

Logs of three geotechnical diamond drill holes
694 – 696 Sandy Bay Road, Hobart, Tasmania

Engineering log – Cored borehole

Hole 1

Sheet 1 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project	R. and B. FRENCH	Location	696 Sandy Bay Road, Sandy Bay
Coordinates	529367mE; 5248226mN	Drill type	Explorer 50
Datum	GDA94	Equipment	HWT 112mm OD core followed by HQ3 wireline (triple tubing)
RL	Approx. 14.7+/- 0.2m ASL	Hole started	17 July 2008
Inclination	82° from horizontal	Hole finished	21 July 2008
Bearing	316° magnetic (grid/magnetic angle 15.1°)	Drill fluid(s)	Water and Polyplus lubricant
		Drilled by	Darren Richardson KMR Drilling Pty. Ltd.
		Logged by	W. C. Cromer
		Checked by	W. C. Cromer

Drilling information				Rock substance				Rock mass defects				Geol interp	
Bit type/size	Case type/size/lift	Notes	Core recovery	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)		Defect description
		Visible reaction to 10% HCL	20% 40% 60% 80%	20% 40% 60% 80%	Vertical depth RL (mAHD) Inclined depth		rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000	Significant General	
HWT							Hole collared in fill over breccia						
HQ3		Pocket penetrometer (kPa) readings 268/08 pp>600			14								
		pp>600			13		BRECCIA: overall colour: light bluish grey; matrix supported; matrix is friable, mainly sand-silt-fine gravel mixtures (SP, GW, GM), with med grained angular quartz? gravel throughout, and locally with some to dominant clay (CH); light yellowish brown and light yellowish pink; mainly nonplastic but locally moderate to high plasticity; clasts up to 50% by volume are well-graded angular light grey to dark grey MW-HW siltstone and fine sandstone to 25-50mm	0.90m: Silty CLAY (CH); high plast; no dilatancy					Joints: irregular, rough; inclined at approx 30° to core axis
		pp>600			12			1.90m: Silty grav SAND (SP, GW); nonplastic; no dilatancy					No significant defects
		pp>600			11			2.90m: Silty grav SAND (SP, GW); nonplastic; no dilatancy					Joints: irregular, rough; inclined at approx 15-30° to core axis
		pp>600			10			3.50m: Grav sandy SILT (GM); nonplastic; no dilatancy					3mm infill seam at 3.4m
		pp>600			9			4.00m: Silty sandy GRAVEL (GW); nonplastic; no dilatancy					Joints: planar, rough, <1mm; inclined at approx 30-60° to core axis
		pp300 (Fb)			8		BRECCIA: overall colour: bright orange grading to yellowish olive; matrix supported; matrix is friable, mainly sand-silt-fine gravel mixtures (SP, GW, GM), locally with some to dominant clay (CH, CL); mainly nonplastic but locally moderate to high plasticity; clasts up to 50% by volume are well-graded angular light yellow MW-HW siltstone and fine sandstone to 75mm	4.70m: Grav sandy SILT (GM); nonplastic; rapid dilatancy					Joints: tight, planar, rough, var. inclined at 20-80° to core axis; some tight irregular joints subparallel to axis
		pp400			7			5.00m: Grav sandy SILT (GM); nonplastic; rapid dilatancy					No defects
		pp300			6			5.50m: Grav sandy CLAY (CL, CH) mod plast; slow dilatancy					Joints: irregular, 20-40° to core axis
		pp400			5			6.45m: Grav silty CLAY (CL); mod plast; rapid dilatancy					No significant defects
		pp500			4								No defects
		pp300			3								No defects
		pp400			2								No defects
		pp300			1								No defects
		pp400			0								No defects

