APPENDIX A

NOTES RELATING TO THIS REPORT BOREHOLE LOGS (BORES 1 TO 8, 10, 11, 15, 201, 202, 301, 303 AND 305) GEOPHYSICAL LOGS BORES 201, 202, 301, 303 AND 305 CORE PHOTOPLATES TABLE A1 – PERCUSSION BORE RESULTS



NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the Discussion and Comments section. Not all, of course, are necessarily relevant to all reports.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties strength or density, colour, structure, soil or rock type and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

	Undrained
Classification	Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q _c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water



table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling — the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling — similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling — a continuous core sample is obtained using a diamond-tipped core barrel, usually 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" — Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

 In the case where full penetration is obtained with successive blow counts for each 150 mm of say 4, 6 and 7

 In the case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm

as 15, 30/40 mm.

The results of the tests can be related empirically to the engineering properties of the soil.

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone — abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35 mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20 mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises: —

- Cone resistance the actual end bearing force divided by the cross sectional area of the cone expressed in MPa.
- Sleeve friction the frictional force on the sleeve divided by the surface area expressed in kPa.
- Friction ratio the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0-5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main scale (0-50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%—2% are commonly encountered in sands and very soft clays rising to 4%—10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:—

 q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:—

$$q_c = (12 \text{ to } 18) c_u$$

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.



Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150 mm increments of penetration. Normally, there is a depth limitation of 1.2 m but this may be extended in certain conditions by the use of extension rods.

Two relatively similar tests are used.

- Perth sand penetrometer a 16 mm diameter flatended rod is driven with a 9 kg hammer, dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
- Cone penetrometer (sometimes known as the Scala Penetrometer) — a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ratio have been published by various Road Authorities.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms.

Bore Logs

The bore logs presented herein are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify on economic grounds. In any case, the boreholes represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems;

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be

the same at the time of construction as are indicated in the report.

• The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Engineering Reports

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface condition, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- unexpected variations in ground conditions the potential for this will depend partly on bore spacing and sampling frequency
- changes in policy or interpretation of policy by statutory authorities
- the actions of contractors responding to commercial pressures.

If these occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the Company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed than at some later stage, well after the event.

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section



is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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AN ENGINEERING CLASSIFICATION OF SEDIMENTARY

ROCKS IN THE SYDNEY AREA

This classification system provides a standardized terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable.

Under this system rocks are classified by Rock Type, Degree of Weathering, Strength, Stratification Spacing, and Degree of Fracturing. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc.) where these are relevant.

ROCK TYPE DEFINITIONS

Rock Type	Definition
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments
Sandstone:	More than 50% of the rock consists of sand sized (.06 to 2mm) fragments
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

DEGREE OF WEATHERING

Term	Symbol	Definition
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	Fs	Rock substance unaffected by weathering, limonite staining along joints.
Fresh	Fr	Rock substance unaffected by weathering.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly laminated	<6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	>2 m

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics (Reference).

Strength Term	ls(50) MPa	Field Guide	Approx. qu MPa*
Extremely Low:		Easily remoulded by hand to a material with soil properties	
	0.03		0.7
Very		May be crumbled in the hand. Sandstone is "sugary" and friable.	
LOW:	0.1		2.4
Low:		A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	
	0.3	with a kine. Shalp edges of core may be mable and break during handling.	7
Medium:		A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife	
	1		24
High:		A piece of core 150 mm long x 50 mm dia. cannot be broken by unaided hands,	
	3	can be slightly scratched or scored with knite.	70
Very		A piece of core 150 mm long x 50 mm dia. may be broken readily with hand	
r ngn.	10		240
Extremely High:		A piece of core 150 mm long x 50 mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	

* The approximate unconfined compressive strength (qu) shownin the table is based on an assumed ratio to the point load index of 24:1. This ratio may vary widely.

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300 mm - 1000 mm with occasional longer sections and occasional sections of 100 mm - 300 mm.
Unbroken:	The core does not contain any fracture.

REFERENCE

International Society of Rock Mechanics, Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1 Final Draft October 1972

GRAPHIC SYMBOLS FOR SOIL & ROCK

<u>SOIL</u>

0	CC
X	тс
\bigotimes	
\bigotimes	FIL
****	PE
	CL
	SII
	SA
	GF
	S⊦
	SI
	CL
	SA
	SA
	CL
· · ·	SI
	GF
	SA
	CL
	cc
	TA

BITUMINOUS CONCRETE
CONCRETE
TOPSOIL
FILLING
PEAT
CLAY
SILTY CLAY
SANDY CLAY
GRAVELLY CLAY
SHALY CLAY
SILT
CLAYEY SILT
SANDY SILT
SAND
CLAYEY SAND
SILTY SAND
GRAVEL
SANDY GRAVEL
CLAYEY GRAVEL
COBBLES/BOULDERS
TALUS

SEDIMENTARY ROCK

BOULDER CONGLOMERATE
CONGLOMERATE
CONGLOMERATIC SANDSTONE
SANDSTONE FINE GRAINED
SANDSTONE COARSE GRAINED
SILTSTONE
LAMINITE
MUDSTONE, CLAYSTONE, SHALE
COAL
LIMESTONE

METAMORPHIC ROCK

SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK

 $\begin{array}{c} + + + \\ + + + \\ \times \times \\ \times \\ \end{array}$



DOLERITE, BASALT

TUFF

PORPHYRY



LogIGRAPHIC-SYMBOLS 24/11/2003 4:38:57 PM



ABBREVIATIONS USED IN DISCONTINUITIES COLUMN OF
BOREHOLE LOGS

Abbreviation	Meaning
DB	Drill Break
Р	Parting
J	Joint
Fr	Fracture
F	Fault
h	Horizontal
v	Vertical
sh	Subhorizontal
SV	Subvertical
he	Healed
pl	Planar
st	Stepped
un	Undulating
ro	Rough
sm	Smooth
sl	Slickensided
ti	Tight
di	Probably drilling induced
fg	Fragmented
Fe	Ironstained
cem	cemented
sty	silty
су	clay
са	calcite
cbs	Carbonaceous
lam	Lamination

Examples:

- 1. At 62.04 m, P, 30°, un, st, ro, cbs lam At 62.04 m Parting, 30°, undulating, stepped, rough, on carbonaceous siltstone lamination
- 2. At 65.08 m, Fr, 70°, pl, ro, st, fg At 65.08 m, fracture, planar, rough, stepped, fragmented.

Abbreviation	Meaning					
	Lithology					
CL	Coal					
MS	Mudstone					
St	Siltstone					
SS	Sandstone					
CBS	Carbonaceous					
lam	Laminations					
bnd	Band					
sm	Seam					
	Strength					
EL Str	Extremely low strength					
VL Str	Very low strength					
L Str	Low strength					
M Str	Medium strength					
H Str	High strength					
VH Str	Very high strength					
EH Str	Extremely high strength					
١	Weathering					
EW	Extremely weathered					
HW	Highly weathered					
MW	Moderately weathered					
SW	Slightly weathered					
Fr	Fractured					

ABBREVIATIONS USED FOR STRATA DESCRIPTIONS

For thin seams to save space, instead of:

From 93.03m to 93.13m depth, medium strength carbonaceous mudstone band (30mm)

write as

92.08m? MS cbs M Str, (30mm)

where abbreviation order is

Depth, Rock type, qualifier, strength, (weathering optional), thickness.

SURFACE LEVEL: 22.5 EASTING: 369920 NORTHING: 6360590 DIP/AZIMUTH: 90°/--

BORE No: 1 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 1 OF 4

			Description	Degree of	<u>.</u>	Rock Strength	L	Fracture	Discontinuities	Sa	amplii	In Situ Testing	
님	Deptl (m)	n	of	Vicunicing	raph Log		Vate	Spacing (m)	B - Bedding J - Joint	be	ore . %	۵°	Test Results
	()		Strata	H M M M M M M M M M M M M M M M M M M M	Ū	Ex Lo Very I Low High Very I Ex Hid	>	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Ty	ပိမ္မ	R0%	∝ Comments
E	0.	15	TOPSOIL - Dark grey silt topsoil with		Σ_{i}								
22			CLAY - (Very stiff), brown clay with trace organics. M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>A</td><td></td><td></td><td></td></wp<>							A			
			CLAY - Very stiff to hard, red-brown and grey clay with trace fine to										
	-1		medium subrounded gravel, M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>A</td><td></td><td></td><td></td></wp<>							A			
21	-									S pp			4,10,12 N = 22 300->400 kPa
-	-2												
	-												
12	- 2	.7											
ŀ	-3		SILTSTONE / SANDSTONE - Extremely low strength, extremely										
ŀ	-		siltstone / sandstone										
-6	-												
E													
ł	4 7		SANDSTONE - Extremely low strength, extremely weathered, light										
-8-	-		brown sandstone										
ł	- 4	.7	SILTSTONE - Extremely low to very		· · · ·								
ŀ	-5		low strength, extremely to highly weathered, light grey siltstone		· ·								
E ~	5.1 5.1	25 35	CLAYSTONE - Very low to low						5.25m to 5.35m, fragmented				
[5.	55	grey and orange-brown claystone						^L 5.35m: CORE LOSS: 200mm	C	66	0	
F	6	.0 .9	CLAYSTONE - Very low to low		Ĭ				L5.55m to 5.8m, highly fractured	С	33	0	
ŀ	- 6. - 6.	16/ 29/	strength, highly weathered, light grey and orange-brown claystone		H				fragmented				
-16	6.	37	SILTSTONE - Medium strength, moderately weathered, grey and		· ·				-5.9m: CORE LOSS: 200mm	C	88	59	
ŀ	- -		orange siltstone						fragmented 6 16m ⁻ CORF LOSS ⁻				
Ē			SILTSTONE - Medium strength,		· ·				130mm 6.29m to 6.37m,				
15			orange siltstone		· ·			 	fragmented 6.42m: P,sh,un,ro				
F	7.8	84	SILTSTONE / CLAYSTONE -		·				6.55m: J,45°,un,H				
E	-8		Extremely low to low strength, extremely to moderately weathered,					╵┎╌┦╶╷╷	6.98m: P,15°,un,ro 7.1m: J.sv.pl.sm				
[4		.2	gery-brown and orange siltstone / claystone		\boxtimes			Ž	⁻ 7.54m: J,80°,un,ro -7.82m: P,15°,pl,ro, cy	С	84	76	
-	- 8. ¹ 	55-	SILTSTONE - Medium strength, moderately weathered, light grey siltstone						filled (20mm) 7.9m: P,10°,pl,ro,cy 8m: sv fracture 8.11m to 8.2m, fg				
			COAL - Medium strength, fresh black coal						^L 8.2m: CORE LOŠS: 350mm				
-6	- 9	9.4 9.6	COAL - Medium strength, fresh,		\times				9.4m: CORE LOSS: 200mm	C	92	61	
Ŀ	-		plack coal						9.85m: sv fracture				
RI	G : Ed	so	n 3000 DRILL	.ER: Simon (APS)		LOC	GED: Bear	CASI	NG:	HW t	o 2.7	m

TYPE OF BORING: Solid flight auger to 2.7m (TC-bit), then HQ wireline to 33.5m

DRILLER: Simon (APS)

LOGGED: Bear

REMARKS: SAMPLING & IN SITU TESTING LEGEND

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

- A D B
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: 22.5 EASTING: 369920 NORTHING: 6360590 DIP/AZIMUTH: 90°/--

BORE No: 1 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 2 OF 4

Γ		Description	Degree of	Rock	L	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ā	Depth	of			/ate	Spacing (m)	B - Bedding J - Joint	ЭС	е%.	Q,	Test Results
		Strata	Gr Gr	- ow Very Lov √ery H √ery H	\leq	0.100	S - Shear D - Drill Break	Ţ	ပို ပိ	R0%	& Comments
	- 11 11	CORE LOSS - COAL - Medium strength, fresh black coal (continued) from 10.1m to 10.2m, light brown clay, stiff CARBONACEOUS SILTSTONE - Medium to high strength, slightly weathered to fresh, light grey siltstone					10.1m: P,sh,pl,ro cy filled 10.2m: P,sh,pl,ro cy filled 10.31m to 10.47m, fg to highly Fr 10.47m: P,sh,un,ro, cy filled 10.55m: P,sh,un,ro, cy filled 10.65m: P,sh,un,ro 10.95m: J,85°,pl,sm 10.99m: P,sh,ro,un	с	92	61	
	- 12 12.0 - 12.4 - 12.45	LAMINITE - Medium to high strength, slightly weathered to fresh, light grey laminite CORE LOSS -					11.11m: J,85°,pl,sm 11.36m to 11.56m, Fg 11.65m: J,85°,pl,sm 11.75m: J,sv,pl,sm 11.85m: J,75°,pl,sm 11.95m: J/Fr, 80°,pl,sm				
-	- 13 - 13.26	LAMINITE - Medium to high strength, slightly weathered to fresh, light grey laminite					11.98m: J/Fr, 85°,pl,sm 12.25m: J/Fr, 85°,pl, sm 12.4m: CORE LOSS: 50mm 12.48m: P,30°,ro,un, cy				
	- 13.41 - 13.92 - 14 - 14.17 - 14.21 [/]	LAMINITE - Medium to high strength, slightly weathered to fresh, light grey laminite from 13.56m to 13.92m, thin coal bands at approximately 40mm spacing CORE LOSS - (Possibly coal)					12.53m: P,20°, ro,un, coal 12.63m: P,10°, ro, un, coal 13.26m: CORE LOSS: 150mm 13.41m: P,sh,ro,un, cy 13.48m: P,sh,pl,sm cy 13.79m: P sh pl sm cy	С	82	82	
	- 15 ^{14.95}	COAL - Medium strength, fresh, black coal LAMINITE - Medium to high strength, slightly weathered to fresh,					13.92m: CORE LOSS: 250mm 14.21m: P,sh,pl,sm, cy 14.21m to 14.29m, highly fractured				
	15.64 16	light grey laminite CORE LOSS - LAMINITE - Medium to high strength, slightly weathered to fresh, light grey laminite			. 4		^L 14.95m: CORE LOSS: 690mm 15.93m: J,40°,ro,pl				
	- 17	form 47 Oct to 47 07m this and						С	77	75	
	- 17.79	bands at approximately 10mm spacings from 17.5m to 17.57m, high strength, fresh, grey sandstone					17.5m: P,sh,H,pl 17.57m: P,sh,pl,ro 17.79m: P,15°,pl,ro				
	- 18 	SANDSTONE - High strength, fresh, grey sandstone from 18.01m to 18.12m, pebbly band		· · · · · · · · · · · · · · · · · · ·			18.27m: J,40°,un,ro, coal	с	100	100	
-	18.82 19 19.04 19.11/	From 18.22m to 18.32m, pebbly band from 18.64m to 18.82m, pebbly band COAL - Medium strength, fresh,					18.73m: P,10°,un,ro, coal 18.82m: P,15°,pl,ro 19.03m: P,sh,pl,ro 19.05m: P,sh,pl,ro, coal	С	73	45	
-		SANDSTONE - High strength, moderately weathered, light				┍┓┿┿┓╎╎ ╎╵╽┇╵╵	CORE LOSS: 330mm 19.44m to 19.5m, fg 19.5m to 19.6m, highly	с	100	69	

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 2.7m (TC-bit), then HQ wireline to 33.5m

CASING: HW to 2.7m

REMARKS: SAMPLING & IN SITU TESTING LEGEND

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: 22.5 EASTING: 369920 NORTHING: 6360590 DIP/AZIMUTH: 90°/--

BORE No: 1 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 3 OF 4

		Description	Degree of	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
뉟	Depth (m)	of		Log		Spacing (m)	B - Bedding J - Joint	be	re . %	р С	Test Results
	(,	Strata	N N N N N N N N N N N N N N N N N N N	Ū	Very Low Very Low Very Low	0.01 0.10 0.50	S - Shear D - Drill Break	Тy	Co Rec	R0%	& Comments
2	-21	grey-light brown sandstone CORE LOSS - (Possibly coal) from 19.5m, medium to high strength, slightly weathered to fresh LAMINITE - Extremely low to very low strength, highly to moderately weathered, grey laminite with some coal laminations <i>(continued)</i>					fractured 19.94m: P,sh,pl,sm 19.5m to 20.13m, Fr, sv, un, H 20.14m: J,75°,pl,ro 20.4m: J,sv,un,ro 20.8m: J,45°,pl,ro 21.25m: J, 70-80°,un,ro	С	100	69	
	21.72	SILTSTONE					21.72m: Fr,80°,pl,ro 21.84m: J,25°,un,ro 22.05m: J,sv,un,ro 22.3m: J,80°,H,un				
2	22.65 22.9 -23 -24	CORE LOSS - LAMINITE - Medium to high strength, fresh, light grey and grey laminite (80% siltstone, 20% sandstone)					22.5m to 22.56m, highly fract, J,20°, sl, un 22.56m: J,20°, sl, un 22.58m: J,35°, sl, pl 22.65m: CORE LOSS: 250mm 22.9m to 23.02m, fract 23.08m: J,50°, H, pl 23.4m: J,35°, pl, ro, H 23.65m: J,80°, H, un, sm 23.8m: J,85°, H, sm, pl	С	92	66	
	- 24.69 - 24.78 - 25 - 25 - 25.8	CORE LOSS - LAMINITE - Medium to high strength, fresh, grey and light grey laminite from 24.8m to 24.85m, carbonaceous siltstone band SILTSTONE - Medium to high					24.69m: CORE LOSS: 90mm 25.05m: J,60°,H,pl 25.37m: J,45°,H,un 25.7m: J,75°,H 25.82m: J,70°,H	С	94	86	
-4	- 26 - - - - - -	strength, fresh, grey siltstone		·			26m: J,sv,H,pl,sm, (25.7m to 26.35m, open di from 25.95m)	С	100	70	
	-27 -27 - 27.39 - 27.5	from 26.95m to 27.39m, Core drilled twice causing increased fracturing					27.35m: J,75°,pl,sm	С	85	20	
- - - - - - - - - - - - - - - - - - -	- 28 28.12 - 28.7 - 29	SILTSTONE - High strength, fresh, grey siltstone LAMINITE - High strength, fresh, grey and light grey laminite from 28.65m, bands of coal COAL - Medium strength, fresh black coal					27.53m: J,75°,pl,sm 27.53m: J,75°,pl,sm 28.83m: P,sh,un,ro	С	100	94	
· · · · ²⁻ · · · ·	- - - - - - -	from 28.83m to 28.89m, bands of brown clay					28.89m: P,sh,un,ro 29.25m: J,80°,un,ro	С	100	100	

