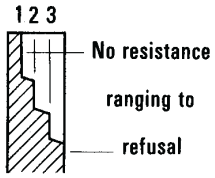
Tasmania

MINERAL RESOURCES TASMANIA

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

Fracture description

RP	Rough planar
RI	Rough irregular
SP	Smooth planar
SI	Smooth irregular

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Barrel withdrawn.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 1×10^{-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.

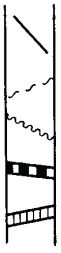
Strength

		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.

c:\data\geology\eng_log.cdr

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - CORED BOREHOLE

borehole no. IBH1/99
sheet 1 of 4

project TAROONA LANDSLIP INVESTIGATION location TAROONA HIGH SCHOOL

co-ordinates	528 785.51mE	drill type		hole commenced	22/3/99
	5 245 198.90mN	drill method	Rotary coring	hole completed	26/3/99
R.L.	30.72m	drill fluid	Water	drilled by	KMR
inclination	Vertical	casing diameter	70mm	logged by	ML
bearing				checked by	RCD
Casing length	68 m				

drilling information | **rock substance** | **rock mass defects**

water	samples	notes	lugeons (0.3, 1, 3, 10, 30, 100)	tray no.	metres R.L.	metres depth	graphic log	substance description (rock type: grain characteristics, colour, structure, minor components.)	weathering	strength (EL, VL, L, M, H, VH, EH)	defect spacing (mm) (30, 100, 300, 1000, 3000)	defect description (thickness, type, inclination, planarity, roughness, coating.) significant	general
					30.72	0		Topsoil (black)					
								Clay, black becoming light green becoming silty and sandy with depth.					
▼		2.50 RWL 7/3/00				2					10		
				TRAY 1				4.75 - 5.05m: sandy clay, green and orange brown.			8		
						4							
					25.67			Sandy clay, orange brown and green mottled. Sand fine to course (possibly derived from dolerite).			5		
						6					11	mainly rough planar	
											2		
											5	rough planar	
											2	rough planar	
						8					1	rough irregular	
											2	rough irregular	
											1	smooth planar	
											4	rough planar	
											3	rough irregular	
						10					5	rough irregular	
				TRAY 2							3	rough planar	
		XRD 1									~20	rough planar	
											6	rough planar	
						12		Boulder of dolerite, light yellowish green and highly weathered, strength extremely low.	HW		4	rough planar	
					18.42								
					17.98			Sandy clay (as above)					
					17.73			Very sandy clay, low to medium plasticity, orange brown, very stiff to very stiff (hard), with some fine to medium gravel (assorted dolerite, sandstone, quartz, iron concretions) from 13.85 - 20.70m.					
						14					2	rough planar	
											1	rough irregular	
				TRAY 3							>20	rough planar (crushed seam)	
											4	rough planar	
											1	rough planar	
						16					4	rough planar (1 smooth planar)	
											4	rough irregular	
											5	rough planar (2 rough irregular)	
						18					3	rough irregular	
				TRAY 4							3	rough irregular	
											3	2 rough planar (1 rough planar)	
						20							

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - CORED BOREHOLE

borehole no. IBH1/99
sheet 2 of 4

project TAROONA LANDSLIP INVESTIGATION — location TAROONA HIGH SCHOOL

co-ordinates	528 785.51mE	drill type		hole commenced	22/3/99
	5 245 198.90mN	drill method	Rotary coring	hole completed	26/3/99
R.L.	30.72m	drill fluid	Water	drilled by	KMR
inclination	Vertical	casing diameter	70mm	logged by	ML
bearing				checked by	RCD
Casing length	68 m				

