William C. Cromer Pty. Ltd. Environmental, engineering and groundwater geologists

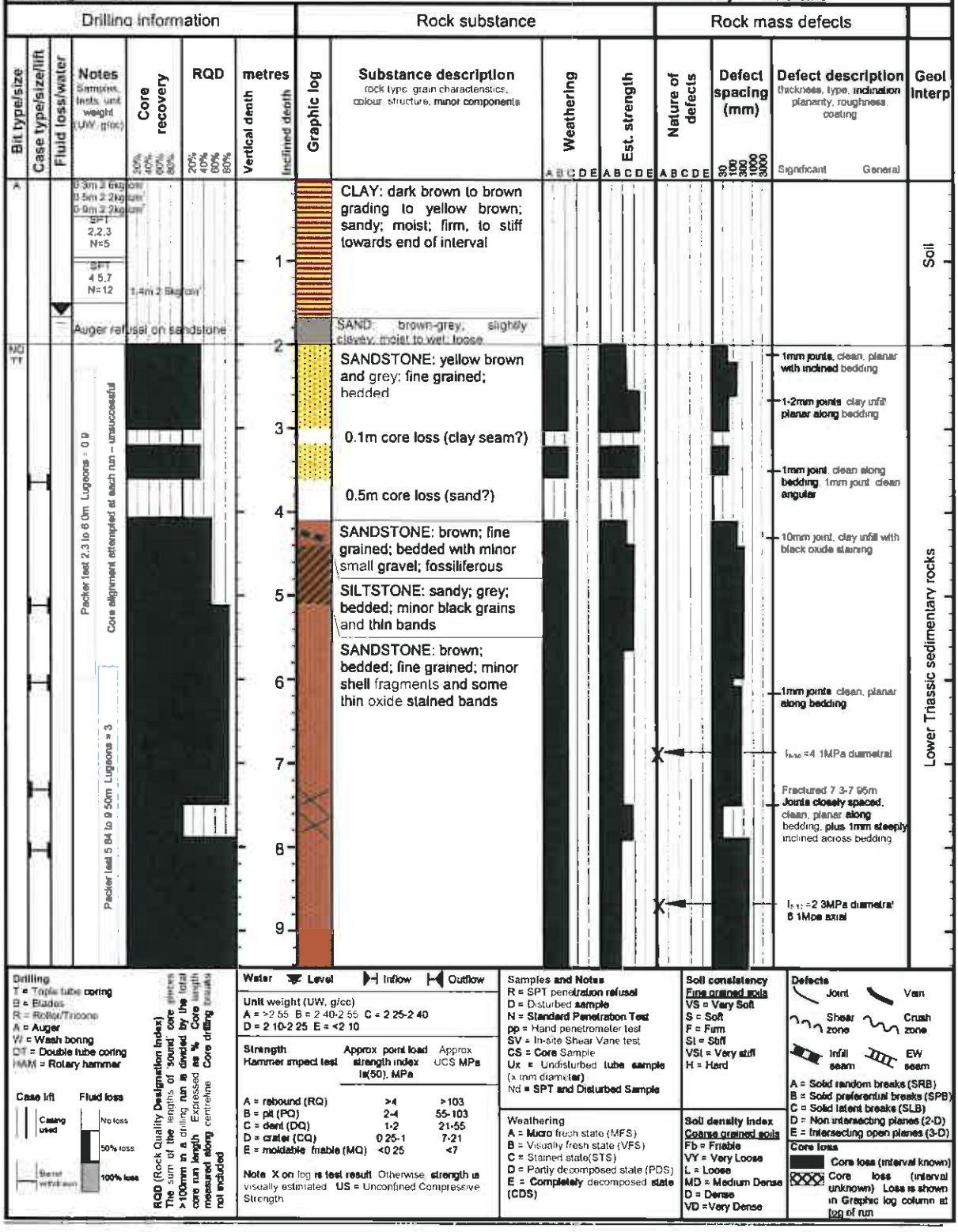
Engineering log – Cored borehole

Incorporating the Unified Rock Classification System (URCS)

DDH – SF7
Sheet 1 of 3

Project HYDRO TASMANIA DUNGROVE SCHEME **Location** Southernfield (dam axis, lower west side)

Coordinates	490339.6mE 5320625.9mN	**Drill type**	Hydra Power Scout	**Hole started**	5 February 2008
Datum	GDA94	**Equipment**	120mm hollow auger NQTT triple tube core drilling	**Hole finished**	7 February 2008
RL	Approx. 419m ASL			**Drilled by**	D. Roberts KMR Drilling Pty. Ltd.
Inclination	84°	**Drill fluid(s)**	Water	**Logged by**	D. Bear
Bearing	010°			**Checked by**	W. Cromer



Drilling
T = Triple tube coring
B = Blades
R = Roller/Tricone
A = Auger
W = Wash boring
DT = Double tube coring
HAM = Rotary hammer

Case lift: Casing used; Barrel withdrawn
Fluid loss: No loss; 50% loss; 100% loss