RIG: Edson 3000 TYPE OF BORING: Solid flight auger to 2.7m (TC-bit), then HQ wireline to 33.5m

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 2.7m

REMARKS: SAMPLING & IN SITU TESTING LEGEND

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level

CHECKED Initials: Date:



Douglas Partners Geotechnics · Environment · Groundwater

SURFACE LEVEL: 22.5 EASTING: 369920 NORTHING: 6360590 DIP/AZIMUTH: 90°/--

BORE No: 1 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 4 OF 4

		Description	Degree of	<u>.0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
뉟	Depth (m)	of	weathening	aph Cog		Spacing (m)	B - Bedding J - Joint	ЭС	е%.	Q,	Test Results
	(11)	Strata	× × × × × ×	9_	Very F /ery F /ery F	0.105	S - Shear D - Drill Break	Typ	Rec	a% Q%	& Comments
	-	COAL - Medium strength, fresh black coal (continued)					30.3m: J,75°,un,ro	с	100	100	
	- - - 31 [31.15						21 45m Dah Hal				
- 6 ⁻	- 32	grey sandstone					3 I. IOIII. P,SII,⊓,pi	с	100	100	
	- 33	from 32.35m to 32.38m, thin coal laminations at approximately 10mm spacings from 32.7m to 32.9m, thin coal laminations at approximately 30mm spacings									
-1-	- 33.5 -	from 33.39m to 33.5m, thin coal laminations at approximately 2mm to 35mm spacings		. <u>.</u>							
-	- 34	Bore discontinued at 33.5m, limit of investigation									
-12-	-										
-	- 35										
-13-	- - - -										
-	- - 36 - -										
-14	-										
	- 37										
-15	-										
-	- 38										
	- - - -										
	- 39 										
-1	- - - -										

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 2.7m

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS: SAMPLING & IN SITU TESTING LEGEND**

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C

TYPE OF BORING: Solid flight auger to 2.7m (TC-bit), then HQ wireline to 33.5m

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level





 SURFACE LEVEL:
 22.0

 EASTING:
 370020

 NORTHING:
 6360740

 DIP/AZIMUTH:
 90°/-

BORE No: 2 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 1 OF 3

		Description	Degree of Weathering	. <u>0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
ᆋ	Depth (m)	of	literation	Log		(m)	B - Bedding J - Joint	bе	ore S. %	۵۵ م	Test Results
N	()	Strata	M M M M M M M M M M M M M M M M M M M	U	Ex Lo Very Low High Very Ex High	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Ту	Rec	R0%	Comments
	- 0.2	FILLING - Generally comprising grey-brown and brown sandy clayey silt with some coal fragments, bricks, dry SILTY CLAY - Light grey-brown and red-brown silty clay, M <wp< td=""><td></td><td>X =</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></wp<>		X =							
	-	SILTSTONE - Extremely low to very low strength, extremely to highly weathered, light brown and red-brown siltstone		· - · · · · · ·				S			10,14,19 N = 33
5	- 2.4	LAMINITE - Low to medium strength, moderately to slightly		· ·							
19	-3	weathered, light grey-brown and grey laminite (70% sandstone, 30% siltstone)		· · · · · · · · · · · · · · · · · · ·							
17	- 3.3	SILTSTONE - Very low strength, highly weathered, grey-brown and orange-brown siltstone from 3.75m to 3.85m, some carbonaceous mudstone bands (2mm to 10mm) from 3.85m, medium to high strength, fresh from 4.12m to 4.18m, high strength sandstone band from 4.46m to 4.7m, high strength sandstone band from 4.7m to 4.76m, low strength,					3.3m: P,5°,sm,un, cy veneer 3.55m: J,30°,ro,un,Fe 3.71m: J,10°,sm,un,Fe, cy filled (12mm) 3.89m: P,5°,sm,pl,Fe 3.98m: P,5°,sm,pl,Fe 4.06m: P,5°,sm,pl,Fe 4.06m: P,5°,sm,pl,Fe 4.6m: J,70°,h,Fe 4.65m: J,70°,h,Fe 4.65m: J,70°,h,Fe 4.7m: P,sh,ro,pl, cy filled (20mm) 4.94m: P,5°,sm,pl, cy	С	100	91	
4 15 15 16 16	-6-6	moderately weathered from 5.35m, very low to low strength coal bands and carbonaceous mudstone bands (2mm to 10mm) CARBONACEOUS MUDSTONE - Low strength, slightly weathered, dark brown-black carbonaceous mudstone with some very low strength coal bands (1mm to 20mm) from 5.8m to 5.87m, very low strength LAMINITE - Medium to high strength, fresh, light grey and grey laminite (50% sandstone, 50% siltstone)					filled (8mm) 5.8m: P,10°,ro,un 5.91m: P,5°,sm,pl, cy filled (3mm) 5.94m: J,45°,ro,pl 6.05m: J,5°,sm,pl 6.15m: P,5°,sm,pl 6.3m: P,5°,sm,pl 6.3m: P,5°,sm,un, cy veneer 7.02m: J,60°,h	С	100	97	
-1-	- 8.3	SANDSTONE - High strength, fresh, light grey, medium coarse grained sandstone		· · · · · · · · · · · · · · · · · · ·							
13	-9						9.05m: J,50°,ro,pl,Fe 9.5m: J,60°,h	С	98	95	
-	9.75	PEBBLY SANDSTONE - Medium to					a.				

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: HW to 2.7m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.7m, then HQ coring to 26.95m **WATER OBSERVATIONS:** Free groundwater obscured by drilling fluids

REMARKS:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 pp
 Pocket penetrometer (kPa)
 Disturbed sample
 PID
 Photo ionisation detector

 B
 Bulk sample
 S
 Standard penetration test
 Initials:

 Ux
 Tube sample (x mm dia.)
 PL
 Point load strength Is(50) MPa
 Date:

 W
 Water sample
 V
 Shear Vane (KPa)
 Date:

 C
 Core drilling
 >
 Water seep
 ¥
 Water level





SURFACE LEVEL: 22.0 EASTING: 370020 NORTHING: 6360740 DIP/AZIMUTH: 90°/--

BORE No: 2 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 2 OF 3

Γ		Description	Degree of Weathering ⊡	Rock Strength	L	Fracture	Discontinuities	Sa	mplii	ng &	In Situ Testing
ā	Depth	of	raph.		Vate	Spacing (m)	B - Bedding J - Joint	be	ore c. %	Da %	Test Results
	N	Strata	D M M M M M M M M M M M M M	Ex Lo Very Mediu Very Very	2	0.01 0.05 0.10 0.50 1.00	S - Shear D - Drill Break	È	ပိမ္ခိ	<u>ж</u> ,	Comments
	- 10.0 10.05 - 10.3 - 10.3 	high strength, fresh, light grey-brown medium to coarse grained pebbly sandstone CORE LOSS - 50mm PEBBLY SANDSTONE - Medium to high strength, fresh, light grey-brown medium to coarse grained pebbly sandstone LAMINITE - Medium to high strength, fractured, light grey and grey lamination (60% siltstone, 40%					9.92m: J,80°,ro,pl 9.95m: J,85°,ro,un 10m: CORE LOSS: 50mm 10.07m: J,45°,ro,pl 10.57m: J,50°,ro,pl	С	98	95	
	= 12 - 12 	sandstone) with trace coal laminations from 11.8m, high strength (40% sandstone, 60% siltstone)					12.4m: P,5°,ro,pl 13.15m: P,5°,sm,pl	С	100	100	
- - - - - - - - - - -	≈ - 14 	from 14.3m, some pyrite in laminations					√13.68m: J,20°m,sl,st 13.74m: J,15°,sl,pl	С	100	100	
	 15 - -	from 15.5m, high strength (80% sandstone, 20% siltstone)					15.07m: P,10°,sm,un 15.2m: J,70°,sm,pl 15.76m: J,30°,sm,un, cy veneer 15.92m: P,10°,sm,un 16.12m: P,10°,sm,un, cy filled (8mm) 16.19m: P,10°,ro,un,Fe	С	92	78	
Ę	- 17.08	CORE LOSS - 240mm					17.08m: CORE LOSS:				
	17.32 17.32 18 18.15	LAMINITE - High strength, fresh, light grey and grey laminite (80% sandstone, 20% siltstone) SILTSTONE - High strength, fresh, grey siltstone					1 240mm 17.35m: J,80°,ro,pl 17.4m: P,10°,ro,pl 17.58m: P,10°,h 17.65m: J,60°,ro,pl 17.75m: J,70°,ro,pl 17.85m: J,70°,ro,pl 18.07m: J,45°,ro,pl	С	100	100	
- - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	from 19m, some carbonaceous bands (5mm to 30mm thick, 50mm to 500mm spacings)					18.85m: J,65°,h,sm,un 18.93m: P,5°,sm, cy veneer 19.03m: P,5°,sm,un cy filled (3mm) 19.07m: P,5°,sm,un cy filled (2mm) 19.11m: P,5°,sm,un cy	С	98	80	

RIG: Scout 103

DRILLER: Sheddon

LOGGED: Reid

CASING: HW to 2.7m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.7m, then HQ coring to 26.95m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND

- A D B
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level ter (kPa)





CLIENT:

PROJECT: LOCATION:

Coal & Allied Operations Pty Ltd Proposed Residential Subdivision Minmi

SURFACE LEVEL: 22.0 EASTING: 370020 NORTHING: 6360740 **DIP/AZIMUTH:** 90°/--

BORE No: 2 PROJECT No: 39663D DATE: 18 Oct 07 SHEET 3 OF 3

					0,			0.		•••	01 0
Γ		Description	Degree of Weathering ⊡	Rock Strength	5	Fracture	Discontinuities	Sa	amplii	ng &	n Situ Testing
뉟	Depth	of	apla		ate	Spacing (m)	B - Bedding I - Joint	e	e%	D	Test Results
[(11)	Strata				62 462	S - Shear D - Drill Break	Typ	Ç C	RQ %	& Commonto
┝ᡣ	20.0	CORF LOSS - 50mm					filled (10mm)				Comments
ŀ	L	SILTSTONE - High strength, fresh.		-			-19.14m: P,5°,sm,un cy				
Ł	Ł	grey siltstone		-		ו ך ו	filled (20mm) 19 2m: J 60° sm pl	с	98	80	
Ł	Ł				1 li		⁻ 19.27m: P,5°,sm,pl, cy	-			
F	F			·	li	i Gi -	veneer 19.66m: P.5° sm.pl. cv				
Ę۳	-21			-			veneer				
-	21.27	from 21.15m, medium strength		-	ļ	┍╧┛╵┊	19.95m: CORE LOSS: 50mm				
F	21.37	CORE LOSS - 50mm			1 1		20.05m: P,5°,sm,un 20.07m: P 5° sm un				
F	21.6	SILTSTONE - Very low strength,			1 li		20.33m: J,45°,sm,pl				
F_	-	siltstone					20.46m: J,40°,sm,un				
F	- 22	COAL - Low strength, fresh, dull					21.2m: P,10°,sm,pl, cy				
F	F	black coal with some tuff bands			1 li		filled (2mm) 21.32m [·] P 10° sm pL cv				
F	F	at 21.7m, very low strength tuff band					filled (2mm)	С	98	90	
F	F	at 21.8m. very low strength tuff band					21.37m: CORE LOSS:				
Ē.	222	from 21.82m to 21.87m, very low			1 li		21.51m: J,70°,sm,un				
f,	23	strength tuff band					² 21.56m: J,30°,sm,un				
Ł	Ł	at 22.11m, very low strength tuff									
Ł	Ł				1 li	- i i i i i i i i i i i i i i i i i i i	23.5m: J.70°.sm.un				
Ł	-						23.7m to 23.98m, high				
Ła	24 23.98	at 23.8m, medium to high strength					fractured, di (10-50mm)				
F,	27	from 23.9m to 23.98m, highly			li						
ŀ	t i	fractured, drilling induced		• • • • • •							
ŀ	È.	SANDSTONE - High to very high									
Ł	-	strength, fresh, light grey fine to medium grained sandstone		: ; ; ; ; ; ; ; ;	li						
Ļφ	- 25			:							
È	-										
ŧ	-			· i i i i i i	1 li		>>	C	100	100	
È	-									100	
F	-										
<u>+</u> 4	-26			: i i i i i i	li	ii ii					
F	F	from 26.1m, coal laminations (1mm		·							
F	F	to 3mm thick), 40mm to 200mm		:							
F	F		i i i i i i i ⊡	·iiiii	li	ii ii					
F	F										
Ęφ	27 26.95	Bore discontinued at 26.95m, limit of		╡╷╷╷╷╻╷	1						
ŀ	Ł	investigation									
ŀ	ŧ										
ŀ	ŧ										
ŧ	ţ										
-φ -	- 28										
ŀ	F				T B						

RIG: Scout 103

-1-- 29

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: HW to 2.7m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.7m, then HQ coring to 26.95m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

A D B U W C

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





SURFACE LEVEL: 22.5 EASTING: 370252.2 NORTHING: 6360816.3 DIP/AZIMUTH: 90°/--

BORE No: 3 PROJECT No: 39663D DATE: 10 Oct 07 SHEET 1 OF 3

		Description	Degree of Weathering	<u>i</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
뇞	Depth (m)	of	, rousing	Log		Spacing (m)	B - Bedding J - Joint	be	ore S. %	D Q %	Test Results
	()	Strata	HW MW SV FR FR	G	Ex Low Low High Ex Hi Ex Hi	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Тy	с я В	<u>م</u>	Comments
22		FILLING - Generally comprising brown and red-brown clay filling with trace fine to medium grained sand and fine gravel, M>Wp		X				A			
	0.75	Ironstone Layer		77				A			
21	- 1 - - - - -	SILTY CLAY - (Very stiff to hard), light grey silty clay with orange and red silty clay inclusions						s			6,9,10 N = 19
	-22.0	SHALE - Extremely low to very low strength, highly weathered, light grey and red-brown shale						0			15 20/120mm
-	- 2.7							5			15,20/120mm
	-3	CLAY - (Hard), grey and red-brown clay with some fine subangular gravel inclusions, and red-brown and grey siltstone, very low strength, highly weathered									
	3.52 	From 3.44m to 3.48m, siltstone SILTSTONE - Very low strength,		· ·							
	- 4 - - -	highly weathered, red-brown and grey siltstone with bands of light grey clay		· ·				C	100	0	
-9-	-										
	- 4.7 - - - - - -	SILTSTONE - Extremely low to very low strength, extremely to highly weathered, brown-grey laminated siltstone with coal laminations		·	[4.7m to 5.15m, highly fractured, ro,un, sh, (15°) 4.85m: J,50°,ro,un,coal				
12	-	1-2mm thick at 5-20mm spacing from 5.15m, very low strength, highly weathered from 5.61m, low strength		· ·			5.02m: 3,35 ,ro,pi 5.15m to 5.61m, highly fractured 5.71m: P,15°,ro,pl, coal				
	- 63	moderately weathered, some coal laminations		· ·			veneer 5.94m: J,sh,ro,un,Fe 6m: P,sh,or,un, clay	с	100	0	
16	7	SILTSTONE - Medium strength, fresh, light grey siltstone with some dark grey carbonaceous siltstone laminations 1-2mm thick at 1-30mm spacings from 6.98m to 7.0m, slightly					6.06m to 6.3m, highly fractured 6.48m: J,sh,ro,un 6.61m: J,sh,ro,un 6.72m: J,sh,ro,un 6.85m: J,sh,ro,un				
15	- - - - 7.59	weathered, ironstaining		· — 		┆ ┆ _{┛┙} ┛╵┆	7m: J,sh,ro,pl,Fe 7.12m: J,sh,ro,un,Fe 7.32m: P,sh,ro,pl,Fe				
		SANDS I ONE - Medium strength, slightly weathered, light grey-light brown fine to medium grained sandstone		· · · · · · · · · · · · · · · · · · ·			17.47m: J,sh,ro,un,⊢e 17.56m: J,sh,ro,un 17.59m: J,sh,ro,un 17.68m: J,sh,ro,un 17.85m: J,30°,ro,un,Fe	с	100	78	
-4-	-	from 8.25m, grading to pebbly sandstone					7.87m: J,sh,ro,un,Fe 7.95m: P,sh,30°,ro,un,Fe 7.99m: J,sh,20°,ro,un				
	- -9 - -	from 0.41m to 0.6m moderately		· · · · · · · · · · · · · · · · · · ·			18.36m: J,sh,ro,un 8.49m: J,sh,ro,un 8.67m: J,sh,ro,un 8.92m: J,sh,ro,un 8.97m: J,sh,ro,un	с	100	59	
	- 9.6 	weathered, fragmented		$\left \right\rangle$			9.11m: J,sh,5°,ro,un 9.26m: J,sh,10°,ro,un 9.32m: J,60°,ro,pl,Fe	с	49	25	

RIG: Edson 3000 TYPE OF BORING: Solid flight auger to 3.5m (TC-bit), then HQ wireline to 22.05m