<p>Drilling</p> <p>T = Triple tube coring B = Blades R = Roller/Tricone A = Auger W = Wash boring DT = Double tube coring HAM = Rotary hammer</p> <p>Case lift Fluid loss</p> <p>Case used No loss 50% loss Barrel withdrawn 100% loss</p> <p>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.</p>	<p>Water Level Inflow Outflow</p> <p>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</p> <p>Strength Hammer impact test Approx. point load strength index Is(50), MPa Approx. UCS MPa</p> <p>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</p> <p>Note: X on log is test result. Otherwise, strength is visually estimated. US = Unconfined Compress Strength pp = Pocket Penetrometer</p> <p>Visible reaction to 10% HCL A, B and C = slow, moderate and rapid reaction resp.</p>	<p>Samples and Notes</p> <p>R = SPT penetration refusal D = Disturbed sample N = Standard Penetration Test pp = Hand penetrometer test SV = In-site Shear Vane test CS = Core Sample Ux = Undisturbed tube sample (x mm diameter) Nd = SPT and Disturbed Sample</p> <p>Weathering</p> <p>A = Micro fresh state (MFS) B = Visually fresh state (VFS) C = Stained state (STS) D = Partly decomposed state (PDS) E = Completely decomposed state (CDS)</p>	<p>Soil consistency Fine grained soils VS = Very Soft S = Soft F = Firm St = Stiff VSt = Very stiff H = Hard</p> <p>Soil density index Coarse grained soils Fb = Friable VY = Very Loose L = Loose MD = Medium Dense D = Dense VD = Very Dense</p>	<p>Defects</p> <p>Joint Vein Shear zone Crush zone Infill seam EW seam</p> <p>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)</p> <p>Core loss</p> <p>Core loss (interval known) Core loss (interval unknown). Loss is shown in Graphic log column at top of run.</p>
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Tertiary-age ? fault scarp deposit

Below 6.5m, material is clast supported with <10% nonplastic matrix

Engineering log – Cored borehole

Hole 1

Sheet 2 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project	R. and B. FRENCH	Location	696 Sandy Bay Road, Sandy Bay
Coordinates	529367mE; 5248226mN	Drill type	Explorer 50
Datum	GDA94	Equipment	HWT 112mm OD core followed by HQ3 wireline (triple tubing)
RL	Approx. 14.7+/- 0.2m ASL	Hole started	17 July 2008
Inclination	82° from horizontal	Hole finished	21 July 2008
Bearing	316° magnetic (grid/magnetic angle 15.1°)	Drill fluid(s)	Water and Polyplus lubricant
		Drilled by	Darren Richardson KMR Drilling Pty. Ltd.
		Logged by	W. C. Cromer
		Checked by	W. C. Cromer

Drilling information				Rock substance					Rock mass defects				Geol interp	
Bit type/size	Case type/size/lift	Fluid loss/water	Notes	Core recovery	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)		Defect description
	A B C	A B C	Visible reaction to 10% HCL mostly rapid reaction	20% 40% 60% 80%	20% 40% 60% 80%	Vertical depth RL (mAH) Inclined depth		rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating Measurements in red type are on core with known 3D orientation in space	
HQ3						6		BRECCIA: as above						
						7								
						8								
						9								
						10								
						11								
						12								
						13								
						14								
						15								
						16								
						17								
						18								

<p>Drilling</p> <p>T = Triple tube coring B = Blades R = Roller/Tricone A = Auger W = Wash boring DT = Double tube coring HAM = Rotary hammer</p> <p>Case lift</p> <p>Fluid loss</p> <p>No loss 50% loss 100% loss</p> <p>ROD (Rock Quality Designation Index)</p> <p>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.</p>	<p>Water</p> <p>Level Inflow Outflow</p> <p>Unit-weight (UW, g/cc)</p> <p>A = >2.55 B = 2.40-2.55 C = 2.25-2.40 D = 2.10-2.25 E = <2.10</p> <p>Strength</p> <p>Hammer impact test</p> <p>Approx. point load strength index Is(50), MPa</p> <p>Approx. UCS MPa</p> <p>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</p> <p>Note: X on log is test result. Otherwise, strength is visually estimated. US = Unconfined Compress Strength pp = Pocket Penetrometer</p> <p>Visible reaction to 10% HCL</p> <p>A, B and C = slow, moderate and rapid reaction resp.</p>	<p>Samples and Notes</p> <p>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</p> <p>Weathering</p> <p>A = Micro fresh state (MFS) B = Visually fresh state (VFS) C = Stained state (STS) D = Partly decomposed state (PDS) E = Completely decomposed state (CDS)</p>	<p>Soil consistency</p> <p>Fine grained soils</p> <p>VS = Very Soft S = Soft F = Firm St = Stiff VSt = Very stiff H = Hard</p> <p>Soil density index</p> <p>Coarse grained soils</p> <p>Fb = Friable VY = Very Loose L = Loose MD = Medium Dense D = Dense VD = Very Dense</p>	<p>Defects</p> <p>Joint Vein Shear zone Crush zone Infill seam EW seam</p> <p>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)</p> <p>Core loss</p> <p>Core loss (interval known) Core loss (interval unknown). Loss is shown in Graphic log column at top of run.</p>
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Engineering log – Cored borehole

