sorted, poorly graded.	M	L		Beach sand
					2							
					3		CL	Clay with gravel. Clay, green micaceous, low plasticity. Gravel, angular quartz.	M	S ↓ F		Micaceous clay and weathered granite.
					4							
					5			Drilled to refusal				Presumed granite.

5 cm

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ENGINEERING LOG – BOREHOLE

borehole no. 14

sheet 1 of 1

10/11

project Groundwater investigation, Mount William National Park

location Track to Picnic Rocks Campsite, north of small stream.

co-ordinates FQ109617

R.L. Approx. 6 m A.S.L.

inclination Vertical

bearing --

drill type Triefus

drill method Auger

drill fluid None

hole commenced 8.10.81

hole completed 8.10.81

drilled by B. Cox

logged by W.R.M.

checked by R.C.D.

penetration 1 2 3	support	water	notes samples, tests	metres R.L.	metres 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
					1		SP	Fine sand. Dark grey with organic material, well sorted, poorly graded.	M	SF		Beach sand
					2		GW + SP	Fine gravel with fine sand. Gravel round, quartz. Sand fine, grey, well sorted.	W	D		Gravel Presumed granite
								Drilled to refusal.				

5 cm

APPENDIX 2

Chemical analyses of groundwater, Mount William National Park

Spear No.	3	6	8	10
Location	Deep Creek	Boulder Point	Musselroe	Stumpys Bay
Registered No.	814183	814184	814185	814186
pH	5.2	5.2	6.1	5.5
Conductivity (µS/cm)	440	380	530	230
Item (mg/*l*)				
CO_3	Nil	Nil	Nil	Nil
HCO_3	7.5	6.8	93	12
Cl	145	120	135	68
SO_4	6	12	17	<5
SiO_2	7.2	8.2	12	11
Ca	6.4	4.9	30	2.8
Mg	8.1	9.2	9.4	4.8
Fe	<0.1	<0.1	<0.1	<0.1
Al	<0.2	<0.2	<0.2	<0.2
K	2.5	2.3	4.6	2.7
Na	80	66	86	39
TDS	350	300	380	160
Permanent hardness	43	45	38	17
Temporary hardness	6.1	5.6	76	10
Alkalinity (as $CaCO_3$)	6.1	5.6	76	10
Sample date	9.10.81	9.10.81	9.10.81	9.10.81