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear/Benson

CASING: HW to 3.5m

REMARKS: SAMPLING & IN SITU TESTING LEGEND

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level ter (kPa)





SURFACE LEVEL: 22.5 EASTING: 370252.2 NORTHING: 6360816.3 DIP/AZIMUTH: 90°/--

BORE No: 3 PROJECT No: 39663D DATE: 10 Oct 07 SHEET 2 OF 3

		Description	Degree of Weathering	S	Rock Strength	Ľ	Fracture	Discontinuities	Sa	amplir	ng &	n Situ Testing	
Ъ	Depth (m)	of		Log	High Low	Wate	(m)	B - Bedding J - Joint	ype	core sc. %	%D	Test Results &	
		Strata	HW MW SW FR				0.05	9.35m: J sh 5° ro un	-	0 %	œ	Comments	
12	10.6			X				9.41m to 9.6m, Fg 9.6m: CORE LOSS: 1000mm					
-	- 11.29 - 11 45	COAL - Medium strength, fresh,						10.62m: J,25°,ro,un,Fe 10.66m: J,10°,ro,un,Fe 10.7m: J,45°,sm,pl,Fe 10.85m: J,sh,sm,pl 10.94m: J,sh,sm,pl 11.12m: J,60°,sm,pl,Fe	С	49	25		
9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- 11.55 11.59 - 11.88 - 12 - 13 - 13 - 14	highly fractured, dull black coal with some bright black coal lenses CORE LOSS - 0.1m SILTSTONE - Low strength, highly weathered, fragmented grey and dark grey siltstone with some carbonaceous siltstone lenses SANDSTONE - Medium strength, fresh, light grey fine grained sandstone						11.27m: P,ro,un 11.41m: Fr, sv, sm,pl 11.45m: CORE LOSS: 100mm 11.27m to 11.83m, Fg 11.83m: J,5°,sm,pl, cs Iam 11.89m: J,30°,ro,un 12.24m: J,sh,ro,un 12.24m: J,sh,ro,un 12.24m: J,sh,ro,pl 13.13m: J,5°,ro,pl 13.66m: J,45°,ro,pl 14.01m: J,sh,ro,un 14.25m: J,5°,ro,pl	С	97	95		
8	- 15 - 15.41 - 16 - 17 17 05	SILTSTONE - Medium strength, fresh, light grey and grey siltstone						14.88m: J,5°,ro,pl 15.1m: P,5°,ro,pl, cs lam 15.13m: P,5°,ro,pl, cs lam 15.16m: P,20°,ro,pl, cs lam 15.23m: J,60°,ro,pl,Fe 15.31m: P,10°,ro,pl, cs lam 15.37m: P,sh,ro,pl, cs lam 15.39m: P,sh,ro,pl, cs lam 15.41m: P,sh,ro,un 15.49m: J,5°, ro, pl	С	100	57		
3	- 19.83	VOID - 17.05m to 19.83m						15.61m: J,sh,ro,pl 15.61m: J,sh,ro,pl 15.67m: J,sh,sm,pl 15.77m: J,sm,un,pl,sh 15.88m: J,sm,un,pl,sh 15.98m: J,sm,un,pl,sh 16.02m: J,sm,un,sh,pl 16.09m: J,sm,un,sh,pl 16.26m: J,sm,un,sh,pl 16.26m: J,sh,sm,pl 16.42m: J,60°,sm,pl,Fe 16.48m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.61m: J,sh,sm,pl 16.94m: P,sh,sm,pl, cs lam 16.97m: J,60°,sm,pl 19.83 to 20.45, Fg	С	23	0		
Ŀ	SILTSTONE - Probable rubble												
RI TY	G: Edso 'PE OF E	n 3000 DRILL BORING: Solid flight auger to 3.5m (.ER: Simon (A TC-bit), then H	.PS) IQ w	l vireline to 22.05	_OC 5m	GGED: Bear/	Benson CASI	NG:	HW t	o 3.5	m	

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS: SAMPLING & IN SITU TESTING LEGEND**

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level

Initials: Date:





CHECKED

SURFACE LEVEL: 22.5 EASTING: 370252.2 NORTHING: 6360816.3 **DIP/AZIMUTH:** 90°/--

BORE No: 3 PROJECT No: 39663D DATE: 10 Oct 07 SHEET 3 OF 3

Γ		Description	Degree of Weathering	. <u>0</u>	Rock Strength	r	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
Ā	J Depth	of	rocationing	Log		Vate	Spacing (m)	B - Bedding J - Joint	be	ore S. %	مد %	Test Results
		Strata	MW HW S LAN	U	Ex Lo Very Low Mediu Very Ex High	>	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Тy	Rec C	RC %	Comments
ŧ	-	SILTSTONE - Probable rubble (continued)										
-	20.45	COAL - Low strength highly	╡╎┏┙┛╎╷╷╵					20 45 to 20 67 Fa	С	23	0	
ŧ	20.67	weathered black coal		· · ·				20.10 to 20.07, 1 g				
ŧ	-21	SANDSTONE - High strength, slightly weathered grey fragmented		::::								
Ē	-	sandstone								100	100	
Ę	ŀ								C	100	100	
ł	-											
Ē	22 22.05	Bore discontinued at 22.05m	│									
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RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear/Benson

CASING: HW to 3.5m

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS: SAMPLING & IN SITU TESTING LEGEND**

Ď

TYPE OF BORING: Solid flight auger to 3.5m (TC-bit), then HQ wireline to 22.05m

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

PP S PL V

- - Point load strength Is(50) MPa Shear Vane (kPa) Water seep ¥ Water level



L.	
0	Pocket penetrometer (kPa)
D	Photo ionisation detector
	Standard penetration test
	Point load strength ls(50) MPa

SURFACE LEVEL: 25.7 EASTING: 370675.9 NORTHING: 6360727.5 DIP/AZIMUTH: 90°/--

BORE No: 4 PROJECT No: 39663D DATE: 24 Oct 07 SHEET 1 OF 3

			Description	Degree of	<u>.</u>	Rock Strength	r	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
물	Dep	th	of	Wedatering	aph		Vate	Spacing (m)	B - Bedding J - Joint	e	e%	Q.,	Test Results
		<i>,</i>	Strata	H H M M M M M M M M M M M M M M M M M M	Ū	Ex Lov Very L Mediu Fx High		0.01 0.10 0.50	S - Shear D - Drill Break	1 ₂ 1	Rec	RC %	& Comments
F	-		SILT - Brown silt, damp										
-).25	CLAY - (Stiff), grey-brown clay with trace silt, M>Wp							A,pp			130-150 kPa
25	3- - - - - 1 1	0.7 1.05	CLAY - (Stiff), brown and grey-brown clay with some silt and \trace sand, M>Wp							A,pp			150-200 kPa 170 kPa
24		1.4	CLAY - (Stiff to very stiff), orange-brown clay with some sand and inclusions of charcoal, trace rootlets, M ≤ Wp CLAY - (Hard), light grey-white clay,							S pp pp			2,6,11 N = 17 250-300 kPa >400 kPa
23			M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></wp<>										
ŧ	-3	2.85 3.0	CORE LOSS -		×				2.85m: CORE LOSS:	C	62	13	
ŧ	- 3	3.25	CLAYSTONE - Extremely low					╵╶╵┛╵╵ ╾┼┞──┼┼╱	3.17m: P,10°,un,ro, coal		02	43	
	- 3 - 3	3.63	red-grey claystone, clay like properties						substance 3.25m: CORE LOSS: 380mm				
	-4 -4 - 4	1.15	CLAYSTONE - Extremely low strength, extremely weathered, red-grey claystone, clay like properties						substance	с	79	79	
	-5	5 4	SILTSTONE - Very low to low strength, highly weathered, grey-brown siltstone with orange bands		· ·				4.51m to 4.56m, Fg 4.83m: J,75°,pl,ro, ∖ rootlets				
		5.22- 5.29	from 4.49m, medium strength, moderately weathered from 5m to 5.1m, very low strength, highly weathered CORE LOSS - SILTSTONE - Extremely low strength, extremely weathered, grey-brown siltstone					╘╶╶╶┚╴╴╹┫╢	4.95m: J,50°,un,ro 5.1m: CORE LOSS: 120mm 5.33m: J,80°,pl,sm 5.34m: J,sv,pl,sm 5.38m to 5.42m, Fg 5.53m: P,sh,un,ro, coal 5.69m: J,85°, H, un 5.85m: J,70°,H,pl 5.92m: J,60°,H,pl	С	92	71	
Γσ	, _		strength, moderately weathered,		· _ ·				5.95m: J,65°,H,pl 6.13m: P,sh,un,ro, Fe				
-	-7	7.36 7.5	grey siltstone with orange bands from 6.5m, slightly weathered from 6.7m, laminations of coal substance and Fe, ≤ 1mm thick COAL - Medium strength, fresh,						6.34m: P,sh,un,ro, Fe 6.47m to 6.5m, P,10°,un,ro 6.68m: J,20°, un,ro,Fe 6.83m: P,5°,un,ro,Fe 7.42m: J,85°, H,un,ro	с	87	77	
F.	2 7	7.65			Ħ				7.43m: J,75°,H,un,ro 7.5m: CORE LOSS:				
-	- 8 		CLAYSTONE / SILTSTONE - Medium strength, slightly weathered to fresh, grey fine siltstone / claystone with coal laminations < 1mm thickness to 8.25m						150mm 7.76m: P,10°,ro,un, clay filled				
	-9								8.9m: J,75°,un,ro	C	100	99	
16	2									с	100	100	

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 2.85m

TYPE OF BORING: Solid flight auger to 2.85m (TC-bit), then HQ wireline to 24.6m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

DAtivin Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: 25.7 EASTING: 370675.9 NORTHING: 6360727.5 DIP/AZIMUTH: 90°/--

BORE No: 4 PROJECT No: 39663D DATE: 24 Oct 07 SHEET 2 OF 3

		Description	Degree of Weathering	. <u>0</u>	Rock Strength	r	Fracture	Discontinuities	Sa	mplir	ng &	In Situ Testing
RL	Depth (m)	of Strata	M H W S H W	Graph Log	Ex Low Very Low Medium High Very High Ex High	Wate	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
-	-								С	100	100	
15 - 1	10.58 10.77	COAL - Medium strength, fresh, \black coal/						10.77m: CORE LOSS: 300mm				
-	. 11.07	SILTSTONE - Medium to high strength, fresh siltstone		· ·				11.32m: P,5°,un,ro	С	86	86	
-14	- 12	at 11.75m, high strength, cobble		· _ ·								
	- - - -	at 12.16m to 12.21m, high strength, cobble		• • •				12.15m: P,10°, un,ro, clay filled				
	-13			• • •				12.8m: J,35°,H,pl				
12	13.55	CORE LOSS -						13.47m: J,70°,pl,ro 13.55m: CORE LOSS:	С	80	75	
-	_ 13.85 - 14 -	SILTSTONE - Medium to high strength, fresh from 13.85m to 14.1m, cored twice		· ·		+		300mm				
	-			· ·				14.73m: J,70°,pl,ro	С	100	66	
-	- 15			• • •								
- - - - - - -	- 16			· ·				15.5m: J,85°,un,sm				
-	-	from 16.03m to 16.44m, laminations containing pyrite and coal up to 3mm thick, 10mm to 50mm spacing		· — ·				pyrite				
-6 - -	16.71 16.81 17	CORE LOSS -						16.56m: P,5°,un,ro 16.62m: P,5°,un,ro, cy 16.71m: CORE LOSS: 100mm	с	90	50	
-	-			· ·		ſ		17.02m: P,sh,ro,un 17.02m: P,sh,ro,un 17.12m: P,sh,ro,un 17.25m: J,sv,un,ro				
-	- 18			· ·				17.52m. 5,70 ,00,10				
		from 18.4m to 18.5m, pebbles and cobbles		·								
-	- 19	from 18.94m to 18.98m, pebbles		 					С	100	60	
9	- - - -	from 19.4m to 19.43m, grey igneous rock band from 19.75m to 19.79m, grey		· ·					с	90	45	

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 2.85m

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

- **SAMPLING & IN SITU TESTING LEGEND** Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





Douglas Partners Geotechnics · Environment · Groundwater

TYPE OF BORING: Solid flight auger to 2.85m (TC-bit), then HQ wireline to 24.6m

ter (kPa)

SURFACE LEVEL: 25.7 EASTING: 370675.9 NORTHING: 6360727.5 DIP/AZIMUTH: 90°/--

BORE No: 4 PROJECT No: 39663D DATE: 24 Oct 07 SHEET 3 OF 3

Γ		Description	Degree of	υ	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
뉟	Depth (m)	of	weathering	Log		Spacing (m)	B - Bedding J - Joint	e	e %	۵.,	Test Results
	()	Strata	M M M M M M M M M M M M M M M M M M M	ū	Ex Low Very Low Very High Ex High	0.01	S - Shear D - Drill Break	Tyl	Rec	R0%	& Comments
	- - 20.49 - 20.6-	igneous rock band SILTSTONE - High strength, fresh, grey siltstone (continued) from 20.11m to 20.14m, grey clay					20.49m: CORE LOSS:	С	90	45	
	20.77	from 20.24m, extremely low to very low strength, extremely to highly weathered CORE LOSS - CARBONACEOUS SILTSTONE -					20.7m: P,sh,pl, ro, clay 20.71m to 20.77m, Fg 21.1m: P,5°,un,ro, cy 21.5m: J,sv,un,ro,H	с	100	81	
3	- 22 - 23 - 23 - 23 - 23 - 23 - 23 - 23	Extremely low strength, extremely weathered, dark grey carbonaceous siltstone from 20.63m, medium strength, moderately weathered from 20.71m, tuff, low strength, highly weathered, brown COAL - Medium strength, fresh black coal from 21.73m to 22.08m, white					22.35m: J,75°,sv,un,ro 22.68m: J,80°,un,ro	С	100	100	
	- 24	from 22.75m, dark brown carbonaceous mudstone bands SANDSTONE - High strengh, fresh, grey sandstone from 24.11m to 24.16m, coal laminations, thickness <1mm, spacing 2mm to 30mm									
	24.6 - 25 - 26 - 27 - 27 - 28 - 29	Bore discontinued at 24.6m, limit of investigation									

RIG: Edson 3000 TYPE OF BORING: Solid flight auger to 2.85m (TC-bit), then HQ wireline to 24.6m

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

ter (kPa)

LOGGED: Bear

CASING: HW to 2.85m

WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS: SAMPLING & IN SITU TESTING LEGEND**

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





SURFACE LEVEL: 20.7 EASTING: 370752.9 NORTHING: 6360439 DIP/AZIMUTH: 90°/--

BORE No: 5 PROJECT No: 39663D DATE: 22 Oct 07 SHEET 1 OF 3

		Description	Degree of Weathering	ic	Rock Strength	Fract	ture	Discontinuities	Sa	amplir	ng &	In Situ Testing
ā	Depth	of	Wedationing	aph Log	Vate Vate	Spac (m	ng)	B - Bedding J - Joint	ЭС	e.	Q.,	Test Results
		Strata	× × × × × × ×	<u>9</u> _	Aligh Low	0.05	.00	S - Shear D - Drill Break	T	Rec	R0%	& Comments
-	0.2	FILLING - Generally comprising light orange-brown fine to medium clayey silt sand with some gravel and cobbles, dry		\bigotimes								
-8	₹ 0.8 -1	FILLING - Generally comprising dark brown gravelly clay with trace sand and silt and coal, M>Wp		$\overset{()}{\nearrow}$								
-		CLAY - Stiff to very stiff, dark brown and orange-brown clay with some extremely low to very low strength claystone inclusions, M>Wp							S			2,2,11 N = 13
	-2	from 2m, very stiff, light grey-brown and light yellow-brown, M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></wp<>										
	2 - 2.8 -3 -	WEATHERED COAL - Extremely low strength, extremely weathered, dark brown and dark orange-brown weathered coal							S			5,4,8 N = 12
	-4 -4	CLAY - Very stiff, light grey-brown and light orange-brown clay with extremely low to medium, highly										3.6.8
	- 4.3	fractured tuffaceous claystone bands, M <wp <br="">SILTY CLAY - Very stiff, light grey and light orange-brown clay with extremely low to low strength tuffaceous claystone bands, M<wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>5</td><td></td><td></td><td>N = 14</td></wp<></wp>							5			N = 14
	2 	from 5.4m, grading to tuffaceous claystone							s			5,12,11 N = 23
	± 6.8	WEATHERED COAL - Extremely low to very low strength, extremely to highly weathered, dark brown-black weathered, coal										0/50
ł	, 7.05	COAL - Very low to low strength,		\times		>>	$\langle \rangle$	7.05m: CORE LOSS:	<u>s</u>			0/5011111
	- 7.38 - 7.38 2	CORE LOSS - 250 mm COAL - Very low to low strength, fresh, dull black coal		· · · · · · · · · · · · · · · · · · ·				7.3m to 7.37m, highly fractured (2-10mm), di	C	86	70	
	-8	LAMINITE - Low strength, moderately to slightly weathered, brown laminite (60% sandstone, 40% siltstone) from 7.45m, medium strength,				╎┝╡]]]]	8.01m: P,5°,sm,pl, cy veneer 8.06m: P,5°,sm,pl, cy filled (6mm) 8.35m: P,5°,sm,pl, cy		00	19	
	-9	From 7.5m, medium to high strength, fresh from 8.34m to 8.55m, medium strength, slightly weathered		· · · · · · · · · · · · · · · · · · ·				filled (15mm) 8.5m: J,20°,sm,pl 8.52m: J,20°,sm,pl, cy veneer 8.81m: P,5°,sm,pl, cy		100	87	
	- - - - -			· · · · ·] 	1111ed (7mm) 9.19m: P,5°,sm,pl, cy filled (3mm) 9.26m: P,5°,sm,pl, cy			07	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: 7.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 7.05m, then NMLC coring to 26.05m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- A D B
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: 20.7 EASTING: 370752.9 NORTHING: 6360439 DIP/AZIMUTH: 90°/--