Hole 2

Sheet 1 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project	R. and B. FRENCH	Location	694 Sandy Bay Road, Sandy Bay
Coordinates	529367mE; 5248246mN	Drill type	Explorer 50
Datum	GDA94	Equipment	HWT 112mm OD core followed by HQ3 wireline (triple tubing)
RL	Approx. 16.6+/- 0.2m ASL	Hole started	21 July 2008
Inclination	83° from horizontal	Hole finished	22 July 2008
Bearing	351° magnetic (grid/magnetic angle 15.1°)	Drill fluid(s)	Water and Polyplus lubricant
		Drilled by	Darren Richardson KMR Drilling Pty. Ltd.
		Logged by	W. C. Cromer
		Checked by	W. C. Cromer

Drilling information					Rock substance					Rock mass defects					Geol interp					
Bit type/size	Case type/size/lift	Fluid loss/water	Notes	Core recovery	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)	Defect description							
			Visible reaction to 10% HCL	20% 40% 60% 80%	20% 40% 60% 80%	Vertical depth RL (mAHD) Inclined depth		rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating							
HWT			Pocket penetrometer (kPa) readings 26/8/08			16		Hole collared in tuffaceous fill over tuff												
	1		pp>600			1		Sandy SILT: mainly yellow and light yellow with orange patches and streaks; locally weakly cemented and sandier; trace to some clay; low plasticity; Firm to Stiff after wet core retrieved and washed; otherwise, Very stiff to Hard after air drying					Matrix notes 0.95m: Silty SAND (SP); nonplast; no dilatancy 1.05m: Silty SAND (SP); trace clay; nonplast; no dilatancy 1.70m: Silty clayey SAND (SC, CL); mod plastic; no dilatancy 2.70m: Sandy SILT (SM); low-mod plastic; no dilatancy 3.00m: Sandy SILT (SM); low-mod plastic; no dilatancy 3.30m: Sandy SILT (SM); low-mod plastic; mod dilatancy 3.60m: Grav SAND (SP); nonplastic; no dilatancy 4.30m: Grav silty SAND (SP); nonplastic; no dilatancy 4.65m: Grav silty SAND (SP); nonplastic; no dilatancy 4.95m: Grav silty SAND (SP); nonplastic; no dilatancy 5.30m: Grav silty SAND (SP); nonplastic; no dilatancy 5.70m: Sandy silty CLAY (CL, CH); mod plast; mod dilatancy 6.10m: Silty clayey SAND (SC); low plast; mod-rapid dilatancy 7.00m: Sandy silty CLAY (CL); mod plast; low-mod dilatancy 7.50m: Sandy silty CLAY (CH); high plast; mod dilatancy 8.15m: Silty CLAY (CH); mod-high plast; mod dilatancy 8.50m: Silty SAND (SP); non plast; slow dilatancy 9.10m: Silty SAND (SP); non plast; slow dilatancy 9.30m: Sandy silty CLAY (CL, CH); high plast; slow dilatancy							
	2		pp>600 pp>600 pp300 (Fb) pp400 pp400			2			Gravelly silty SAND: variable sand-silt-gravel mix; light yellow and yellow; matrix supported; nonplastic; variably, weakly cemented; with up to 40-50% angular orange brown sand and fine to coarse tuffaceous gravel clasts; occasional chalcedony patches; "silty" matrix appears to be largely amorphous material						No significant defects 20mm white silt infill seam at 2.1m	Defects are mainly irregular, <1-5mm infill seams with brown soft CH clay; orientation variably subhorizontal to subvertical				
	3		pp>600 pp300 (Fb) pp200 (Fb) pp500 (Fb) pp>600			3				BRECCIA: overall colour light yellow with occasional orange patches; matrix supported; matrix is friable, mainly variable plasticity sand-silt-clay mixtures (SP, SC, CL, CH); clasts up to 20% by volume are well-graded (to 30mm) angular sandstone and EW siltstone							No significant defects	In breccia, occasional defects are tight, planar joints at +/-45° to core axis. At 6.9-7m, EW chalcedony? or opaline vein inclined 30° to core axis.		
	4		pp400 pp>600			4		Sandy SILT and silty SAND: as above						No significant defects					5.6m Bedding dips 27° to 255°M 5.6m Partings dip 30° to 040°M 5.7m Partings dip 20° to 010°M	
	5		pp400 (Fb) pp500 pp>600 pp600 pp500			5			BRECCIA: as above						No significant defects	Tertiary-age ?fault scarp deposit				
	6		pp>600 pp400 pp300 (Fb) pp>600			6											No significant defects	Tuff as above		
						7							No significant defects	Tuff as above						
						8						No significant defects			Tuff as above					
						9										No significant defects	Tuff as above			
						8							No significant defects	Tuff as above						
						9						No significant defects			Tuff as above					