drilling information | **rock substance** | **rock mass defects**

water	samples	notes	lugeons (0.3, 1, 3, 10, 30, 100)	tray no.	R.L.	depth	graphic log	substance description (rock type: grain characteristics, colour, structure, minor components.)	weathering	strength (EL, VL, L, M, H, VH, EH)	defect spacing (mm) (30, 100, 300, 1000, 3000)	defect description (thickness, type, inclination, planarity, roughness, coating.) significant / general
				TRAY 4	20						1	1 rough planar
					10.05			Very sandy clay (as sheet 1)			1	1 smooth planar
											2	2 smooth planar
		XRD 2						Sandy clay, greenish brown, (sand is fine to coarse and possibly derived from dolerite).			6	6 smooth planar
											2	2 1 rough planar & 1 smooth planar
					22						2	2 1 rough irregular & 1 smooth irregular, 10° & 85°
											4	4 smooth planar
				TRAY 5							1	1 rough planar — 20°
											1	1 rough irregular
											7	7 subvertical 85 - subhorizontal (several systems)
					24						2	2 smooth planar
											3	3 planar - slickensided rough
											15	15 1 long 75° (joint) slickensided, others planar (smooth & rough) 20° - 30° some 5°
											1	1 smooth planar
											8	8 mainly planar, some irregular, 20° - 30°, one 70°
					26						3	3 smooth planar
											1	1 rough planar
											1	1 rough planar
						3.22					5	5 2 longitudial smooth planar 3 rough planar
						3.02		Cobble size fragment of dolerite boulder.			1	1 rough planar
					28			Sandy clay, greenish brown. 27.80m: with gravel size angular fragment derived from Permian siltstone.			2	2 smooth planar
											1	1 rough planar
											3	1 rough planar 55°
						1.72		Sandy clay, reddish brown with some gravel (coarse, of weathered dolerite).			8	8 mainly rough planar (5° - 40°)
											1	1
											8	8
					30							smooth planar (slickensided) 20° - 30° (one 55°)
				TRAY 6		0.52		Slightly silty clay, dark green.				
						-0.58		Dolerite, light greenish brown, stained red.	HW		27	mainly semi-open 0° - 10°
		XRD 3				-0.88		Sandy clay, reddish brown locally mottled green, with some fine to medium gravel (dolerite, iron concretions, Permian rocks).			1	
					32						14	14 smooth planar
						-2.48					2	2 — 15° - 30°
								Silty clay, green occasionally brown, with rare cobbles (dolerite).				smooth planar
					34						1	
						-3.68		Sandy clay, reddish brown and greenish brown with occasional fine to medium gravel (iron concretions).			4	
				TRAY 7		-4.58					2	2 rough irregular
						-4.78		Sandstone recovered. Strength extremely low.			4	4 smooth planar
											4	4 smooth planar - rough planar
					36						5	5 smooth planar - 1 rough planar — 45°-55°
						-5.48		Sandstone recovered. Strength extremely low.			1	1 rough planar
						-5.78					6	6 smooth planar
											1	1
						-6.28		Boulder, light green to white, low strength (dolerite).	HW		4	4 smooth planar - smooth irregular — 15°-30°
				TRAY 8		-6.73					2	2 rough irregular
					38			Silty clay, high plasticity, greenish brown, in parts sandy, with rare gravel and cobbles (dolerite, extremely weathered)			3	3 smooth planar - smooth irregular
											6	6 smooth planar - (one inferred ???)
											5	5 smooth planar
											5	5 smooth planar - slickensided — 20° - 35°
											1	1 smooth planar
				TRAY 9	40						18	18 smooth - planar; irregular — 20°
											1	1 rough irregular

MINERAL RESOURCES TASMANIA

ENGINEERING LOG - CORED BOREHOLE

borehole no. IBH1/99
sheet 3 of 4

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co-ordinates	528 785.51mE	drill type		hole commenced	22/3/99
	5 245 198.90mN	drill method	Rotary coring	hole completed	26/3/99
R.L.	30.72m	drill fluid	Water	drilled by	KMR
inclination	Vertical	casing diameter	70mm	logged by	ML
bearing				checked by	RCD
Casing length	68 m				

drilling information | **rock substance** | **rock mass defects**

water | samples | notes | lugeons (0.3, 1, 3, 10, 30, 100) | tray no. | metres R.L. | depth | graphic log | **substance description** (rock type: grain characteristics, colour, structure, minor components.) | weathering | **strength** (EL, VL, L, M, H, VH, EH) | **defect spacing (mm)** (30, 100, 300, 1000, 3000) | **defect description** (thickness, type, inclination, planarity, roughness, coating.)

Geomechanical Sample

D

XRD 4

XRD 5

XRD 6

XRD 7

TRAY 9

TRAY 10

TRAY 11

TRAY 12

TRAY 13

40

42

44

46

-15.68

48

-19.08

50

52

-22.98

54

-23.28

56

-26.18

-26.48

58

-28.18

60

Silty clay (as sheet 2).

Becoming soft and wet.

Sheared zone, dipping at 60°.

Becoming sandy.

Sandy clay, reddish in parts, greenish dark brown, with rare gravel (dolerite, very low strength).

Dolerite, medium grained, dark brown and greenish brown, generally extremely weathered, in parts highly weathered, extremely low strength, some thin seams of white clay (smectite and halloysite).

Sandy clay, grey locally orangeish red, sand fine to coarse, stiff.

Sandy clay, reddish brown with greenish brown laminations. Very stiff to very stiff (hard) (weathered poorly consolidated sandstone).

Dolerite Boulder, coarse grained green to white, slightly weathered, moderate strength.

Sandy clay, reddish brown, with occasional coarce gravel and cobbles (extreme weathered dolerite), stiff to very stiff. Below 58.30m, occasional boulders of slightly weathered, moderate strength dolerite.

Silty sandy clay (as sheet 4).