BORE No: 5 PROJECT No: 39663D DATE: 22 Oct 07 SHEET 2 OF 3

		Description	Degree of Weathering ·≅	Rock Strength	5	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
님	Depth (m)	of	raph 641101119		Vate	Spacing (m)	B - Bedding J - Joint	be	ore S. %	D S D	Test Results
		Strata	C H K K K K K K K K K K K K K K K K K K	Ex Low Medic Very Very		0.05	S - Shear D - Drill Break	Тy	C S	Я ~	∝ Comments
9		LAMINITE - Low strength, moderately to slightly weathered, brown laminite (60% sandstone, 40% siltstone) (<i>continued</i>) from 10.5m, (80% siltstone, 20% sandstone) at 10.6m, coal band (6mm) at 10.9m, high strength from 11.25m, pyrite in coaly laminations					filled (4mm) 9.44m: P,5°,sm,pl, cy filled (2mm) 9.51m: P,5°,sm,pl, cy filled (6mm) 9.75m: P,5°,sm,pl, cy filled (3mm) 9.79m: P,5°,sm,un, cy filled (12mm) 9.93m: P,5°,sm,un, cy filled (6mm) 10.25m: P,5°sm,un, cy veneer	С	100	87	
	- 12 - 13 - 14	siltstone)					10.41m: P,5°sm,pl, cy veneer 10.55m: J,30°,sm,un 10.66m: J,5°,sm,un 10.73m: J,10°,sm,un 10.73m: J,5°,sl,un 10.83m: P,5°,ro,un cy veneer 10.88m: J,10°,sl,un 12.93m: P,5°,sm,un 13.12m: P,5°,sm,un cy filled (6mm) 13.25m: J,80°,ro,pl 13.5m: J,80°,ro,pl 13.87m: P,5°,sm,un	С	100	90	
3	- 15 - 16 - 16.75 - 17 - 17.71	SILTSTONE - High to very high strength, dark grey siltstone from 17.48m to 17.52m, carbonaceous siltstone					15.74m: J,70°,ro, pyrite	С	98	97	
	17.78/ 18 19 19 19.3	CORE LOSS - SILTSTONE - High to very high strength, fresh, dark grey siltstone LAMINITE - High to very high strength, fresh, light grey and grey laminite (50% sandstone, 50% siltstone)					70mm 17.79m: P,5°,sm,un, cy veneer 18.37m: P,5°,sm,un	С	100	100	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: 7.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 7.05m, then NMLC coring to 26.05m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

REMARKS:

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level ter (kPa)

U, W C

A D B





SURFACE LEVEL: 20.7 EASTING: 370752.9 NORTHING: 6360439 DIP/AZIMUTH: 90°/--

BORE No: 5 PROJECT No: 39663D DATE: 22 Oct 07 SHEET 3 OF 3

Γ		Description	Degree of Weathering	. <u>0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng & I	In Situ Testing
R	i Depth (m)	of Strata		Graph Log	Vate Nate	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	20.35	SILTSTONE - High to very high strength, fresh, dark grey siltstone						с	100	100	
	- 21						20.77m: P,5°,sm,un 21.36m: P,5°,sm,un				
· · · · · · · · · · · · · · ·	-22 22.23	COAL - Low strength, fresh, dull black coal with some tuff bands and some pyrite at 22.27m, tuff band 10mm from 22.35m to 22.43m, low to medium strength tuff band (45mm) at 22.54m, medium strength tuff		· · · ·			22.08m: J,45°,h 22.23m: P,sh,sm,pl 22.3m: J,80°,sm,pl, pyrite 22.65m: J,80°,sm,pl	С	100	96	
- ~-~-	-	band (10mm)				· · · ·	23.5m: J,65°,sm,pl				
P-	24 24.54 25	SANDSTONE - Very high strength, fresh, light grey fine to medium grained sandstone, abundant pyrite in discontinuities					23.95m: J,80°,sm,pl 24.15m to 24.28m, highly fractured (2-20mm) 24.35m: J,60°,sm,pl 24.45m: J,80°,sm,pl 24.54m: P,5°,sm,pl	С	100	83	
- 4-	- 26 26 05						- 25.96m: P.5°.ro.pl _				
· · · · · · · · · · · · · · · · · · ·	- 27	Bore discontinued at 26.05m, limit of investigation					()				
-	- 28										
· 8-	- 29										

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

DRILLER: Sheddon

LOGGED: Reid

CASING: 7.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 7.05m, then NMLC coring to 26.05m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

REMARKS:

A D B

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level ter (kPa) U, W C





Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SURFACE LEVEL: 23.6 EASTING: 370940 NORTHING: 6360420 DIP/AZIMUTH: 90°/--

BORE No: 6 PROJECT No: 39663D DATE: 23-24/10/07 SHEET 1 OF 3

			Description		egre eath	ee of	<u>.</u>	5	Roo Stren	ck nath	_	Fracture	Discon	tinuities	Sa	amplir	ng & l	n Situ Testing
ā	Del n)	pth n)	of		ouur	loning	Log	N N		- Le	Vate	Spacing (m)	B - Bedding	J - Joint	be	ore S. %	åD åD	Test Results
		Í	Strata		A M	FS SV	G	Very	Medic	Very		0.01 0.10 1.00	S - Shear	D - Drill Break	Ţ	Rec	Ъ В С	Comments
		0.5	FILLING - Generally comprising light brown and red-brown silty clay with trace sand and gravel				\bigotimes											
-6	3- - -	1.0	FILLING - Generally comprising dark brown-black				\bigotimes											
-		1.0	SILTY CLAY - Firm, light grey-brown mottled red-brown silty clay with trace sand gravel and rock fragments, M>Wp												pp S			90 kPa 2,1,3 N = 4
-	-2		from 2.1m year offf McWa															90 kPa
-			nom 2. mi, very sun, w <vvp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>050 400 1 5-</td></vvp<>															050 400 1 5-
Ē	Ē			ļ	İİ	İİ									pp S			350-400 kPa 4,7,7
-	-3		from 3m, hard, red-brown mottled light grey-brown, some iron-cemented bands															N = 14
-	-														s			6,9,11 N = 20
	 5																	
-	•																	16 10/70mm
	-6	5.7	LAMINITE - Very low to low strength, highly to moderately weathered, light brown and red-brown laminite (70%				· · · · · · · · · · · · · · · · · · ·								5			10, 10/7 011111
Ē	Ę		from 6.25m, light grey-brown and		٦Ì		· · · · ·						6.3m: J,20°	,ro,un,Fe				
-1	=		grey and orange-brown				· · · · ·						6.4m: J,60° 6.48m: J,60 6.75m: P,5°	,sm,st °,ro,un,Fe ',ro,pl,Fe				
	-7						· · · · ·						_7m: P,5°,ro _7.13m: P,5°	,st,Fe ,ro,pl,Fe				
	- ₽ -						· · · · ·						7.47m: P,5° 7.55m: P,5°	,ro,un,Fe ,ro,un,Fe	с	100	84	
-	-8	7.8	SILTSTONE - Low strength, moderately weathered, dark grey and orange-brown siltstone				•					}	7.7m: J,10° 7.75m: J,15 7.83m: P,5° filled (12mn	,ro,pl,Fe i°,ro,pl,Fe ',ro,un, cy n)				
	2 - -		from 7.97m to 8m, extremely low strength from 8.65m to 8.82m, very low										7.99m: P,10 filled (30mn 8.13m: P,10 8.23m: P,10)°,sm,pl, cy n))°,ro,un,Fe)°,ro,un,Fe,				
F	9		strength from 8.95m, medium strenath, fresh										cy filled 8.32m: J,70	l°,sm,pl				
	- - - - -		, , , , , , , , , , , , , , , , , , ,				· · · - · · - · · · · · · · · · · ·						8.41m: J,70 8.6m: J,70° 8.8m: P,5°,9 8.85m: J,60 8.95m: P,10	l°,sm,pl ,sm,pl sm,pl,Fe l°,sm,un)°,sm,pl, cy	С	100	81	
Ł	ł			Li	<u> </u>	_i i	- ·					i i i	veneer					

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: HQ to 6.2m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 6.20m, then NMLC coring to 24.0m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- A D B
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level

Initials: Date:





SURFACE LEVEL: 23.6 EASTING: 370940 NORTHING: 6360420 **DIP/AZIMUTH:** 90°/--

BORE No: 6 PROJECT No: 39663D DATE: 23-24/10/07 SHEET 2 OF 3

		Description	Degree of Weathering	ji	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
뉟	Depth (m)	of	3	Log		(m)	B - Bedding J - Joint	be	c. %	DC %	Test Results
		Strata	H M M M M M M M M M M M M M M M M M M M	G		0.01 0.10 0.10 1.00	S - Shear D - Drill Break	Ļ	с я В	Я,	Comments
12 13 13 13	- 10.0 ² 	LAMINITE - Medium to high strength, fresh, light grey and grey laminite (60% siltstone, 40% sandstone) from 11.15m, high strength (80% sandstone, 20% siltstone) from 11.36m to 11.39m, extremely low strength, extremely weathered					9.22m: P,10°,sm,un 10.29m: P,10°,sm,pl, cy filled (2mm) 10.38m: P,10°,sm,pl, cy filled (2mm) 11.09m: J,15°,sm,pl,Fe 11.24m: J,15°,sm,pl,Fe 11.38m: P,5°,ro,un, cy filled (30mm) 11.42m: P,5°,h,Fe 11.5m: P,5°,sm,pl, cy	С	100	81	
10 10 11 10 10 10 10 10 10 10 10 10 10 1	- 12 12.5 - 13 - 14 - 14	SANDSTONE - High to very high strength, fractured, light grey fine to medium grained sandstone from 12.7m to 12.89m, very high strength, fresh siderite band from 13.25m to 13.33m, very high strength siderite band from 13.45m to 13.55m, very high strength siderite band					veneer 11.57m: P,5°,sm,pl, cy veneer 11.66m: P,5°,sm,pl, cy filled (2mm) 12.73m: J,60°,ro.pl,Fe 12.74m: J,80°,ro.pl,Fe 12.84m: J,80°,ro.pl,Fe 12.85m: J,75°,ro,pl,Fe 12.89m: P,5°,ro,pl,Fe 13.44m: P,10°,ro,pl	C	100	98	
	- 16	from 16.1m, fresh					16.13m: P,5°,ro,pl,Fe 16.44m: P,10°,ro,un,Fe 16.86m: J,30°,ro,pl,Fe 17m: J,80°, h,Fe 17.17m: J,10°,ro,pl,Fe 17.19m: J,10°,ro,pl,Fe 17.3m: J,70°,h,ro,un,Fe 17.64m: J,45°,ro,pl,Fe 17.77m: J,50°,ro,pl,Fe	С	100	97	
	- 19 - 19.15 	SILTSTONE - Extremely low to very low strength, extremely weathered, grey-brown and orange-brown siltstone from 19.3m, very low to low strength,					18.22m: P,5°,ro,pl,Fe 18.52m: J,50°,ro,pl,Fe 18.72m: P,10°,ro,pl,Fe 19.16m: P,5°,ro,un,Fe 19.24m: P,5°,sm,pl,Fe 19.33m: J,60°,sm,pl 19.35m: J,80°,sm,pl 19.45m: J,80°,sm,pl	С	100	90	

RIG: Scout 103

DRILLER: Sheddon

LOGGED: Reid

CASING: HQ to 6.2m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 6.20m, then NMLC coring to 24.0m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

REMARKS:

SAMPLING & IN SITU TESTING LEGEND								
A	Auger sample	pp	Pocket penetrometer (kPa)	Ŀ				
D	Disturbed sample	PID	Photo ionisation detector		Initiala			
B	Bulk sample	S	Standard penetration test		muais.			
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa	ŀ				
Ŵ	Water sample	v	Shear Vane (kPa)		D /			
С	Core drilling	⊳	Water seep ¥ Water level		Date:			







CLIENT:

Proposed Residential Subdivision LOCATION: Minmi

SURFACE LEVEL: 23.6 EASTING: 370940 NORTHING: 6360420 DIP/AZIMUTH: 90°/--

BORE No: 6 PROJECT No: 39663D DATE: 23-24/10/07 SHEET 3 OF 3

		Description	Degree of Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
RL	Depth (m)	of Strata	×××××××××××××××××××××××××××××××××××××	Graph Log	Ex Low Very Low Medium High Very High Ex High	5pacing (m) .00.00.00.00.00.00.00.00.00.00.00.00.00	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	20.75	moderately weathered from 19.5m, medium to high strength, fresh SILTSTONE - Extremely low to very low strength, extremely weathered, grey-brown and orange-brown siltstone (continued)					19.8m: J,80°,sm,pl 19.85m: P,5°,sm,pl, Fe, cy filled (2mm) 19.95m: P,5°,sm,pl, Fe 20.1m: P,5°,sm,pl, Fe 20.26m: J,50°,sm,pl, Fe 20.42m: P,5°,sm,pl, Fe 20.46m: P,5°,sm,pl, Fe	С	100	90	
	- 22	from 20.35m to 20.45m, low strength, slightly weathered COAL - Very low to low strength, slightly weathered, dull black coal with tuff bands and bands of pyrite from 20.83m to 20.91m, very low strength tuff bands (60mm) from 21m, low strength, fractured from 21.23m to 21.25m, very low strength tuff band at 22.03m, pyrite band (8mm)					20.5m: J,80°,sm,pl,Fe 20.53m: J,60°,sl,un,Fe 20.57m: J,50°,sl,un,Fe 20.6m: P,5°,sm,pl, Fe 20.62m: P,5°,sm,pl, Fe 20.65m: J,50°,sl,un,Fe 20.65m: J,50°,sl,un,Fe 20.66m: P,5°,sm,pl 21.6m: P,5°,sm,pl 21.75m: J,70°,sm,st 22.02m to 22.13m, highly fr (1mm-10mm)	С	100	100	
	-23 23.1	from 22.82m to 22.96m, carbonaceous mudstone (bands 2mm to 12mm thick, 2mm to 10mm spacings) SANDSTONE - Very high strength, fresh, light grey fine to medium grained sandstone					22.9m: J,75°,sm,st 23.07m: J,45°,sm,un				
-	- 24 24.0	Bore discontinued at 24.0m, limit of investigation									
	-25										
	-										
- - - - -	- 26										
	- 27										
-4											
- - - - - - -	- 29										
Ē	-										

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Sheddon

LOGGED: Reid

CASING: HQ to 6.2m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 6.20m, then NMLC coring to 24.0m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids

REMARKS:

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level ter (kPa) A D B U, W C