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

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 Compress Strength
pp = Pocket Penetrometer

Visible reaction to 10% HCL
A, B and C = slow, moderate and rapid reaction resp.

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

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
L = Loose
MD = Medium Dense
D = Dense
VD = Very Dense

Defects

- Joint
- Vein
- Shear zone
- Crush zone
- Infill seam
- EW seam

Core loss

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

Engineering log – Cored borehole

Hole 2

Sheet 2 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project R. and B. FRENCH **Location** 694 Sandy Bay Road, Sandy Bay

Coordinates 52°36'36"E; 52°48'24.6"N	Drill type Explorer 50	Hole started 21 July 2008
Datum GDA94	Equipment HWT 112mm OD core followed by HQ3 wireline (triple tubing)	Hole finished 22 July 2008
RL Approx. 16.6 +/- 0.2m ASL	Drill fluid(s) Water and Polyplus lubricant	Drilled by Darren Richardson KMR Drilling Pty. Ltd.
Inclination 83° from horizontal		Logged by W. C. Cromer
Bearing 351° magnetic (grid/magnetic angle 15.1°)		Checked by W. C. Cromer

Drilling information				Rock substance				Rock mass defects				Geol interp	
Bit type/size	Case type/size/lift	Fluid loss/water	Notes	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)		Defect description
			Visible reaction to 10% HCL A B C	Core recovery 20% 40% 60% 80%	Vertical depth RL (mAHD)	Inclined depth	rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000		Thickness, type, inclination, planarity, roughness, coating Measurements in red type are on core with known 3D orientation in space
HQ3	6		Pocket penetrometer (KPa) readings 28/8/08 pp>600 pp>600 pp>600				BRECCIA: as above, but higher strength; matrix supported; matrix is friable, mainly variable plasticity light olive yellow sand-silt-clay mixtures (SP, SC, CL, CH); clasts up to 20% by volume are mainly well-graded grey, orange and white angular siltstone, sandstone and quartzite to 5-10mm, with occasional hard, indurated fine sandstone to 75-150mm	Matrix notes 0.95m: Silty SAND (SP); nonplast; no dilatancy					
	7		10.0 – 10.1m XRD whole sample 50% quartz 35% smectite 5% halloysite 5% plagioclase 5% K feldspar XRD clay fraction 5% quartz 80% smectite 15% halloysite Atterbergs LL = 47% PL = 24% LS = 12% Emerson Np. = 3		7 6 5 4		11.7m: pink earthy mineral in matrix 12-13.8m colour darkens to pinkish yellow 12.2 – 12.4 +/-50% angular and locally aligned hard, indurated sandstone clasts to 20mm	9.75m: Sandy silty CLAY (CL, CH); mod-high plast; slow dilatancy 10.40m: CLAY (CH); high plast; non dilatant 10.95m: CLAY (CH); high plast; non dilatant 11.40m: Silty CLAY (CL); mod plast; mod dilatancy 11.70m: Grav silty SAND (SP); nonplastic; non dilatant					
	8		pp>600 (F)										
	9		pp>600										
	10		pp>600				From 13.8 – 16m, colour yellowish orange; from 16 – 18.55m, colour bright orange; From 13.6 – 18.55m, both clast and matrix supported; clasts angular light grey and grey sandstone and siltstone, well graded from gravel to 75mm; matrix mainly silty sand and sandy silt, locally with trace-some clay, locally with trace-some clay; nonplastic to low plasticity	12.50m: Clayey grav silty SAND (SP, SC); low plasticity; slow dilatancy 13.50m: Silty sandy GRAVEL (GP); nonplastic; non dilatant 14.40m: Silty SAND with trace clay (SP); nonplastic; non dilatant					
	11		pp>600										
	12		pp>600										
	13		pp>600										
			Density = 2045kg/m3 Iss50 diametral = 203kPa										
			Density = 1965kg/m3 Iss50 diametral = 41kPa				End of hole at 18.55m inclined depth	15.30m: Sandy silty GRAVEL (GW); nonplastic; non dilatant 16.70m: Sandy silty GRAVEL (GW); nonplastic; non dilatant 17.75m: Sandy clayey SILT (CL); mod plast; slow dilatancy					

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
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 %.