RQD (Rock Quality Designation Index) The sum of the lengths of 'sound' core pieces >100mm in a drilling run is divided by the total core run length. Expressed as %. Core length measured along centreline. Core drilling breaks not included

Water Level Inflow Outflow

Unit weight (UW, g/cc)
A = >2.55 B = 2.40-2.55 C = 2.25-2.40
D = 2.10-2.25 E = <2.10

Strength Hammer impact test	Approx. point load strength index Is(50), MPa	Approx. UCS MPa
A = rebound (RQ)	>4	>103
B = pit (PQ)	2-4	55-103
C = dent (DQ)	1-2	21-55
D = crater (CQ)	0.25-1	7-21
E = moldable friable (MQ)	<0.25	<7

Note X on log is test result. Otherwise strength is visually estimated. US = Unconfined Compressive Strength

Samples and Notes
R = SPT penetration refusal
D = Disturbed sample
N = Standard Penetration Test
pp = Hand penetrometer test
SV = In-situ Shear Vane test
CS = Core Sample
Ux = Undisturbed tube sample (x mm diameter)
Nd = SPT and Disturbed Sample

Weathering
A = Micro fresh state (MFS)
B = Visually fresh state (VFS)
C = Stained state(STS)
D = Partly decomposed state (PDS)
E = Completely decomposed state (CDS)

Soil consistency
Fine grained soils
VS = Very Soft
S = Soft
F = Firm
St = Stiff
VSt = Very stiff
H = Hard

Soil density index
Coarse grained soils
Fb = Friable
VY = Very Loose
L = Loose
MD = Medium Dense
D = Dense
VD = Very Dense

Defects
Joint, Vein, Shear zone, Crush zone, Infill seam, EW seam
A = Solid random breaks (SRB)
B = Solid preferential breaks (SPB)
C = Solid latent breaks (SLB)
D = Non intersecting planes (2-D)
E = Intersecting open planes (3-D)

Core loss
Core loss (interval known)
Core loss (interval unknown) Loss is shown in Graphic log column at top of run

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Inclination	84°	**Drill fluid(s)**	Water	**Logged by**	D. Bear
Bearing	010°M			**Checked by**	W. Cromer

Drilling information

Bit type/size	Case type/size/lift	Fluid loss/water	Notes: Samples, tests, unit weight (UW, g/cc)	Core recovery (20% 40% 60% 80%)	RQD (20% 40% 60% 80%)	metres: Vertical depth	metres: Inclined depth
			Packer test @ 34 to 13 0m Lugeons = 1 2 Core alignment attempted at each run – unsuccessful Packer test 12 84 to 16 6m Lugeons = 20 Packer test 18 4 to 21 06m Lugeons = 100			10 11 12 13 14 15 16 17 18	

Rock substance

Graphic log	Substance description (rock type, grain characteristics, colour, structure, minor components)	Weathering (A B C D E)	Est. strength (A B C D E)
	SANDSTONE: brown with yellow and red oxide staining as infill in fine veining; fine grained; bedded,		X
	SANDSTONE: grey-brown; bedding sub-horizontal with some cross-bedding; fine grained		X
			X
	SANDSTONE: light brown; occasional small voids filled with pink clay (ie clay pellets); fine grained, visible sub-horizontal bedding		X

Rock mass defects

Nature of defects (A B C D E)	Defect spacing (mm) (30 100 300 1000 3000)	Defect description (thickness, type, inclination, planarity, roughness, coating) Significant / General
		1mm joint, clean planar, subhorizontal bedding
		Is(50)=2 7MPa diametral, 4 7Mpa axial
		80mm wide clay seam
		1mm joints, clean planar along bedding
		Is(50)=4MPa diametral
		1mm joints, clean, planar, along bedding and 45° across bedding
		1mm joints, clean planar along bedding
		1mm joints, clean, planar, along bedding
		Is(50)=3Mpa diametral, 5Mpa axial 1mm joints clean, planar, along bedding 3mm joints, planar, black oxide infill across bedding at 45
		30mm clay band at 15 2 1-2mm jts clean, planar
		Fractured zone 15 3-15 55 to 16 0
		Clean jt along bedding, and vertical jts
		Fragmented 16 7 – 16 73
		1mm joints, clean, planar, along bedding Fragmented 17 5 – 17 65
		Is(50)=3MPa axial

Geol interp: Lower Triassic sedimentary rocks

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D = 2 10-2 25 E = <2 10

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NQ TT			Packer test 18.4 to 21.05m Lugeons = 100			19			SANDSTONE: light brown; visible sub-horizontal bedding; fine grained; occasional small voids filled with pink clay (ie clay pellets)		X			Is(50) =4.5MPa diametral 1mm joints, planar with bedding, sub-horizontal clean Fragmented section 19.3-19.45m Vertical fractures from 20.1-20.85 (fragmented 20.2 to 20.55)	
						20									
						21									
									End of hole 21.05m						
						22									
						23									
						24									
						25									
						26									
						27									

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