SURFACE LEVEL: 34.1 EASTING: 369988 NORTHING: 6360526.5 DIP/AZIMUTH: 90°/--

BORE No: 7 PROJECT No: 39663D DATE: 11-15/10/07 SHEET 1 OF 3

gl Depth (m) of Test Result (m) State (m) Becaring (m) Becari		_	Description	Degree of Weathering	lic	Rock Strength	Ľ	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
Strate Strate Strate Strate Comments A TOPSOL- Dark gray days of all strates to pack with topool with automating rank with topool with automating rank topool with automating rank with topool with automating rank with topool with automating rank with topool with automating rank topool with automating rank topool with automating rank with topool with automating rank with topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topool with automating rank topo	뉟	Depth (m)	of		raph Log		Vate	Spacing (m)	B - Bedding J - Joint	be	ore c. %	DG %	Test Results
5 TOPSOL - Datk gey days site 03 Construction 04 Construction 05 Construction 06 Construction 07 TopSol - Datk gey days site 08 Construction 09 Construction 09 Construction 09 Construction 00 Construction 00 Construction 01 Strongh, externely low to low strongh, born 02 Construction 03 Construction 03 Construction 04 Construction 05 Construction 05 Construction 06 Construction 07 Construction 08 Struction 09 Struction 00 Construction			Strata	M M M M M M M M M M M M M M M M M M M	ი	Ex Low Low High Very Ex Hi		0.05 0.10 1.00 1.00 1.00 1.00 1.00 1.00	S - Shear D - Drill Break	Тy	Rec	Я°	Comments
1 Stitustione grave MANAYD isteringh, externely tow isteringh, externely tow isteringh, externely tow isteringh, externely tow isteringh, externely weathered, light gray allocate from 2.25m, tow steringth 3 3 3 3 3 0 2.65 CORE LOSS: 0.25m 0 0 0 3 3 0 3.35 SILTSTOME - Externely tow to low strength, extremely weathered, gray-hown siltstore 0 0 0 0 3.46 CORE LOSS: 0.25m 0 0 0 0 0 3.47 CORE LOSS: 0.25m 0 0 0 0 3.46 SILTSTOME - Externely tow to low strength, extremely weathered, gray-hown siltstore 0 0 0 0 41 6 5 0 0 0 0 0 3.47 CORE LOSS: 0.25m 0 0 0 0 0 3.48 CORE LOSS: 0.27m 0 0 0 0 0 41 6 Situstore instance strength, extremely tow to low strength, extremely weathered light 0 0 0 0 42 7 0 CORE LOSS: 0.27m 0 0 0 43 0 0 0 0 0 0 44 0	34	- 0.3	TOPSOIL - Dark grey clayey silt topsoil with abundant organics to 0.1m, humid										
Interruption Statemely weathered, light growth low site of the state of the	-	-1	SILTSTONE - Extremely low							S			20.
2 fom 2.25m, low strength 265 CORE LOSS - 0.25m 265m: CORE LOSS: 650mm C 0 0 3.35 CORE LOSS - 0.25m 3.3m: CORE LOSS: 250mm 7 0 0.0mit colors 250mm 7 0.0mit colors 250mm 7 0.0mit colors 250mm 7 0.0mit colors 250mm 7.0mit colors 200mm 7.0mit colors 200mm <td< td=""><td>-</td><td>- - - - - -</td><td>strength, extremely weathered, light grey siltstone from 1m, (extremely low to low strength), brown</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	-	- - - - - -	strength, extremely weathered, light grey siltstone from 1m, (extremely low to low strength), brown										
243 CORE LOSS - 0.25m 2.6m CORE LOSS: 3.35 SULTSTONE - Extremely low to low strength, extremely weathered, grey-brown silistone 3.5m Lot 75m, 1g at 0.05m intervals 3.3m Lot 70m, 1g at 0.05m int	32	-2	from 2.25m, low strength										
3.3 CORE LOSS - 0.25m 2.3m CORE LOSS: 3.56 SLTSTONE - Extremely two to low strength, extremely weathered, grey-brown sitistone 3.5m J70; cy filed 4m; J70; cy	ł	2.65	CORE LOSS - 0.55m		\setminus				2.65m: CORE LOSS: 650mm				
3.33 CORE LOSS - 0.25m 3.45 SILTSTONE - Extremely low to low strength, extremely weathered, grey-brown siltstone 3.35 6.4	31	-3			X					С	0	0	
3.35 SLTSTONE - Extremely low to low strength, extremely weathered, grey-brown siltstone 3.56 Sam: J.70", or yilled 3.3m: J.70", or yilled 3.3m: J.70", or yilled 3.3m: J.70", or yilled 4m: J.70", h 6 6 0 4.75m to 5.05m, friable 7 7.0 CRE LOSS - 0.2m 5.5m: P.sh.uns.on Fe 5.5m: P.sh.unr.on Fe 5.5m: P.sh.unr.on Fe 5.5m: P.sh.unr.on Fe 5.5m: P.sh.unr.on Fe 5.5m: P.sh.unr.on Fe 5.5m: D.71", and the p.sh.h 6.3m to 5.05m, friable C 84 19 7 7.0 CLAYEY COAL - Extremely low strength, highly weathered black C 84 19 7 7.0 CLAYEY COAL - Extremely low strength, highly weathered black C 43 0 8 6.1 Strength, highly meathered black C 43 0 7 7.0 CLAYEY COAL - Extremely low strength, highly weathered black C 43 0 8 6.1 Strength, highly meathered black C 43 0 8 CORE LOSS - 0.1m 8.8m: CORE LOSS: 1300mm C 81 58 9 Michael and Michael a	ŀ	- 3.3	CORE LOSS - 0.25m		\mathbf{X}		ŕ		3.3m: CORE LOSS: 250mm				
8 5 4.75m to 5.05m, friable 6 5.9 CORE LOSS - 0.2m 8 6 5.9 7 7.0 CLAYEY COAL - Extremely low strength, righly weathered light brown sittstone 7 7.0 CLAYEY COAL - Extremely low strength, righly weathered black clayey coal CORE LOSS - 0.1m 8 6.7 7.0 CORE LOSS - 0.1m 6.7 1 Sum J.70°, hi to 7.3m, friable clayey coal CORE LOSS - 1.3m 8 6.7 9 9.7 9.7 CORE LOSS - 0.1m 1 AMINITE - High strength, fresh, grey fine to medium grained sittstone, animite 9.47 9.57 9.47 CORE LOSS - 0.07m		3.55 4 	SILTSTONE - Extremely low to low strength, extremely weathered, grey-brown siltstone						3.55m to 4.75m, fg at 0.01m to 0.05m intervals 3.8m: J,70°, cy filled 3.9m: J,70°, cy filled 4m: J,70°, h	С	86	0	
6 6.1 5.9 CORE LOSS - 0.2m 5.9 5.9 CORE LOSS - 0.2m 5.9 5.9 5.9 5.9 5.9 CORE LOSS - 0.2m 5.9 5.9 CORE LOSS: 200mm 6.3 5.9 CORE LOSS - 0.2m 5.9 CORE LOSS: 200mm 6.3 6.3 5.9 CORE LOSS: 200mm 6.3 6.3 6.3 6.3 6.3 6.3 6.3 7.0 6.3 6.4 19 6.3 6.3 6.3 7.0 6.3 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 6.3 7.0 7.0 7.0 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3	29	- - - - - - - - - - - - - - - - - - -							4.75m to 5.05m, friable				
6 0.1 CORE LOSS - 0.2m 5.m: CORE LOSS: SILTSTONE - Very low to low strength, highly weathered light 6.m: CORE LOSS: 200mm 6.1 Siltstone 6.m: CORE LOSS: 200mm 7 7.0 CLAYEY COAL - Extremely low 6.m: P.sh.h 6.sm: P.sh.h 7.3 Clayey coal 6.m: P.sh.h 6.sm: P.sh.h 7.3 CORE LOSS - 0.1m 6.sm: CORE LOSS: 1.3m 8.6 CORE LOSS - 0.1m 8.6m: CORE LOSS: 1.3m 18 9.4 9.5 CORE LOSS - 0.1m 8.6m: CORE LOSS: 19 9.47 9.5 CORE LOSS - 0.07m 1.41	-		from 5.6m to 5.65m, ironstone						5.1m: J,45 ,n 5.25m: P,sh,un,sm 5.4m: J,70°,pl,un,Fe 5.6m: P,sh,un,ro,Fe 5.7m: J/Fr?,sv, pl,ro,Fe	с	84	19	
3LL SIGNE - Vely Low Ublow Strength, highly weathered light brown siltstone CLAYEY COAL - Extremely low strength, extremely weathered black 7.3 CLAYEY COAL - Extremely low strength, extremely weathered black CORE LOSS - 0.1m LAMINITE - High strength, fresh, grey fine to medium grained sittstone, laminite 9.47 9.5 CORE LOSS - 0.1m LAMINITE - High strength, fresh, grey fine to medium grained sittstone, laminite 9.47 9.5 CORE LOSS - 0.07m	-8	-6 - 6.1	CORE LOSS - 0.2m		\ge		-	>><	5.9m: CORE LOSS: 200mm				
7.3 strength, extremely weathered black clayey coal CORE LOSS - 1.3m 8 8 8 8 8 8 8 8 8 8 8 6.9m: P, sh 6.9m: P, sh 7.3m, friable clayey coal 7.3m; CORE LOSS: 1.3m 7.3m; CORE LOSS: 1.3m 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 8.6m; CORE LOSS: 1.300mm 9 9 9 6 9 9 6 CORE LOSS - 0.1m 1.4MINITE - High strength, fresh, grey fine to meldum grained sandstone with interbedded siltstone, laminite 9.47 9.47 9.57 CORE LOSS - 0.07m CORE LOSS - 0.07m 6 1.11 1.20 1.20 1.20 1.20 2.20 2.20 2.21 2.21 2.21 2.22 2.22 2.23 2.24 2.25 2.25 2.26 2.26 2.27 2.26 2.27 2.26 2.27 2.26 2.27 2.26 2.27 2.26 2.26 2.26 2.27 2.26 2.27 2.26 2.27 2.26 2.27 2.26 2.26 2.27 2.26 2.26 2.27 2.26 2.26 2.27 2.26 2.26 2.27 2.26 2.26 2.27 2.26	27	- 7 7.0	SILESTONE - Very low to low strength, highly weathered light brown siltstone		· · · · · · · · · · · · · · · · · ·				6.2m: J,45°,un,ro,Fe 6.3m to 6.7m, fragmented at 0.01m to 0.05m intervals 6.7m: J,70°,pl,ro,Fe 6.8m: P,sh,h 6.88m: P,sh,h				
8.6 CORE LOSS - 0.1m LAMINITE - High strength, fresh, grey fine to medium grained sandstone with interbedded 9 9.47 9.5 CORE LOSS - 0.07m 9.47 9.47 9.5 CORE LOSS - 0.07m	-	- 7.3	strength, extremely weathered black clayey coal/ CORE LOSS - 1.3m		\bigvee				6.9m: J,70°,h 16.96m: P,sh 7m to 7.3m, friable clayey coal 7.3m: CORE LOSS: 1300mm	С	43	0	
8. LAMINITE - High strength, fresh, grey fine to medium grained sandstone with interbedded siltstone, laminite 9 Software 8.93m: P.sh,pl,sm clay smear, Fe 2 81 58 9.47 9.5 CORE LOSS - 0.07m 9.47 9.47 9.47 9.47 9.47 9.47 9.47 100 mm 9.47 9.47 100 mm 100 mm 100 mm 9.47 9.5 CORE LOSS - 0.07m 100 mm 100 mm 100 mm 100 mm	26	- <u>8</u> .6	CORE LOSS - 0.1m		\bigwedge		4		8.6m; CORE LOSS;				
9.5 CORE LOSS - 0.07m	25	- 9 - 9 - 9 - 9.47	LAMINITE - High strength, fresh, grey fine to medium grained sandstone with interbedded siltstone, laminite						100mm 8.93m: P,sh,pl,sm clay smear, Fe 9.1m: P,sh,pl,sm clay smear, Fe	с	81	58	
		9.5	_CORE LOSS - 0.07m/						9.3m to 9.43m, J/MFr?, sv,h,Fe 9.47m: CORE LOSS:	с	100	0	

RIG: Edson 3000

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Harris

CASING: HW to 6m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit to 2.65m), then HQ3 coring to 22.75m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:** from 8.6m, 20% water loss

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

SAMPLING & IN SITU TESTING LEGEND

- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: 34.1 EASTING: 369988 NORTHING: 6360526.5 DIP/AZIMUTH: 90°/--

BORE No: 7 PROJECT No: 39663D DATE: 11-15/10/07 SHEET 2 OF 3

		Description	Degree of	<u>ں</u>	Rock Strength	_	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
님	Depth (m)	of		Log		ale	Spacing (m)	B - Bedding J - Joint	96	е%.	0	Test Results
	(,	Strata		פֿ	Very L Very L Very High	5	0.10	S - Shear D - Drill Break	Ţ	Rec	R0%	& Comments
24	10.15 10.45	SANDSTONE - High strength, highly weathered, brown fine to medium grained sandstone with interbedded siltstone to 9.75m (continued) CORE LOSS - 0.3m, possible extremely weathered rock						9.5m to 9.8m, MFr, sv,h,Fe 9.8m to 10.15m, MFr, sv,pl,ro,Fe 10.15m: CORE LOSS: 300mm 10.47m: P,sh,un,ro 10.9m to 11.6m MFr				
23		SANDSTONE - High strength, highly weathered, fine to medium grained brown sandstone						sv, un, ro,Fe	С	100	0	
22	- 12 - 12 	Iayer SILTSTONE - Medium to high strength, slightly weathered grey		· ·				11.77m: P,sh,un,ro 11.8m: J,60°,h 11.85m to 11.88m, fragmented				
21	- 12.9 - 13 - 13	CORE LOSS - 0.5m SILTSTONE - Medium to high strength, slightly weathered grey siltstone				2		11.95m: J/MFr?, 45°,pi,h 12.1m: Fr,sv,h 12.2m to 12.4m, Fg 12.4m: CORE LOSS: 500mm 12.9m to 13.1m, fragmented at 0.01m	с	57	0	
20	- - - 14 - 14.15	CORE LOSS - 0.3m						Intervals 13.1m to 13.35m, Frs, sv 13.35m to 13.45m, fragmented 13.6m: J/MFr,70°,h 13.66m: J,45°,un,ro-sm,	с	70	0	
-	14.45 	SILTSTONE - Medium to high strength, slightly weathered, grey siltstone						clay lined 13.67m: P,sh,un 13.76m to 13.84m, friable clay	с	78	0	
19	- 15 - - -							-13.84m to 14.15m, fragmented -14.15m: CORE LOSS: 300mm -14.54m to 14.65m.	с	100	0	
	[15.55 - 15.65 [,] - - 16	CORE LOSS - 0.1m SILTSTONE - Medium to high strength, slightly weathered, grey						fragmented 14.7m: MFr?,sv,un,ro 14.83m: P,sh,pl,sm, calcite	с	80	0	
17	- - - - - - - - - - - - - - - - - - -	siltstone						14.95m: MFr?,sv,un,sm 15.1m: MFr,45°,pl,sm 15.23m: Psh,pl,sm, calcite 15.3m: MFr?, sv,ir,h 15.45m: MFr,sv, ir,ro, calcite 15.55m: CORE LOSS: 100mm 15.65m to 16m, fragmented	С	92	6	
	- 17.7 - 18	CORE LOSS - 0.15m SILTSTONE - Medium strength, slightly weathered, fragmented, grey				ľ		16m: M⊦r,sv,pl,sm, ⊦e 16.15m: MFr's, sv,h 16.2m to 16.3m, fragmented at 0.02m				
5	- - - - - - - - - - - - - - - - - - -	from 17.9m, high strength, fresh						intervals 16.3m: J/MFr?, 70°,pl,sm 16.35m: J/MFr?, 70°,h 16.4m to 16.42m, friable clay seam 16.5m: MFr, sh to sv,h 16.5m to 16.5m	с	96	38	
-	19.42	CORE LOSS - 0.35m COAL - Medium strength, fragmented, black coal with interbedded carbonaceous mudstone layers		\times				fragmented at 0.01m intervals 16.75m: MFr,sv,h 16.93m: Fr,sv,h 16.95m to 17.55m, MFr's, sv, h, calcite				

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Harris

CASING: HW to 6m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit to 2.65m), then HQ3 coring to 22.75m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:** from 8.6m, 20% water loss

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

SAMPLING & IN SITU TESTING LEGEND PD Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep Water level





SURFACE LEVEL: 34.1 EASTING: 369988 NORTHING: 6360526.5 DIP/AZIMUTH: 90°/--

BORE No: 7 PROJECT No: 39663D DATE: 11-15/10/07 SHEET 3 OF 3

Γ		Description	Degree of	Rock	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
묍	Depth (m)	of Strata		Very Low Very Low Medium Ex High Ex High	et Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
- 1	-	COAL - Medium strength, fragmented, black coal with interbedded carbonaceous mudstone layers (continued)				17.55m: CORE LOSS: 150mm 17.7m to 17.85m, fragmented 0.01m to 0.03m intervals	с	96	38	
13	21	SANDSTONE - High strength, fresh,				18.05m: MFr,45° to sv, ir, sm, calcite 18.31m: P,sh,pl,sm 18.38m: P,sh,un,sm 18.44m: P,sh,un,sm 18.55m: P,sh,un,sm 18.65m: P,sh,pl,sm 18.88m: MFr, 45° to sv,un,ro Fe	С	85	17	
12	- 22 22.27 22.65	SILTSTONE - Medium to high strength, fresh, fragmented grey				19.08m: CORE LOSS: 340mm 19.47m: P,sh 19.57m: P,sh 19.67m to 19.7m, fragmented 19.07m te 70°				
	-23	CORE LOSS - 0.1m/ Bore discontinued at 22.75m				20.55m: Fr,sv,h 20.6m to 20.65m, fragmented, di? 20.75m: P,sh 20.8m: P,sh 20.85m to 20.88m, fragmented ot 0.01m				
	- 24					ragmented at 0.0 rm intervals 20.92m to 20.95m, fragmented at 0.01m intervals 21.08m to 21.24m, friable clay seam 21.3m: Er 20°				
6	- 25					21.51m to 21.55m, friable clay seam 21.6nm: P,sh 22.27m to 22.65m, fragmented at 0.01m to 0.05m intervals 22.65m: CORE LOSS:				
	- 26					[100mm				
	- 27									
9	- 28									
2	- 29									

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Harris

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit to 2.65m), then HQ3 coring to 22.75m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:** from 8.6m, 20% water loss

