

UR1981-09

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1981/9. Foundation conditions at the Matpine sawmill, Exeter.

D.J. Sloane

Abstract

A level area to the east of the Matpine sawmill, Exeter, is underlain by up to six metres of Quaternary alluvial quartz sand (SW), clayey sand (SC), and sandy clay (CL). The water-table is present at a depth of 1.2 m and saturated clayey sand extends to a depth of about three metres.

Foundation problems may occur due to the loading of this area by a proposed 311 t 'Olivine' rock furnace.

INTRODUCTION

At a request from Matpine Pty Ltd of Frankford Highway, Exeter, foundation investigations were conducted on an area adjacent to an existing wood kiln and workshop [DQ949278]. The company proposes to build an 'Olivine' furnace and particulate bed heat regenerator system based on a foundation slab of reinforced concrete, some 12 m by 6 m, to take a total load of 311 t.

An area suitable for the location of the system was outlined by the company and after a preliminary site inspection it was decided to drill several shallow auger holes to determine the nature of the underlying materials, and to see if rock was present at shallow depth. The area was thought to be underlain, in part, by waste wood and sawdust from an old sawmill and it was required to know the depth of such material if present.

A series of six shallow auger holes were drilled to depths of between four and six metres by a Triefus trailer mounted drill. Vane shear and penetrometer testing was not undertaken due to the unconsolidated and water saturated nature of the underlying sandy sediments. Undisturbed drive tube samples were also unable to be obtained. Disturbed samples were taken by the 'auger-pull' method with auger runs of one metre.

TOPOGRAPHY

The sawmill is sited on a gently undulating terrace area. The proposed construction site has been levelled slightly and slopes down to the east to a low lying swampy area some four metres lower in altitude. Fill in the form of mill waste has been deposited on the edge of the embankment slope, burying it in most places.

GEOLOGY AND AUGER RESULTS

The area has been mapped as Quaternary alluvium, marsh and swamp, and river terrace deposits on the Frankford geological map sheet (Gulline *et al.*, 1973). The area is underlain by Quaternary alluvial sediments associated with the Stony Brook catchment area, close to a boundary with Triassic sandstone to the east.

Sediments sampled from the six auger holes range from fine to medium grained quartz sand to clayey sand and sandy clay. These extend to a depth of at least six metres in the area investigated. The sequence below the proposed site consists of fine to medium grained quartz sand which extends to a depth of between two and three metres. This sand grades to

a clayey sand which extends from this depth to a depth of between four and six metres. Sandy clay is present towards the bottom of some of the auger holes and is also present as thin layers or perhaps lenses in the clayey sand. Clay content seems to vary both laterally and vertically. All auger holes were stopped after stiff clayey sand was encountered with a low moisture content compared to the overlying sediments. Detailed logs are appended to this report.

GROUNDWATER CONDITIONS

Groundwater was encountered in all six auger holes. Water levels were measured on completion of drilling. From auger holes MP1, 2, 3, 4, and 6 it appears that the water-table is present at a uniform depth of 1.2 m, with saturated sediments occurring from this depth to a depth of about three metres. There also appears to be a water-table gradient sloping towards the east. The standing water level in auger hole MP5 is approximately 1.5 m lower in altitude than the water-table measured in the remainder of the holes. The water-table also appears to be close to the ground surface in the low lying area to the east of hole MP5, as indicated by the reedy vegetation present. This low lying area also becomes a little swampy during winter. A contributing factor to the high water-table regime in this area could be seepage from the water-bearing sediments encountered below the proposed construction site.

CONCLUSIONS

The proposed furnace site is underlain by sand and clayey sand to a depth of at least six metres. The water-table is present at a depth of 1.2 m and saturated sediments extend from this level to a depth of about three metres. This aquifer appears to drain to a low lying area to the east, at the fringe of the old sawdust dump, and may require draining if problems are likely to occur due to the load imposed by the construction of the proposed furnace.

REFERENCE

GULLINE, A.B.; BRAVO, A.P.; NAQVI, I.H. 1973. Geological atlas 1 mile series. Zone 7 sheet 38 (8215S). Frankford. *Department of Mines, Tasmania.*

[26 February 1981]