EW
HW
EW
SW

8 — 35° & 45° (50%)
1 smooth planar
5 rough irregular, 1 smooth planar
1 rough irregular
1 smooth irregular — 20° (two 70°)
10 rough planar, few smooth planar — 10°
1 rough planar
27 drilling induced, horizontal — Possible slip zone
1 rough planar (few tight or open <1mm)
4 smooth planar - rough planar (one has grey organic matter) — 10°
11 mainly rough planar, (some smooth to rough crushed irregular)
1 rough planar
2 rough planar — 10° - 20° (few 30°)
6 rough planar, (1 smooth planar)
rough planar to irregular, (1 smooth planar)
1 rough planar
7 5 rough planar, (2 smooth to rough planar) — 20° - 35°
8 8 smooth planar, 4 tight or open < 1mm
11 3 smooth planar, 8 rough irregular — 20° - 35° (one slickensided)
frequently crushed
1 rough planar 25°
numerous rough irregular - crushed
2 1 rough planar
2 1 smooth planar, 1 rough planar
6 5 smooth planar, 3 tight to open — 5 joints 70° (infilled smectite)
2 1 rough planar < 1mm
5 smooth planar
1 rough irregular (1 smooth planar)
1 rough irregular — 50-70° few<5°
13 rough irregular (few smooth irregular) — 20-30°
3 smooth planar (1 rough irregular)
4 1 2 smooth planar, 2 tight to open
2 1 smooth planar
5 1 3 smooth planar, 2 tight to open
1 smooth planar
1 rough planar
1
2 rough planar to rough irregular
1 4 smooth planar
1 rough planar < 5°
4 2 smooth planar 80° 2 rough
1 2 smooth planar planar 0 - 5°
1 2 rough planar — 40-60° 2@20°
2 smooth planar, 2 tight to open
1 smooth planar 5° < 1mm
4 3 smooth planar, 1 tight to open
2 smooth planar (1 subvertical) — 30-50°
3 1 smooth planar
smooth irregular
11 8 smooth planar, 3 tight to open < 1mm — 20-30° 1@60°

20°, 30°, 50°, steeper in finer material. Joints filled with red brown clay.

More plastic material

More plastic material

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ENGINEERING LOG - CORED BOREHOLE

borehole no. IBH1/99
sheet 4 of 4

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		XRD 8		TRAY 13	60			Silty sandy clay, reddish brown, in parts greenish brown, stiff to very stiff. (Weak Mudstone).			1 4	} 20° - 30° (one 60°)
											12	
											1 5	} smooth planar
											1 1	
											1 2	30°, 35°
											1 1	} rough planar 55°
											1	20°
											1	smooth planar (clay infill ~ 1mm coating) 45°
											1	rough planar 30°
											2	rough planar
												numerous joints < 1cm mainly smooth planar, some smooth irregular, few core pieces 7 - 12cm tight to open, all the rest broken completely. possible slip zone
											5	4 rough planar, 1 smooth planar, few tight to open
											1	rough planar, few tight to open
											20	rough planar, 5 smooth planar } 15° (few 20° - 30°)
		XRD 9									1	rough planar
		palynology (P1079)									6 2	} smooth planar } 20°
											10	smooth planar, few tight to open < 1mm
				TRAY 14								
											5	} smooth planar 60°
											2	few tight to open, numerous
											3	<1mm, 30°
											2 1	} smooth to rough planar } smooth planar 30° - 35°
											1	
											11	8 smooth planar & 3 coal seams 1 - 2cm 15° - 20°
											3	} smooth planar (few 30°)
											6 17	smooth planar, few tight to open, < 1mm 30°
											2	
											12	} smooth planar 40° - 60°
											5	rough irregular others 20°
											1 4	} smooth planar 15° - 20°
		XRD 10		TRAY 16	70			Siltstone, sandy, grey, carbonaceous, low strenght. 68.40 - 68.60m: coal seam.			8	(few 30°)
		XRD 11						Siltstone, sandy (fine to coarse), clayey, light green to brown, massive with rare angular fine to medium gravel, very low to low strength.				

Siltstone, sandy, clayey light green with orange brown banding, massive, extremely low strength.

Siltstone, sandy, light green and light grey, some organic material, very low strength.

Dolerite boulder, coarse gravel, dark and light grey spotted, fresh very high strength.

Slightly sandy clayey gravel and cobbles, greenish brown and reddish brown, composed of green sandy sily clay (weathered siltstone), angular fragments of Permian sandstone, and subrounded iron concretions.

TRAY 15

-30.78 -32.78 -34.28 -36.58 -37.58 -38.28 -39.98

62 64 66 68 70 72 74 76 78 80

FR

BH1/99

0.0
to
13.45 m

BH1/99

13.45
to
16.70 m

BH1/99

16.70
to
21.20 m

BH1/99

21.20
to
25.70 m

BH1/99

25.70
to
30.20 m

BH1/99

30.20
to
34.50 m

BH1/99

34.50
to
39.20 m

BH1/99

39.20
to
43.70 m

BH1/99

43.70
to
48.10 m

BH1/99

48.10
to
52.70 m

BH1/99

52.70
to
57.20 m

BH1/99

57.20
to
61.50 m

BH1/99

61.50
to
65.70 m

BH1/99

65.70
to
70.70 m