A D B

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level



CASING: HW to 6m

Douglas Partners Geotechnics · Environment · Groundwater

SURFACE LEVEL: 34.5 EASTING: 370235.7 NORTHING: 6360534 DIP/AZIMUTH: 90°/--

BORE No: 8 PROJECT No: 39663D DATE: 16 Oct 07 SHEET 1 OF 3

a Depth (m) of Depth Strata B	he	e		-		
Strata Exercise of the second sec	~ .		l e ,	% 	۵°	Test Results
TOPSOL - Dark grey silt topsol with abundant organics to 0.1m, humid CLAY - Hard, red-brown clay, M <wp from 0.5m, with trace to some siltstone gravel 3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely weathered, grey siltstone SILTSTONE - Medium strength, moderately weathered, grey siltstone</wp 	- (Τy	ы С	Rec	<u>я</u> "	Comments
0.3 CLAY - Hard, red-brown clay, M-Wp Yrom 0.5m, with trace to some siltstone gravel 1 1 SILTSTONE - Extremely low strength, extremely weathered clay layers 3 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (strength), extremely weathered brown siltstone (strength), extremely weathered brown siltstone (strength), extremely weathered brown siltstone (strength), extremely weathered brown siltstone (strength), extremely low strength, extremely weathered brown siltstone (strength, extremely low strength, extremely weathered brown siltstone (strength, extremely low strength, extremely weathered, black-brown strength, extremely weathered, black-brown strength, extremely weathered, grey siltstone 3.95m: CORE LOSS: 350mm 5 5.177 CORE LOSS - 0.35m 5.23m: P.sh, clay lined 5.35m to 5.42m, friable 5 5.177 SiltITSTONE - Medium strength, moderately weathered, grey siltstone 5.23m: P.sh, clay lined 5.35m to 5.42m, friable						
M:Wp from 0.5m, with trace to some siltstone gravel 3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 3.95m: CORE LOSS: 350mm 4 3.95 CORE LOSS - 0.35m 3.95m: CORE LOSS: 350mm 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 5 SILTSTONE - Extremely low strength, extremely weathered, black-brown some siltstone (soil like properties) coal (soil like properties) COAL - Extremely weathered, black-brown social (soil like properties) 5.17 SILTSTONE - Medium strength, moderately weathered, grey siltstone 5.23m: P.sh, clay lined 5.35m to 5.42m, friable						
3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 3.95m: CORE LOSS: 350mm 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soli like properties) 3.95m: CORE LOSS: 350mm 5 CORE LOSS - 0.35m 3.95m: CORE LOSS: 350mm 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soli like properties) 4.3 m to 5.17m, friable clay 5 SILTSTONE - Medium strength, moderately weathered, grey siltstone 5.23m: P, sh, clay lined strength weathered, grey siltstone						
3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 3.95m: CORE LOSS: 3.95m: CORE LOSS: 350mm 4 3.95 CORE LOSS - 0.35m 3.95m: CORE LOSS: 350mm 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown coal (soil like properties) 3.95m: CORE LOSS: 350mm 5.17 SILTSTONE - Medium strength, moderately weathered, grey siltstone 5.23m: P.sh, clay lined 5.35m to 5.42m, friable						
3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown sittstone with interbedded clay layers 4 3.95 CORE LOSS - 0.35m 3.95m: CORE LOSS: 350mm 4.3 SILTSTONE - Extremely low strength, extremely weathered brown sittstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown coal (soil like properties) 5.17 SILTSTONE - Medium strength, moderately weathered, grey sittstone		S	-			20
3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded day layers CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low exterend, black-brown coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone SILTSTONE - Medium strength, moderately weathered, grey siltstone SILTSTONE - Medium strength, moderately weathered, grey siltstone						20, ,
 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 <						
 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 3 3.0 4 3.95 CORE LOSS - 0.35m 5 10 5 117 <li< td=""><td></td><td></td><td></td><td></td><td></td><td></td></li<>						
 3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone 						
 3 3.0 3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low 4.5 SILTSTONE - Extremely low strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone 						
 3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers 4 3.95 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low 4.5 SILTSTONE - Extremely low 4.5 CORE LOSS - 0.35m 4.3 SILTSTONE - Extremely low the properties) COAL - Extremely low strength, extremely weathered, black-brown 5.17 SILTSTONE - Medium strength, moderately weathered, grey siltstone 						
3 3.0 SILTSTONE - Extremely low strength, extremely weathered brown siltstone with interbedded clay layers						
5 5						
4.3 SILTSTONE - Extremely low 4.5 Strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown 5.17 SILTSTONE - Medium strength, moderately weathered, grey siltstone						
4.3 SILTSTONE - Extremely low 4.3 SILTSTONE - Extremely low 4.5 SILTSTONE - Extremely low 4.5 SILTSTONE - Extremely low strength, extremely weathered, black-brown SILTSTONE - Medium strength, moderately weathered, grey siltstone SILTSTONE - Medium strength, moderately weathered, grey siltstone						
4.3 SILTSTONE - Extremely low 4.5 strength, extremely weathered brown sitstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown 5.17 coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone			_			
4.3 SILTSTONE - Extremely low 4.5 strength, extremely weathered brown siltstone (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown 5.17 coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone						
Since (sublicity) Since (soil like properties) COAL - Extremely low strength, extremely weathered, black-brown 5 SILTSTONE - Medium strength, moderately weathered, grey siltstone						
COAL - Extremely low strength, extremely weathered, black-brown 5.17 coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone						
5.17 coal (soil like properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone						
SILTSTONE - Medium strength, moderately weathered, grey siltstone	2	С	85	5	17	
hrom 5.35m to 5.42m, extremely						
Image: Constrained						
weathered coal						
						PL(D) = 1.86MPa
6.1mm o 6.13m, Fg						
						PL(D) = 1.22MPa PL(A) = 2.13MPa
[[
6.78m to 6.81m, J.30°,pl,sm		C	0	。	62	PL(D) = 2.35MPa
[[1			0	02	PL(A) = 3.03MPa
CORE LOSS - 8.17m to 8.3m,						
9.15 SILTSTONE - Medium strength,						PL(D) = 2.26MPa
Image: State of the s				T		PL(A) = 4.21MPa
weathered, extremely low to very low	:	С	10	00	74	
La.am: CORE LOSS:						

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 4.3m

TYPE OF BORING: Solid flight auger to 3m, then rotary to 4m, then HQ wireline to 20.45m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level A D B U, W C

- ter (kPa)





SURFACE LEVEL: 34.5 EASTING: 370235.7 NORTHING: 6360534 DIP/AZIMUTH: 90°/--

BORE No: 8 PROJECT No: 39663D DATE: 16 Oct 07 SHEET 2 OF 3

			Description	Degree of	<u>.</u>	Rock Strength	_	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
ā	De (n	pth n)	of Strata		Graph Log	rev Low ery Low ligh ligh rev High rev High	Wate	Spacing (m) ଞ୍ଜୁ ଜୁଞ୍	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
-	-		properties) SILTSTONE - Medium strength, moderately weathered, grey siltstone		•				350mm 9.18m: J,65°,pl,ro,Fe 9.22m to 9.3m,	с	100	74	
	*- - - - - 11		(continued)		· — ·				P,sh,pl,sm Fe '9.3m to 9.45m, P,sh,pl,sm, cy '79.42m: J,50°,pl,ro, cy	с	100	58	PL(D) = 0.32MPa PL(A) = 1.12MPa
	3	11 7	from 11m to 11.1m, very low strength, highly weathered grey siltstone		 				9.45m: P,10°,pl,sm, cy filled (20mm) 9.45m to 9.55m, P,sh,pl,sm 29.6m: 1.55° un ro Fe	с	80	15	
ŀ	-12	1.85	CORE LOSS - SILTSTONE - Medium strength,		Xii		Ť		9.8m: J,80°,pl,ro,Fe 9.8m: P,sh,pl,sm cy				
		2.26	hoderately weathered, grey siltstone from 12.03m to 12.1m, very low strength, highly weathered, fragmented, light grey siltstone						veneer 10.07m: P,sh,un,ro, cy filled 10.14m: J,60°,un,ro 10.35m: J,75°,pl,ro, Fe 10.85m to 11 1m frag to	с	48	0	PL(D) = 7.22MPa
	- 13 - 13 - 13 - 13 - 1	3.53	SILTSTONE - Very low strength, highly weathered, light grey siltstone from 13m, very low strength, highly weathered, light grey siltstone from 13.24m to 13.27m, medium strength, moderately weathered, gray siltstone				4		highly fract 11.16m: P,10°,pl,ro,Fe 11.27m to 11.7m, highly fract, P, 10°,ro,pl 11.65m: J,85°,pl,ro,Fe 11.7m: CORE LOSS: 150mm 11.9m: P sy 85° ro nl Fe	с	72	19	PL(A) = 0.83MPa
	- 14 - 1 - 1	13.9 4.26 4.34	from 13.27m, low strength from 13.47m, medium strength, moderately weathered, grey siltstone CORE LOSS - 0.37m						11.94m to 102.1m, frag, Fe,ro,un 12.14m: J,sh,10°,ro,un,Fe 12.15m: J,sh,ro,un,Fe				PL(D) = 4.25MPa PL(A) = 2.73MPa
	- 15 		SILTSTONE - Very low strength, higly weathered, light grey siltstone VOID - 0.08m SILTSTONE - Medium strength, slightly weathered, slightly fractured, light grey siltstone						12.23m: P,sv,80°,ro,un,Fe 12.26m: CORE LOSS: 550mm 12.81m to 12.85m, frag 12.85m: J,45°,ro,pl,Fe 13.25m: P,sv,ro,un,Fe 13.28m to 13.39m, frag 13.46m: J,sh,ro,pl				PL(D) = 2.17MPa PL(A) = 8.26MPa
	- 16 - 1 - 17 - 17 1	6.32 6.95 7.02	COAL - Medium strength, fresh, fractured, dull black coal with some bright black coal laminations from 16.37m to 16.39m, low strength, moderately weathered grey-brown siltstone CORE LOSS - 0.17m					╌╌╴╴╴╴╴╴┼╴╴╴╴ ╌╌╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴	13.53m: CORE LOSS: 370mm 13.9m to 14.15m, frag, Fe stained 14.24m: P.sv,80°,ro,pl,Fe 14.41m to 14.5m, frag 14.44m: P,sv,80°,ro,pl, Fe, clay veneer 14.6m to 14.63m, frag 14.63m to 15m,	C	94	41	PL(D) = 0.6MPa PL(A) = 0.68MPa
	≥ _ 1 _ 18	7.75	COAL - Highly fractured From 17.61m to 17.75m, fragmented CORE LOSS - 0.56m		\setminus				J,sv,85°,ro,pl 14.81m: J,sh,ro,un 14.89m: J,sh,ro,pl 15.23m: J,sh,ro,un 15.44m to 15.5m, frag 15.5m to 15.74m, fract				PL(D) = 1.77MPa PL(A) = 2.85MPa
	1 1 19 19 1	8.31 8.66 8.74	LAMINITE - Medium strength, fresh, grey laminite TUFFACEOUS SILTSTONE - Low strength, moderately weathered, light brown mottled light grey tuffaceous siltstone COAL - Medium strength, fresh, feathered dull bless clustifice				¥	┤ ┙╍┨╗╍╴╴╴╴╴╴ ╯╴╴╴╴╴╴	15.91m to 16.12m, J,sv,75°,ro,un, Fe 16.25m to 16.32m, frag 16.37m: J,sh,ro,un 16.39m: J,sh,ro,un 16.43m: cleat,sv,85°,ro,pl 16.6m: J,sh,sm,pl 16.67m: J,sh,ro,pl, clay	С	81	57	PL(D) = 0.81MPa PL(A) = 0.61MPa
	≝+ [1 -	9.64	SILTSTONE - Medium strength,		•				stained 16.7m to 16.77m, frag 16.83m: J,sh,ro,pl 16.87m to 17.17m, frag				

RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 4.3m

TYPE OF BORING: Solid flight auger to 3m, then rotary to 4m, then HQ wireline to 20.45m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

- **SAMPLING & IN SITU TESTING LEGEND** Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: 34.5 EASTING: 370235.7 NORTHING: 6360534 DIP/AZIMUTH: 90°/--

BORE No: 8 PROJECT No: 39663D DATE: 16 Oct 07 SHEET 3 OF 3

Γ		Description	Degree of	. <u>0</u>	s	Rock trength		Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ᆋ	Depth (m)	of	weathering	Log			Vate	Spacing (m)	B - Bedding J - Joint	be	sre %	۵°	Test Results
	()	Strata	M H M M M M M M M M M M M M M M M M M M	Ū	Ex Lo	High Verv		0.01 0.10 1.00 1.00	S - Shear D - Drill Break	Tyl	с S В	R0%	Comments
-	-	slightly weathered, light grey siltstone							-16.95m: CORE LOSS: 70mm	С	81	57	PL(D) = 5.29MPa
F4	20.45	from 19.39m to 19.42m, some							17.14m: J,sh,ro,pl	Ŭ	<u> </u>	01	
Ē	-	From 19.61m to 19.64m, fragmented							17.24m: J,sh,ro,pl				
ŧ	21	from 19.96m, fresh							17.54m: J,sh,ro,pl				
E	[2]	LAMINITE - Medium strength, slightly weathered, light grey and			ļii	i i i	i		17.75m: CORE LOSS:				
F	-	grey laminite (continued)							560mm -18.37m: J,sh,ro,un				
Ē	-	investigation							-18.39m to 18.66m, cleat, sv,ro,pl				
Ē					l i i				18.44m: J,sh,ro,un 18.54m: J.sh.ro.pl				
Ē	- 22								18.66m: J,sh,ro,un				
Ē									18.75m: J,sh,ro,pl				
Ē	-				ļįį		i		cleat, sv (90°), ro,pl				
Ē	- 23								19.03m: J,sh,ro,pl				
ŧ	- 20								19.1m: J,sh,ro,un 19.15m: J,sh,ro,un				
Ē					ļįį		i		19.61m to 19.64m, frag 19.68m: J,sh,10°,sm,pl,				
È	-								carb siltstone veneer 19.75m: J,sh,5°,sm,pl				
Ē	-24								19.84m to 19.86m, frag 19.98m: J.ro.un				
ŧ	-				İİ				20.01m: J,sv,75°,ro,pl				
Ŀ									20.19m: J,sh (10°),ro,pl				
È	-								20.25m to 20.27m, frag				
Ē	-25				İİ				20.2011. P,SV, (65-), sm,pl				
ŧ	-								20.3m to 20.35m, frag 20.35m to 20.43m,				
[[P,sv,(85°),sm,pl 20.43m to 20.45m, frag				
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RIG: Edson 3000

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Simon (APS)

LOGGED: Bear

CASING: HW to 4.3m

TYPE OF BORING: Solid flight auger to 3m, then rotary to 4m, then HQ wireline to 20.45m WATER OBSERVATIONS: Free groundwater obscured by drilling fluids **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ter (kPa)

A D B

U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





SURFACE LEVEL: 29.8 EASTING: 370514.7 NORTHING: 6360402.3 **DIP/AZIMUTH:** 90°/--

BORE No: 10 PROJECT No: 39663D DATE: 22 Oct 07 SHEET 1 OF 2

		Description	Degree of Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	In Situ Testing
	Depth	of	Wednering	Log		Spacing (m)	B - Bedding J - Joint	be	re %	D D	Test Results
	(,	Strata	H M M M M M M M M M M M M M M M M M M M	Q	Ex Lov Very L High Ex Hig	0.01 0.10 0.50	S - Shear D - Drill Break	Ţ	Rec	RO%	& Comments
E	_ 0.1	SILT - Brown silt with some sand									
-	- 0.5	CLAY - Brown and orange clay with		<u>//</u>				A			
Ę		SANDSTONE - Extremely low						A			
	-1	strength, extremely weathered, medium grained, light brown sandstone									
Ē	1.3	CLAYSTONE / SILTSTONE -									
Ē		Extremely low strength, extremely weathered, orange-brown and grey		<u> </u>							
-8	1	claystone / siltstone		<u> </u>							
Ē	-2			 							
Ē	[- ··							
F	-										
-6	·[Ξ.							
F	-3 2.95	SILTSTONE - Very low to low					from 2.95m to 3.33m, fragmented to highly				
Ē	Ē	weathered, orange-brown and grey					fractured				
ł	-	from 2.98m to 3.3m grey clay bands					highly fractured to	С	89	0	
- ac	2						fractured				
Ę	4 4.05	from 3.87m to 3.93m, light grey and		Ž			3.93m: CORE LOSS:				
F	4.36						from 4.05m to 4.15m, fg				
Ē	[CLAYSTONE - Very low strength,					highly fr				
- 40	2	grey claystone		· _ ·			4.36m: P,sh,pl,sm 4.41m: P,sh,H,pl, cy	С	100	50	
Ē	5 5.0	from 4.25m, extremely low to very		;	┤ ╎ ╎ ┢┚ ╎ ╎ ╎ │	│ 	filled (2mm) 4.47m: P.sh.pl.ro				
ţ	-	weathered, orange-brown and light		·		L'HA II	4.67m: P,sh,pl, ro, cy				
Ē	E	SILTSTONE - Medium strength.		·			from 4.79m to 5m,				
-20	5-	moderately weathered, grey and		·			filled				
F	-6	at 4.47m, ironstone band 7mm thick		·			5.2m: P,sh,pl,ro, cy filled				
E	[from 4.97m to 5m, clay band		·			5.3m: P,5°,un,ro 6.15m: J.70°.un.ro				
F	-	SILTSTONE - Low to medium strength, moderately weathered,		· —		li i G i i	from 6.17m to 6.23m,				
E		light grey siltstone interlayered with		·		ا کلے ا	spacing	С	100	60	
Ę	-7	from 5.9m to 6m, medium to high		·			6.45m: P,sh,un,H				
Ē	Ē	sitstone		•		╎┍┯┙╎╎	Trom 6.61m to 6.69m, fg, P, sh,pl,ro				
ţ	-	from 6.81m to 6.93m, medium to		· ·			6.78m: J,80°,H,un from 6.81m to 6.95m, fg				
Ę	, E	grey siltstone				╵╺╅┼┛╵╵	6.92m: J,50°,H,un				
Ę	-8	from 7.71m to 7.89m, medium to					7.02m: J,70°,H,pl				
F	-	grey siltstone				╟┖╩┷╵╎╴	from 7.21m to 7.33m, fg,				
E	8.45	from 8.04m, medium to high		\sim			T7.32m: J,sv,un,ro,H	С	94	45	
ŀ.	- 8.52	siltstone					7.4m: P,sh,pl,H 7.67m: P,sh,pl,ro				
Ę	-9	SILTSTONE - High strength slightly		 •			7.69m: P,sh,un,ro clay filled (20mm)				
ŧ	-	weathered, grey-brown and grey		· _ ·			7.71m: P,10°,un,ro				
Ē	E	SINSIONE		 •		╎╎┍┩╎	7.83m: J,60°,un,ro	C	100	85	
ŧ,	ļ					1 5 1	from 8.02m to 8.22m, fg				
Ę	1			<u> </u>			8.27m: J,70°,un,ro 8.41m: P,5°,un,H				
R	IG: Edsc	on 3000 DRILL	.ER: Simon (APS)	LO	GGED: Bear	CASI	NG:	HW t	o 3m	

RIG: Edson 3000 TYPE OF BORING: Solid flight auger to 2.95m (TC-bit), then HQ wireline to 17.3m

WATER OBSERVATIONS:

REMARKS:

CLIENT:

PROJECT:

LOCATION: Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SAMPLING & IN SITU TESTING LEGEND

- A D B
- SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- U, W C
- pp
 Pocket penetrometer (kPa)

 pPID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength (s(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level