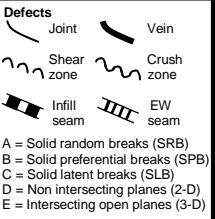
Water Level Inflow Outflow	Unit weight (UW, g/cc) A = >2.55 B = 2.40-2.55 C = 2.25-2.40 D = 2.10-2.25 E = <2.10	Strength Hammer impact test
	Approx. point load strength index Is(50), MPa	Approx. UCS MPA
	A = rebound (RQ) >4 >103	
	B = pit (PQ) 2-4 55-103	
	C = dent (DQ) 1-2 21-55	
	D = crater (CQ) 0.25-1 7-21	
	E = moldable, friable (MQ) <0.25 <7	

Samples and Notes
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Ux = Undisturbed tube sample (x mm diameter)
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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)

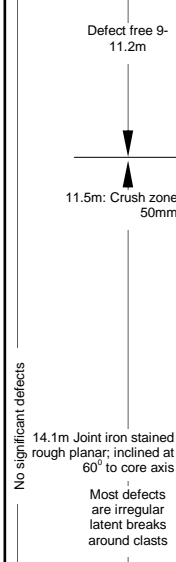
Soil consistency
Fine grained soils
VS = Very Soft
S = Soft
F = Firm
St = Stiff
VSt = Very stiff
H = Hard

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



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)

Tertiary-age ? fault scarp deposit



No significant defects

14.1m Joint iron stained rough planar; inclined at 60° to core axis
Most defects are irregular latent breaks around clasts

Engineering log – Cored borehole

Hole 3

Sheet 1 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project R. and B. FRENCH **Location** 694 Sandy Bay Road, Sandy Bay

Coordinates 529341mE; 5248242mN
Datum GDA94
RL Approx. 23.8+/- 0.2m ASL
Inclination 76° from horizontal
Bearing 270° magnetic (grid/magnetic angle 15.1°)

Drill type Explorer 50
Equipment HWT 112mm OD core followed by HQ3 wireline (triple tubing)
Drill fluid(s) Water and Polyplus lubricant

Hole started 28 July 2008
Hole finished 30 July 2008
Drilled by Darren Richardson
Logged by W. C. Cromer
Checked by W. C. Cromer