LOCATION MATPINE FACTORY

SUBURB FRANKFORD HIGHWAY

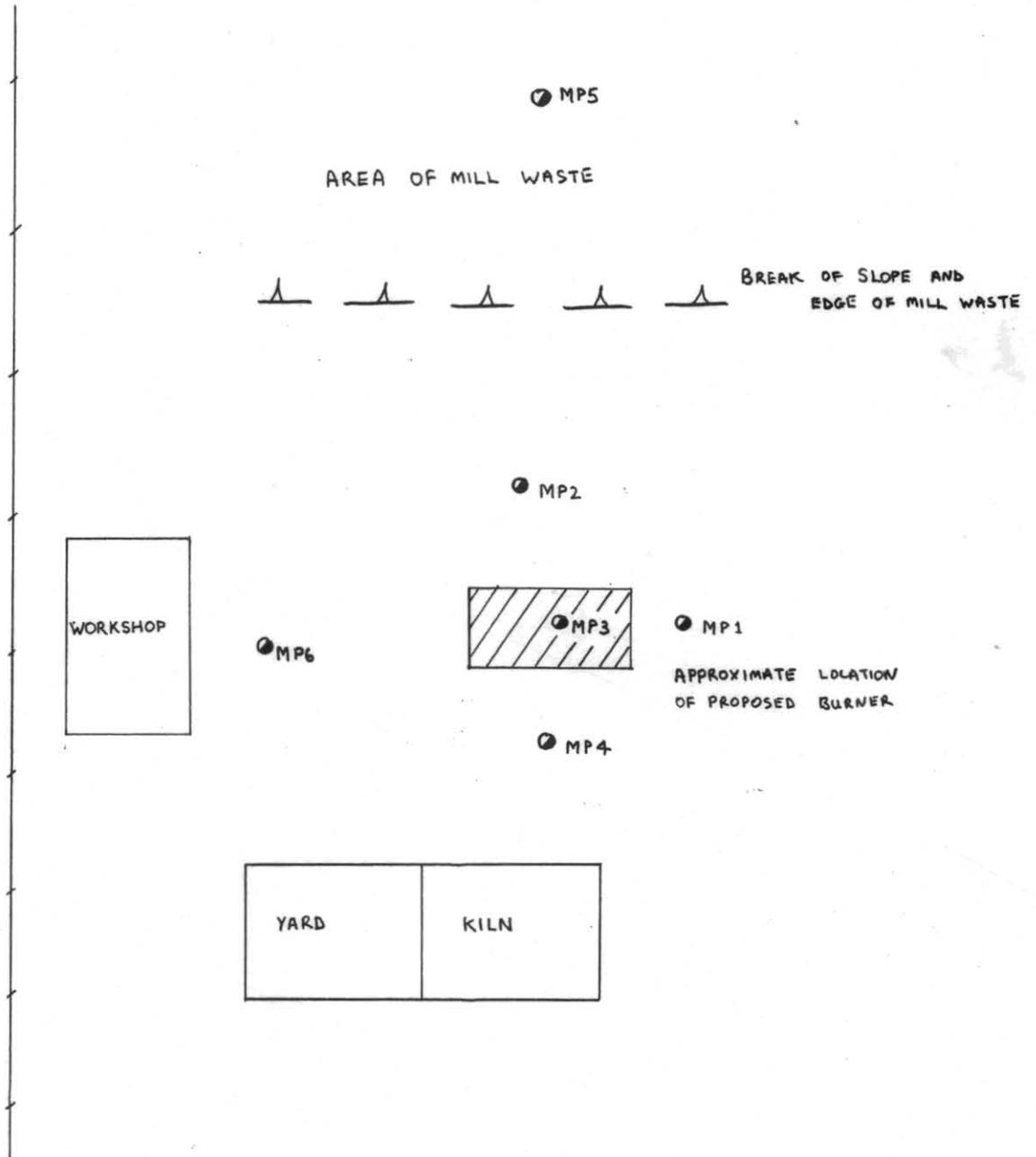
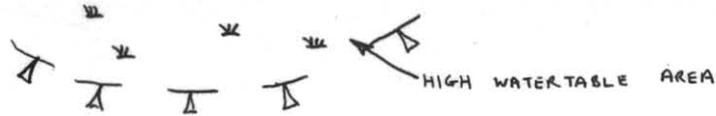
GEOLOGIST D. J. SLOANE

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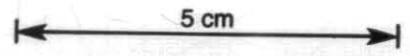
OWNER MATPINE Pty. Ltd.

TOWN EXETER

DATE 3/2/81



Approx. North.



SCALE APPROX. 1:500

LEGEND

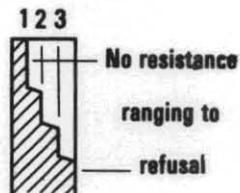
-  20° Slope angle and direction
-  Change of slope - downslope side indicated
-  Change of slope - upslope side indicated

-  Area in which building advised
-  " " " septic tank "

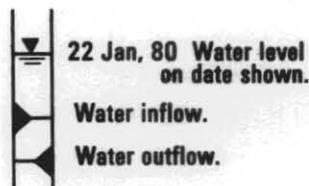
EXPLANATION SHEET FOR ENGINEERING LOGS

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. | |

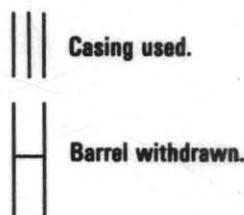
Notes: X on log is test result
— is range of results.