SURFACE LEVEL: 29.8 EASTING: 370514.7 NORTHING: 6360402.3 **DIP/AZIMUTH:** 90°/--

BORE No: 10 PROJECT No: 39663D DATE: 22 Oct 07 SHEET 2 OF 2

Γ		Description	Degree of	. <u>0</u>	Rock Strength	_	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
님	Depth (m)	of	weathening	aph Log		/ate	Spacing (m)	B - Bedding J - Joint	e	е%.	Q,	Test Results
		Strata	× ↓ ↓ × × ×	ອ້	ix Lov /ery L /ery L /ery F /ery Hig	5	.05)	S - Shear D - Drill Break	Typ	Re C	a% Q%	& Comments
-	-	SILTSTONE - High strength, slightly weathered, grey-brown and grey slitstone (continued)		·				8.45m: CORE LOSS: 70mm 8.53m: J,sv,un,ro	с	100	85	Commente
19	- - - - 11	from 10.13m to 10.25m, sandstone bands 2mm to 40mm thick at 5mm to 30mm spacing						-8.8m: P,sh,pl,H -8.86m: P,sh,pl,ro -8.89m: P,sh,pl,ro -9.42m: J,sv,pl,ro -9.57m: J,sv,un,H -9.65m: J,80°,un,sm		100	88	
18	11.35	SANDSTONE - High strength, slightly weathered, light brown-cream sandstone from 11.68m, igneous rock band		· · · · · · · · · · · · · · · · · · ·				19.8m: J,85°,un,ro from 10.31m to 10.45m, P,sh,un,ro, clay filled 10.49m: J,70°,un,sm 10.65m: J,85°,un,sm 11m: J, 65° pl sm			00	
	- 12 - - - - - - - - - - - - - - - - - - -	from 12.59m to 12.63m, coal						11.24m: P,5°,pl,ro 11.27m: J,75°,un,H 11.35m: P,5°,un,ro 11.58m: J,85°,H,pl 11.61m: P,5°,pl,sm 11.82m: J,65°,un,H 12.26m: J,75°,pl,ro 12.33m: J,40°,un,ro				
16	- 14	COAL / CARBONACEOUS MUDSTONE - Medium strength, fresh, black interlayered with dark brown carbonaceous mudstone from 13.69m to 13.85m, black coal						12.39m: J,85°,un,ro 12.78m: J,80°,un,H,ro 12.8m: J,80°,un,ro 12.98m: J,20°,pl,ro cy veneer 13.1m: P,30°,un,ro cy veneer 13.19m: P.5° un ro	с	100	86	
15	- - - - - - - - - - - - - - - - - - -	from 14.27m, black coal, medium strength, fresh						13.3m: P,sh,un,ro 13.37m: J,sv,un,H,ro 13.44m: P,5°,un,ro 13.6m: P,sh,pl,ro 13.62m: J,85°,un,ro,H 14.55m: P,5°,pl,ro				
14	-	from 15.31m to 15.43m, brown and light brown clay band						15.31m: P,sh,pl,ro 15.47m: P,sh,un,ro) pyrite 15.65m: J,85°,un,ro	с	100	87	
E	- 16 ^{15.95} 16.0			<u>×</u>	╤╤╤┚┾╤╤╤		╞═╪┨╤╤╤	15.81m: P,5°,un,ro 15.86m: P,5°,un,ro,				
13	16.25 	SILTSTONE - High strength, fresh, grey siltstone LAMINITE - High strength, fresh, grey and light grey laminite with pyrite in some laminations		· · · · · · · · · · · · · · · · · · ·				pyrite 15.95m: CORE LOSS: 50mm 16.14m: J,80°,un,sm 16.37m: J,65°,un,ro	с	96	96	
12	17.3 17.3	Bore discontinued at 17.3m, limit of investigation										
11												
10	- 19 - - - - - - - - - - - - - - - - - - -											
RI	G: Edso	n 3000 DRILL	.ER: Simon (A	APS)			GED: Bear	CASI	NG:	HW t	o 3m	

DRILLER: Simon (APS) RIG: Edson 3000 TYPE OF BORING: Solid flight auger to 2.95m (TC-bit), then HQ wireline to 17.3m WATER OBSERVATIONS:

REMARKS:

U, W C

CLIENT:

PROJECT:

LOCATION: Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SAMPLING & IN SITU TESTING LEGEND

- SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: 24.1 EASTING: 370628.3 NORTHING: 6360071.5 DIP/AZIMUTH: 90°/--

BORE No: 11 PROJECT No: 39663D DATE: 31 Oct 07 SHEET 1 OF 3

\square		Description	Degree of Weathering	.º Roc	k ath 🖵	Fracture	Discontinuities	Sa	mplir	ng & I	n Situ Testing
Ч	Depth (m)	of	rocationing	Log *	Vate	(m)	B - Bedding J - Joint	pe	ore S. %	مر م	Test Results
		Strata	M M M M M M M M M M M M M M M M M M M	Very Mediu		0.05	S - Shear D - Drill Break	Τy	Rec	ко %	Comments
24	0.1	SILT - Brown silt with abundant organics, leaves CLAY - (Very stiff to hard), brown clay, M <wp from 0.4m, (hard), light brown clay with ironstone bands, M<wp< td=""><td></td><td></td><td></td><td></td><td></td><td>A,pp</td><td></td><td></td><td>>400 kPa</td></wp<></wp 						A,pp			>400 kPa
23	- 1 - -							A			
22	-2-2							S pp			15,25 >400 kPa
-	- 2.3	CLAYSTONE - Extremely low strength, extremely weathered, light grey claystone from 2.8m, grey-brown						с	94	94	
21	3.15 3.2′	CORE LOSS/ CLAYSTONE - Very low strength,					3.15m: CORE LOSS: 50mm	с	100	100	
-	- 3.92	orange claystone from 3.7m, very low to low strength,					3.40m. P, 10 ,10,0m				
20	4 4.04	highly weathered					3.92m: CORE LOSS: 120mm	С	83	83	
	4.4 4.55	CLAYSTONE - Extremely low to very low strength, highly weathered, light grey and orange claystone from 4.13m to 4.3m, low strength,					4.2511: 3,80 ,01,10 4.4m: CORE LOSS: 150mm				
	- 5.3 - 5.3 	highly weathered, light grey and orange siltstone CORE LOSS - CLAYSTONE - Extremely low to very low strength, extremely weathered, light grey and orange-brown claystone					5.86m: J.80°,pl,H	с	91	89	
12	6.63 6.75	from 4.75m, very low to low strength, highly to moderately weathered SILTSTONE - Very low to low strength, highly to moderately weathered, grey and orange-brown siltstone from 6.16m, laminated from 6.29m to 6.34m, extremely low to very low strength, highly weathered					6.07m: J,65°,pl,H 6.48m: J,un,ro 6.58m: J,pl,ro 6.63m: CORE LOSS: 120mm	С	93	90	
15	7.85 8 7.98 	CORE LOSS - SILTSTONE - Very low strength, highly weathered, grey and brown siltstone from 6.9m to 6.96m, extremely low strength, extremely weathered CORE LOSS - SILTSTONE - Medium strength, slightly weathered, grey siltstone from 8.21m, high strength, fresh					7.85m: CORE LOSS: 130mm 7.98m to 8.21m, P,10°,pl,ro (50mm spacings) 8.28m: J,65°,pl,sm 8.44m to 8.53m, highly fract 8.77m: J,35°,un,ro 8.82m: J,50°,H,un 9.12m: J,60°, un sm	С	91	56	
	9.5	from 8.31m to 8.44m, undulating laminations from 8.98m to 9.03m, extremely low strength, extremely weathered, light					9.19m: P,sh,pl,sm, cy veneer 9.21m: P,5°,un,ro 9.25m: CORE LOSS: 250mm_	с	80	62	
RIC TY	G: Edso PE OF E	on 3000 DRILL BORING: Solid flight auger to 2.3m, (BSERVATIONS:	.ER: Simon (TC-bit), then	APS) HQ wireline to	LOC 22.7m	GED: Bear	CASI	NG: I	HW t	0 2.3	m

REMARKS:

CLIENT:

PROJECT:

LOCATION: Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SAMPLING & IN SITU TESTING LEGEND

- SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C
- J IES ING LEGEND

 pp
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength (s/50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: 24.1 EASTING: 370628.3 NORTHING: 6360071.5 DIP/AZIMUTH: 90°/--

BORE No: 11 PROJECT No: 39663D DATE: 31 Oct 07 SHEET 2 OF 3

		Description	Degree of Weathering .9	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of Strata		Very Low	2 Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
-14-	-	grey from 9.03m to 9.07m, low strength, moderately weathered, light grey				9.54m: J,65°,H,un 9.8m: P,sh,un,ro, cy 10.09m: J,50°,un,ro	с	80	62	
13	- 10.5 - 10.58⁄ 	CORE LOSS - SILTSTONE - High strength, fresh, grey siltstone (continued) from 10.05m, fresh from 10.27m, slightly weathered from 10.38m, very low to low				10.2m: J,50°,un,ro 10.29m: J,25°,un,H 10.32m: J,15°,un,ro 10.33m: J,80°,H,un 10.45m: J,85°,un,ro 10.5m: CORE LOSS: 80mm	с	91	81	
12	- - - - 12	strength, highly to moderately weathered CORE LOSS SILTSTONE - Low to medium strength. moderately weathered.				10.94m; J,60°, un,ro 110.94m; J,60°, un,ro 11.03m; P,5°, un,ro cy 11.24m; J,85°, H,un 11.4m; P,5°, un,ro, cy 11.62m; J,85°, H,pl 11.64m; P, sh, un,ro	С	100	91	
- - - - - - - - - - - - - - - - - - -	- 13	grey siltstone from 10.7m, high strength, fresh from 11.67m to 11.8m, medium strength, slightly weathered				11.67m to 11.7m, P,sh,un,ro, cy 11.91m: J,55°,H,pl 12.48m: J,sv, H,un 12.63m: P,5°,ro,un 12.77m: J,80°,un,ro, white mineral inclusion 12.87m: J,40°,un,ro 13.05m: J,55°,un,ro 13.18m: J,85°,un,ro	С	100	86	
	- - 14 - - - - - - - - - - - - - - - - - - -	from 14.67m to 14.84m, low strength, moderately to highly				13.49m: J,85°,un,ro 13.68m: J,80°,un,H 13.77m: J,70°,pl,ro 13.91m: P,sh,ro,un, cy 13.97m: P,10°,ro,un, cy 14.07m: P,5h,ro,un 14.15m: P,5°,ro,un 14.26m: J,85°,un,sm	С	96	85	
-6 - - - -	- 15.1 15.25	CORE LOSS - SILTSTONE - High strength, fresh, grey siltstone (laminated)				. 14.67m to 14.82m, P,5°, un,ro, cy (50mm spacing) 14.71m: J,70°,un,sm 14.84m: CORE LOSS: 50mm	с	79	40	
	- 16	SILTSTONE - High strength, fresh, grey siltstone (laminated) from 16.17m to 16.4m, medium strength, slightly weathered				15.1m: CORE LOSS: 150mm 15.41m: P,10°,un,ro,cy 15.53m to 15.72m, highly fract	с	100	80	
	- - - - 17 -	from 16.2m, band of conglomerate 15mm thick from 16.5m, medium strength, slightly weathered from 16.69m, extremely low	: : : : : : : : : : : : : : : : : : :			15.53m: J,75°,un,ro 15.8m: P,5°,ro,un, cy 15.95m: P,un,sm, white mineral inclusions 16.02m: J,80°,un,ro 16.05m: P,sh,H,un	С	100	100	
	- - - - - - - - - - - - - - - - - - -	strength, extremely weathered from 16.78m, very low to low strength, highly weathered from 16.82m, low to medium strength, moderately weathered from 16.88m, high strength, fresh from 14.2cm, light grav, situate				116.17m: P,sh,pl,ro, cy filled 116.37m: J,75°,pl,ro 116.44m: P,5°,un,H 116.66m: J,65°,un,sm 117.15m: J,70°,sv, un,ro 117.41m: J,80° 117.5m: P 10° un ro	с	100	86	
	18.55 18.65 19 19 19.15	VOID SANDSTONE - Medium to high strength, slightly weathered, pale brown sandstone VOID				17.67m: P,10°,un,ro, cy 17.67m: P,10°,un,ro, cy 17.84m: P,56°,un,ro 18.13m: P,50°,un,ro 18.14m: J,50°,un,ro 18.14m: J,sh,pl,ro 18.46m: P,60°,pl,ro,Fe 18.51m: J,pl,ro 18.55m: Void 0.1m 18.65m to 18.78m, highly fract 18.94m: P,45°,ro,un,Fe 19.1m: P,sv,80°,ro,un,	С	38	20	
RI	G: Edso	n 3000 DRIL	LER: Simon (APS) LO	GGED: Bear	CASI	NG:	HW t	o 2.3	m

TYPE OF BORING: Solid flight auger to 2.3m, (TC-bit), then HQ wireline to 22.7m WATER OBSERVATIONS:

REMARKS:

CLIENT:

PROJECT:

LOCATION: Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SAMPLING & IN SITU TESTING LEGEND

- A D B U W C
- SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- PD
 Phote benetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





Douglas Partners

Geotechnics · Environment · Groundwater

SURFACE LEVEL: 24.1 EASTING: 370628.3 NORTHING: 6360071.5 DIP/AZIMUTH: 90°/--

BORE No: 11 PROJECT No: 39663D DATE: 31 Oct 07 SHEET 3 OF 3

Γ		Description	Degree of	<u>.0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	n Situ Testing
뉟	Depth (m)	of	weathening	aph Log		Spacing (m)	B - Bedding J - Joint	эс	е%.	D,	Test Results
	(11)	Strata	× ↓ ↓ ↓ ∞ ±	<u>9</u> _		0.10	S - Shear D - Drill Break	Typ	Rec	RQ%	& Comments
- +	- - - - - -	VOID (continued)					Fe 19.15m: Void 2.15m				
3 .	- 21 - 21.3 - 21.55 - 21.6	CORE LOSS - COAL - Medium strength, fresh, dull black coal with shiny black coal		\times			21.3m: CORE LOSS: 250mm 21.55m to 21.6m, frag	С	38	20	
	- 22 22.1 - 22.7	VOID SILTSTONE - Medium strength, slightly weathered, grey and light grey siltstone with some carbonaceous siltstone laminations					22.18m: J,sh,ro,un 22.34m: P,30°,ro,un, Fe 22.4m: J,sh,ro, un, carbonaceous siltstone				
	-23	Bore discontinued at 22.7m, limit of investigation					veneer 122.44m to 22.6m, frag 22.64m: P,45°,ro,un,Fe 22.66m: P,30°,ro,un, Fe				
	- 24										
	- 25 										
	- 26										
	- 27										
	- 28										
· · · · · · · · · ·	- 29										
R	G: Edso	n 3000 DRILL	ER: Simon (A	APS)) LOG	GED: Bear	CASI	NG:	HW t	0 2.3	m

TYPE OF BORING: Solid flight auger to 2.3m, (TC-bit), then HQ wireline to 22.7m WATER OBSERVATIONS:

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A D B U W C

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep ¥ Water level

CHECKED Initials: Date:



Douglas Partners Geotechnics · Environment · Groundwater

CLIENT: PROJECT: LOCATION: Minmi

Coal & Allied Operations Pty Ltd Proposed Residential Subdivision

SURFACE LEVEL: 24.8 EASTING: 369867.5 NORTHING: 6360744.2 DIP/AZIMUTH: 90°/--

BORE No: 15 PROJECT No: 39663D DATE: 26 Oct 07 SHEET 1 OF 3

		Description	Degree of Weathering .9	Rock Strength	L	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing	
님	Depth (m)	of	de.		Vate	Spacing (m)	B - Bedding J - Joint	be	sre %	a°°	Test Results	
		Strata	G FR S S S S S S S S S S S S S S S S S S	Ex Lo Very High Very Fx Hii		0.01 0.10 0.50	S - Shear D - Drill Break	Ту	C C	R 0	Comments	
24	0.2	SILT - Brown grey silt topsoil with abundant organics, damp CLAY - (Stiff) grey brown clay (alluvium) with red brown mottling						А				
-	- 1 - - -							S,pp	-		1,3,4 N = 7	
	-2 2.0	CLAYSTONE - Extremely low strength, extremely weathered grey brown claystone From 2.45m, increased drilling resistance							-			
	- - - - - - - -	From 2.8m, extremely low to very low strength, extremely to highly weathered, grey brown From 3.2m, grey brown and light grey From 3.4m, light grey						с	100	100		
20 21 21 21 21	- 4 	From 4.0m to 4.32m, very low to low strength, highly weathered red siltstone inclusions From 4.23m, very low to low strength, highly weathered From 4.6m to 5.0m, red and orange siltstone inclusions					4.74m: J, 15°, pl, ro 4.77m: J, 30°, pl, ro, rootlets, H	С	100	75		
	- 	From 5.15m to 5.2m, red and orange siltstone inclusions From 5.35m to 6.15m, red and orange siltstone and light grey claystone, very low to low strength, highly weathered CLAYSTONE/CARBONACEOUS SILTSTONE - Veny low to low					14.83m: J, 30°, H, pl 14.86m: J, 55°, H, pl 14.87m: J, 55°, H, un 14.92m: J, 40°, un, ro	с	100	75		
15 15 15 16 17 17 17 17 17 17 18 17 1 18 19 19 19 19 19 19 19 19 19 19 19 19 19	6.5 7 7.2 7.3 7.4 7.5 8.4 8.56	SILISTONE - Very low to low strength, moderately weathered orange claystone interlayered with dark grey carbonaceous siltstone CARBONACEOUS SILTSTONE - Very low to low strength, moderately weathered dark grey carbonaceous siltstone with laminations of coal 1mm to 5mm thick at 1mm to 90mm spacing COAL - Medium strength, fresh black coal CORE LOSS - 0.1m COAL - Medium strength, fresh black coal LAMINITE - Medium to high strength, fresh grey and light grey laminite CARBONACEOUS SILTSTONE - Low strength, highly weathered fragmented dark grey/grey carbonaceous siltstone with some 1-2mm thick coal laminations at					6.6m: P, sh, poss DI 6.61m: P, sh, poss DI 6.64m: P, sh, poss DI 6.73m: P, sh 6.74m: J, 45° 6.82m: P, sh, poss DI 6.95m: P, sh, poss DI 6.95m: P, sh, poss DI 4.92m to 14.2m, Frs generally at 0.05m spacings 7.05m: P, sh, poss DI 7.2m: P, sh, poss DI 7.3m: CORE LOSS: 100mm 7.5m: P, sh 7.6m: P, sh 8m: Fr, 45°, pI 8.15m: P, sh 9.55m: P, sh 8.6m: P, sh 8.6m: P, sh 9.02m: P, sh 9.07m: P, sh	C	97	65		
P!	G. Edec	ו ווסח 3000 מע	FR: Simon (APG			GGED: Bear	CV6	NG	HW/ +	028	m	
TY	PE OF I	B: Edson 3000 DRILLER: Simon (APS) LOGGED: Bear CASING: HW to 2.8m PE OF BORING: Solid flight auger to 2.8m (TC-bit), then HQ wireline to 25.95m										