Drilling information				Rock substance				Rock mass defects						
Bit type/size	Case type/size/lift	Fluid loss/water	Notes	Core recovery	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)	Defect description	Geol interp
			Visible reaction to 10% HCL A B C	20% 40% 80%	20% 40% 80%	Vertical depth RL (mAHD) Inclined depth		rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating Measurements in red type are on core with known 3D orientation in space Significant General	
	HWT					23		Hole collared in black surface clays						
	HQ3		Pocket penetrometer (kPa) readings 26/8/08			22		Gravelly SAND: brown; matrix-supported; with well-graded clasts of angular cream siltstone, distinctive red siltstone, sandstone and dolerite to 50mm; 20-30% hard fresh grey rounded dolerite cobbles to 0.2m	Matrix notes 1.35m: rock props; matrix weakly cemented silty sand 1.90-2.90m: rock props; matrix weakly cemented silty sand				Most defects are latent, irregular breaks around clasts	Quaternary? or Tertiary? Boulder Bed
			pp>600 Density = 2265kg/m3 Iss50 diametral = 329kPa			21		Gravelly silty SAND: variable sand-silt-gravel mix; light yellow and yellow flecked with angular brown; matrix supported; nonplastic; variably, weakly cemented; with up to 40-50% angular orange brown sand and fine to coarse tuffaceous gravel clasts; occasional chalcedony patches; 'silty' matrix appears to be largely amorphous material; bedding laminations dip at 30° to core axis	3.00m: hard; close to rock props; sandy gravel 3.25m: Grav silty SAND (SP); nonplastic; rapid dilatancy				At 3.4m: 5mm grey CL-CH clayey silt infill seam	Tertiary-age volcanic ash
			pp>600 Core orientation tool successful this run			20		BRECCIA: overall colour light yellow with occasional orange patches; matrix supported; matrix is friable, mainly variable plasticity silt with some sand and trace clay (SP, SC, CL); occasional clasts increasing at base to 20% by volume are well-graded (to 30mm) angular light yellow fossiliferous sandstone and EW siltstone	4.0-4.3m: rock props; matrix weakly cemented coarse gravel 4.55m: Silty sandy CLAY (CH); mod plasticity; no dilatancy 4.75m: Grav silty SAND (SP, GW); nonplastic 5.00m: Silty sandy CLAY (CH); mod plasticity; slow dilatancy 5.40m: Silty sandy CLAY (CH); mod plasticity; slow dilatancy			3.8m to 4.3m Bedding/infill seam dips 35° Bedding dips 35° to 020°M All defects are latent, irregular breaks	Tertiary-age volcanic ash	
			pp>600 Density = 1472kg/m3 Iss50 diametral = 40kPa			19		Calcareous SILTSTONE and fine SANDSTONE: light grey and grey; finely laminated with cream laminations dipping approx 30° to core axis	6.2-6.3m: 5mm light green CH silty clay infill seam dips 85° to 100°M 6.7m: Joint dips 60° to 180°M 6.8m: Joint dips 20° to 020°M				Perman-age siltstone/sandstone	
			pp>600 Core orientation tool possibly successful this run			18								
			pp>600 Density = 2129kg/m3 Iss50 diametral = 808kPa			17								
			Orientation tool successful			16								
			Slow to rapid HCL reaction on cream white laminae, including fenestellae			15								
						14								
						13								
						12								
						11								
						10								
						9								
						8								
						7								
						6								
						5								
						4								
						3								
						2								
						1								
						0								

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

ROD (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 lengths 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

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 Compress Strength
pp = Pocket Penetrometer

Visible reaction to 10% HCL
A, B and C = slow, moderate and rapid reaction resp.

Samples and Notes
R = SPT penetration refusal
D = Disturbed sample
N = Standard Penetration Test
pp = Hand penetrometer test
SV = In-site 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.

Engineering log – Cored borehole

Hole 3

Sheet 2 of 2

Incorporating the Unified Rock Classification System (URCS) and Unified Soil Classification System (USCS)

Project R. and B. FRENCH

Location 694 Sandy Bay Road, Sandy Bay

Coordinates 529341mE;

Drill type Explorer 50

Hole started 28 July 2008

5248242mN

Equipment HWT 112mm OD core followed by HQ3 wireline (triple tubing)

Hole finished 30 July 2008

Datum GDA94

RL Approx. 23.8 +/- 0.2m ASL

Inclination 76° from horizontal

Drill fluid(s) Water and Polyplus lubricant

Drilled by Darren Richardson
KMR Drilling Pty. Ltd.

Bearing 270° magnetic (grid/magnetic angle 15.1°)

Logged by W. C. Cromer
Checked by W. C. Cromer

Drilling information				Rock substance					Rock mass defects				Geol interp	
Bit type/size	Case type/size/lift	Fluid loss/water	Notes	Core recovery	RQD	metres	Graphic log	Substance description	Weathering	Est. strength	Nature of defects	Defect spacing (mm)		Defect description
			Visible reaction to 10% HCL A B C	20% 40% 80%	20% 40% 60% 80%	Vertical depth RL (mAHD) Inclined depth		rock type, grain characteristics, colour, structure, minor components	A B C D E	A B C D E	A B C D E	30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating Measurements in red type are on core with known 3D orientation in space Significant General	
HQ3			Notes: Samples, tests, unit weight (UW, g/cc) Slow to rapid HCL reaction, cream white laminations, including lamellae Standing water level 10.56m 3 10 08			10 11 12 13		Calcareous SILTSTONE and fine SANDSTONE: light grey and grey; finely laminated with cream laminations dipping approx 30° to core axis; brecciated 9.4-9.9m				10.6m 10.6m	9.4-9.9m Crush zone? Defects are mainly partings along and parallel to laminations Joint dips 60° to 130°M Joint dips 50° to 270°M	Permian-age siltstone/sandstone
					0%	12		End of hole at 11.60m inclined depth						

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