Density index

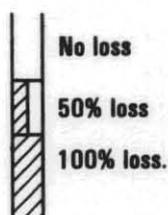
- | | | % |
|----|---------------|----------|
| VL | Very loose. | 0 - 15 |
| L | Loose. | 15 - 35 |
| MD | Medium dense. | 35 - 65 |
| D | Dense. | 65 - 85 |
| VD | Very Dense | 85 - 100 |

Cored borehole log

Case - lift



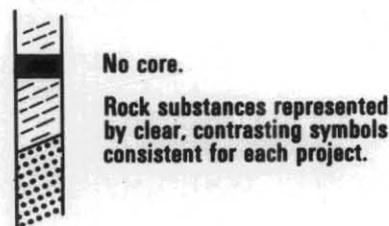
Fluid loss



Lugeons

Lugeon units (μL) are a measure of rock mass permeability. For a 48 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



Weathering

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

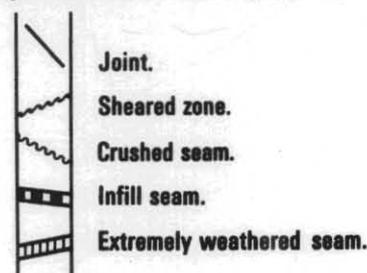
Strength

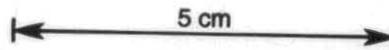
- | | | point load strength index $I_{5(50)}$ (MPa) |
|----|-----------------|---|
| EL | Extremely low. | < 0.03 |
| VL | Very low. | 0.03 - 0.1 |
| L | Low. | 0.1 - 0.3 |
| M | Medium. | 0.3 - 1 |
| H | High | 1 - 3 |
| VH | Very high. | 3 - 10 |
| EH | Extremely high. | > 10 |

Note: X on log is test result.

Significant defects

Significant defects shown graphically.



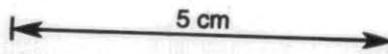


ENGINEERING LOG - BOREHOLE

project MATPINE PTY LTD	location FRANKFORD HIGHWAY, EXETER
co-ordinates DQ 949 278	drill type TRIEFUS
R.L. 55m approx.	drill method AUGER
inclination 90°	drill fluid
bearing	hole commenced 3.2.81
	hole completed 3.2.81
	drilled by B. Cox
	logged by J. SLOANE
	checked by

penetration	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	structure, geology
1 2 3											25 50 100 200 400	
				0		SM	Silty sand: Fine. Brown. Some medium and coarse sand. Some silt. Trace clay.	D	L			
				1								
			← S.W.L. 3/2/81									
				2		SW	Sand: Fine-medium quartz. Yellowish brown	W	L			
						sw	Sand: Fine medium quartz. Brownish black. Some silt and clay.	W	L			
				3								
				4		SC	Clayey Sand: Medium quartz sand. Dull yellowish brown. Plastic clay fines. Some greyish yellow brown clay or clayey sand layers?	M	S			
				5		CL	Sandy clay: Plastic clay with medium quartz sand. Sand ≈ 30%. Bright yellowish brown	M	St			
				6								
			END									

← Hole collapse to this level after drilling. (S.W.L.)



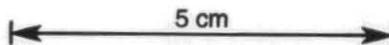
ENGINEERING LOG - BOREHOLE

project MATPINE PTY LTD	location FRANKFORD HIGHWAY, EXETER	
co-ordinates DQ 949 278	drill type TRIEFUS	hole commenced 3-2-81
R.L. 55m approx.	drill method AUGER	hole completed 3-2-81
inclination 90°	drill fluid	drilled by B. COX
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		checked by

penetration	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	structure, geology
1 2 3				0							25 50 100 200 400	
				0	•••••	SW	Sand: Fine-medium. Quartz sand. Light grey - brownish grey	D		L		
				1	•••••	SW	Sand: Fine-medium. Quartz. Mottled brown - brownish grey.	M ↓ W		L		
				2	•••••	SC	Clayey sand: Fine-medium sand. Some clay. Dark brown.	W		L		
				3	•••••							
				4	•••••	SC	Clayey sand: Fine-medium quartz sand. 30% - 40% plastic silty clay fines. Some sandy clay - grey laminations? Dull yellowish orange - bright yellowish brown	M		S		
				5	•••••	SC	Clayey sand as above: Dull yellow orange.	D-M		St		
				6	•••••							

S.W.L. 3/2/81

END



ENGINEERING LOG - BOREHOLE

project MATPINE PTY LTD	location FRANKFORD HIGHWAY, EXETER	
co-ordinates DQ 949278	drill type TRIEFUS	hole commenced 3-2-81
R.L. 55m approx.	drill method AUGER	hole completed 3-2-81
inclination 90°	drill fluid	drilled by B. COX
bearing		logged by J. SLOANE
		checked by

penetration	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	structure, geology
1 2 3										25 50 100 200 400	
				0	○	SP	Sand: Medium-fine quartz sand. Mottled dull yellow orange - light grey	M	L		
				1	↓			W			
			← s.w.l 3/2/81	2	●	SP	Sand: Medium quartz sand. Mottled - dark reddish brown - bright yellowish brown				
				3	//		Sandy clay-clayey sand. Approx 50% medium quartz sand. Plastic clay fines. Greyish yellow brown - brownish grey	M	MD		
			END	4	//			D	V.St.		