WATER OBSERVATIONS:

REMARKS:

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

SAMPLING & IN SITU TESTING LEGEND

- SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level







SURFACE LEVEL: 24.8 EASTING: 369867.5 NORTHING: 6360744.2 DIP/AZIMUTH: 90°/--

BORE No: 15 PROJECT No: 39663D DATE: 26 Oct 07 SHEET 2 OF 3

		Description	Degree of	Rock Strength	Fracture	Discontinuities	Sa	mplir	ng & I	In Situ Testing
RL	Depth (m)	of Strata		Vate Nation	Spacing (m) ତ୍ରେମ୍ବ ଜୁଡ଼	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
13 14 14	10.12 - 11 - 12 11.95	5mm spacings From 9.4m to 9.48m, slightly weathered From 9.97m, moderately weathered with some 1-2mm coal laminations at 2-10mm spacings LAMINITE - Medium to high strength, fresh highly fractured grey and light grey laminite <i>(continued)</i> COAL - Low to medium strength, moderately weathered black coal SANDSTONE - High strength, slightly weathered grey fine to medium grained sandstone				9.65m: P, sh, poss DI 9.85m: P, sh, poss DI 9.97m: P, sh 9.93m: P, sh 9.93m to 10.03m, multiple partings 10.47m to 10.50m, fg 10.9m to 10.92, fg 11.05m: P, sh 11.1m: P, sh, poss DI 11.33m: P, sh, poss DI 11.53m: P, sh, cy lined (20mm) 11.7m to 11.90m, fr, sv 12m: P, sh, poss DI	С	97	60	
12	- 13 - 14 - 14.2 - 15	From 13.8m to 14.2m, conglomerate, high strength, slightly weathered grey conglomerate SANDSTONE - High strength, slightly weathered grey fragmented sandstone From 14.74m to 14.99m, high strength fresh grey conglomerate From 15.38m to 15.81m, high strength fresh conglomerate				12.65m: J, 45° 12.85m: P, sh, poss DI 12.95m: P, sh, cy lined (10mm) 13m: P, sh 13.20m to 13.50m, multiple p, sh, 50-100nm spacing 13.65m: J, 45°, poss DI 13.8m: J, 45°, poss DI 13.90m to 13.92m, fg 13.92m to 14.0m, J, 70° 14m: J, 45° 14.05m: P, sh 14.24m: P, sh, un ro 15.03m: P, sh, un ro	C	100	75	
-6	- 16 ^{15.95}	SILTSTONE - Low to medium strength, moderately weathered dark grev siltstone	│			15.81m: P, sh, un ro 15.95m to 16.67m, P, sh, un, ro @ 20-70mm	С	100	100	
- 8	16.74 17 17.05	COAL - Low strength, moderately weathered black coal CORE LOSS - 0.25m				16.67m to 17.05, Fg 17.05m: CORE LOSS: 250mm	с	81	81	
	-18 -18 -18.24	SILTSTONE - Low strength, moderately weathered grey siltstone LAMINITE - Medium to high strength, moderately to slightly weathered grey siltstone				17.30m to 18.27m, P, sh, un, ro @ 10-20mm 17.48m: P, sh, un ro 18.53m: P, sh, un ro	С	100	31	
	- - - - - - - - -					18.7m: Fg 18.88m: P, sh, un, sm 18.91m: P, sh, un, sm 19.18m: P, sh, un, sm 19.46m: P, sh, un, sm 19.85m to 19.90, J, 45°,	С	100	91	
RI	G: Edso	n 3000 DRILL	ER: Simon (APS)	LO	GGED: Bear	CASI	NG: I	HW to	o 2.8	m

RIG: Edson 3000

TYPE OF BORING: Solid flight auger to 2.8m, (TC-bit), then HQ wireline to 25.95m

WATER OBSERVATIONS:

REMARKS:

U, W C

CLIENT:

PROJECT:

LOCATION: Minmi

SAMPLING & IN SITU TESTING LEGEND

A D B

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level

CHECKED Initials: Date:



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Coal & Allied Operations Pty Ltd Proposed Residential Subdivision

SURFACE LEVEL: 24.8 EASTING: 369867.5 NORTHING: 6360744.2 **DIP/AZIMUTH:** 90°/--

BORE No: 15 PROJECT No: 39663D DATE: 26 Oct 07 SHEET 3 OF 3

		Description	Degree of Weathering	Rock	L	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of	der der		Vate	Spacing (m)	B - Bedding J - Joint	be	re %	D D	Test Results
	(,	Strata	G H R S S M A F E	High High High		0.05 0.10 (1.00 (S - Shear D - Drill Break	Ţ	ပိ မိ	R0%	& Comments
	-21	LAMINITE - Medium to high strength, moderately to slightly weathered grey siltstone (continued)					un, Fg 19.99m to 20.06m, J, 60°, un, ro 20.12m: P, sh, un, ro 20.17m: P, sh, un, ro 20.17m: P, sh, un, ro 20.32m: P, sh, un, ro 20.36m: P, sh, un, ro 20.48m: P, sh, un, ro 20.48m: P, sh, un, ro 20.58m to 20.63m, Fg 20.90m to 21.70m, P, sh, un, ro @20-100mm	с	100	29 29	
E	- 22 - 23 - 23.18 - 23.45	SILTSTONE - Low strength, moderately weathered grey siltstone					¹ 21.70m to 23.55m, P, sh, pl, ro 23.45m: CORE LOSS:	С	92	0	
F	- 23.6	CORE LOSS - 0.15m			4		150mm 23.60m to 24.30m P				
Ē	-24	moderately weathered grey siltstone					sh, un, ro @ 20-50mm				
ŧ	-										
Ē	- 24.3	VOID - 24.3m to 25.4m				• 					
	-25							с	100	15	
ŧ	25.4	SILTSTONE - Very low strength, highly weathered grey siltstone.									
Ę.	25.84	highly fragmented (possible rubble)					25.64m: CORE LOSS: 200mm				
-	26 ^{25.95}	CORE LOSS - 0.15m SILTSTONE - Low strength, highly weathered grey siltstone (possible floor) Bore discontinued at 25.95m, limit of									
Ę		Investigation									
	-27										
-7	,										
f	-28										
	-										
-4	-29										
Ľ	ŀ										
R	IG: Edso	n 3000 DRILL	.ER: Simon (APS	S)	LOG	GED: Bear	CASI	NG:	HW t	o 2.8	m

TYPE OF BORING: Solid flight auger to 2.8m, (TC-bit), then HQ wireline to 25.95m WATER OBSERVATIONS:

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A D B U W C

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

- PD
 Phote benetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level

CHECKED Initials: Date:





CLIENT: PROJECT:

Coal & Allied Operations Pty Ltd Proposed Residential Subdivision LOCATION: Minmi

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 1 OF 9

Γ			Description	Degree of	<u>ں</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
		epth m)	of	weathering	raph l od		Spacing (m)	B - Bedding J - Joint	be	ore . %	۵¢ م	Test Results
		,	Strata	MW MW SW FR	U	Ex Low Very Low Very Low Very L	0.01	S - Shear D - Drill Break	Ту	Rec	RC %	Comments
		0.2 0.55	CLAY - Grey brown clay with some silt with sandstone SANDSTONE - Orange brown mottled grey brown sandstone with clay inclusions						А			
	-1		SILTSTONE AND SANDSTONE - Orange brown sandstone interbedded with grey brown and orange siltstone layers						s			9,14,9 N = 23
	-2		From 1.5m, light grey siltstone									
			From 2.2m, increased drilling resistance						S			18/110mm refusal, bouncinູ
	-3		From 3.0m, orange brown sandstone/siltstone									
	-4								S			25/90mm, refusal
		5.4	SANDSTONE - Low strength, moderately to highly weathered orange brown fine grained sandstone					5.44m: DB 5.5m: DB 5.58m: P, 10°, un, ro 5.69m: DB 5.77m: DB 5.8m: DB 5.8m: DB	с	100	100	
	- 7	6.51 6.57 6.62	SILTSTONE/SANDSTONE - Low to very low strength, moderately to highly weathered orange and orange grey siltstone/sandstone CORE LOSS - From 6.57m to 6.62m SILTSTONE/SANDSTONE - Low to very low strength moderately to					5.87m: DB 5.94m: DB 5.94m: DB 5.97m: DB 4 From 6.07m to 6.21m, J, 70°, un, fg 6.24m: DB 6.5m: DB 4 From 6.52m to 6.57m, J, 70° un fa	с	96	85	
	- 8	8.3	highly weathered orange and orange grey siltstone/sandstone From 6.62m to 6.68m - fragmented, higher strength material SANDSTONE - Low strength, moderately weathered grey, fine grained sandstone	1				6.57m: CORE LOSS: 50mm 6.98m: DB 7m: P, sh, stepped, sm From 7.05m to 7.10m, fg 77.14m: DB 77.21m: DB	с	100	83	
	-9	9.06 9.11	SILTSTONE/CLAYSTONE - Low strength, moderately to high weathered grey-dark grey siltstone/claystone CORE LOSS - From 9.06m to 9.11m					From 7.26m to 8.06m, J, sv, un, he From 7.33n to 7.39m, fg 7.43m: DB 77.57m: DB 7.63m: P, sh, pl, ro 8.04m: DB From 8.12m to 8.19m, fg	с	97	78	

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

SAMPLING & IN SITU TESTING LEGEND

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 2 OF 9

Π		Description	Degree of	<u>.0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of Strata	M M M M M M M M M M M M M M M M M M M	Graph Log	Ex Low Very Low Medium High Very High Ex High	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE/CLAYSTONE - Low strength, moderately to highly weathered grey-dark grey					From 8.20m to 8.364m, DB at 10mm spacing 8.51m: P, sh, un, sm 8.59m: DB	с	97	78	
	- 11	sitstone/claystone (<i>continued)</i>					From 8.61m to 8.64m, J, 45°, pl, sm From 8.76m to 8.8m, fg 8.87m: P, sh, pl, sm 9.06m: CORE LOSS: 50mm From 9.11m to 9.24m, J, sv, un, ro	с	100	81	
	- 12 12.6 12.8	¬From 12.55m, coal lenses/ ⊂CORE LOSS - From 12.6m to/ 12.8m/					9.18m: DB 9.24m: DB 9.24m: DB 9.36m: DB 9.3m: DB 9.33m: P, clay filled 9.4m: P, sh, pl, sm 9.42m: P, sh, pl, sm 9.55m: P, sh, pl, sm	С	81	69	
	13.05 13.35 13.6 13.6	CLAYSTONE - Very low to low strength, moderately weathered, grey claystone with coal laminations CORE LOSS - From 13.05m to 13.35m CLAYSTONE - Low to medium					9.57m: P, sn, pl, sm 9.66m: P, 10°, pl, sm From 9.74m to 9.78m, J, 45°, pl, sm 9.86m: P, sh, pl, sm 9.95m: P, sh, un, sm 10.06m: P, sh, un, sm From 10.12m to 10.29m,	с	60	0	
	-	From 13.57m, clay COAL - Medium strength, moderately weathered, black coal, with seams of 5mm to 330mm thick					J, 60 , rg r10.52m: DB r10.62m: DB r10.69m: DB r10.8m: P, sh, pl, sm From 10.8m to 11.25m,	с	60	40	
	-15 -16	clay at approximately 160mm spacing					J, sv, uii, io From 11.05m to 11.25m, fg 11.36m: DB 11.56m: DB 11.56m: DB 11.57m: DB From 11.74m to 11.84m, J, 50°, pl, ro 11.87m: DB 11.95m: DB 11.97m: DB 12.0m to 12.07m, J, 50°, un, ro 12.16m to 12.31m, fg	С	100	87	
	- 17 - 17.5 - 17.55	CORE LOSS - From 17.5m to		×			12.42m: DB 12.47m: DB 12.6m: Core loss, 0.2m CORE LOSS: 200mm 13.05m: Core loss, 0.3m CORE LOSS: 300mm	с	93	42	-
	-18	LAMINITE - High strength, slightly weathered, grey laminite (70% siltstone/30% sandstone)					From 13.35m to 13.7m, highly fractured to fg 13.77m: J, 80°, un, ro 14.31m: P, 10?8, un, sm, cy From 14.39m to 14.45m, fg 14.5m: P, 10°, un, ro, cy filled 14.58m: P, 10°, un, sm, cy From 14.75m to 15.25m, highly fr to fg 15.25m: P, 5°, un, ro, cy filled	С	100	94	
	-	From 19.4m, very high strength (90% sandstone/10% siltstone)		· · · · · · · · · · · · · · · · · · ·			cy From 14.75m to 15.25m, highly fr to fg 15.25m: P, 5°, un, ro, cy filled 15.45m: J, sv, pl, ro 15.49m: P, 5°, un, ro, cy				

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 3 OF 9

ſ			Description	Degree of	<u>ں</u>	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
	ᆋ	Depth	of	weathering	aph		Spacing (m)	B - Bedding J - Joint	e	e %.	0	Test Results
		(11)	Strata	M A A A S A	5_	<pre>/ery + /ery + /ery + /ery + /ery +</pre>	0.01 0.105 1.00	S - Shear D - Drill Break	Typ	Rec	RQ %	& Comments
	-		LAMINITE - High strength, slightly weathered, grey laminite (70% siltstone/30% sandstone) (continued)		· · · · · · · · · · · · · · · · · · ·			filled -15.6m: J, 75°, un, ro 15.66m: P, 5°, un, ro -15.72m: P, 10°, un, he 15.77m: P. 5°, un, he -15.83m: P, 5°, un, he	с	100	94	
		22						fg 16.1m: J, sv, un, ro (16.05m to 16.2m) 16.3 16.3m: J, sv, pl, he 16.4m: J, 80°, pl, ro From 16.95m to 17.07m, highly fr From 17.13m to 17.22m, highly fr From 17.27m to 17.5m, fg to higly fr T7.5m: Core loss, 0.05m CORE LOSS: 50mm Unless otherwise stated, discontinuities are partings, sh-10°, un, ro 17.68m: DB 18m: Sh-10°, un, ro 18.06m: Sh-10°, un, ro	с	100	100	
		24 25 26						18.14m: Sh-10°, un, ro 18.17m: Sh-10°, un, ro 18.33m: J, 80°, pl, sm, part he (18.17m to 18.48m) with DB on laminations 18.49m: DB 18.54m: DB 18.56m: DB 18.56m: DB 18.56m: DB 18.78m: J, 60°, un, he 18.84m: DB 18.91m: DB 19.01m: DB 19.01m: DB 19.07m: DB 19.07m: DB 19.09m: J, 70°, pl, sm (19.11m to 19.26m) 19.39m: DB 19.78m: DB 19.78m: DB 19.78m: DB 20.51m: DB 20.51m: DB	С	100	95	
		27 28						20.78m: DB 20.78m: DB 20.8m: DB 20.81m: DB 20.84m: DB 20.85m: DB 20.87m: DB 21.01m: DB 21.11m: DB 21.14m: DB 21.27m: DB 21.3m: DB From 21.33m to 21.44m.	С	100	100	
		29						J, (MFr), 70°, stepped, sm From 21.49m to 21.64m, J (MFr?), 70°, un, sm 21.64m: DB From 21.66m to 21.78m, J, (MFr?), 70°, pl, sm 21.76m: DB 21.76m: DB 22.51m: DB	с	100	100	
	ŀ				<u> ···</u> -		li li ii	22.64m: DB	С	98	72	

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DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

- A D B U X W C
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 4 OF 9

Γ		Description	Degree of Weathering .≌	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
R	Depth (m)	of Strata		Ex Low Very Low Medium Very High Very High	Spacing (m) 500 000	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	30.34 -31 -32 -32 -32.78	Medium to high strength, Fg COAL - Low strength, moderately to highly weathered, black coal From 32.21 to 32.25 laminite low to medium strength, highly weathered, yellow brown laminite				22.79m: DB From 22.81m to 23.06m, J, (MFr), 70°, pl, sm 22.95m: DB 23.07m: DB 23.39m: DB From 23.39m to 23.50m, J (MFr), 70°, pl, sm 23.5cm: DB 23.65m: DB 23.65m: DB 23.66m: DB From 23.76m to 23.89m, J (MFr), 70°, pl, sm 23.84m: DB 23.84m: DB 23.91m: DB From 23.91m to 24.07m, J (MFr), sv, un, ro 23.92m: DB	С	98	72	
	- 33	LANINI IE - High to very high strength, slightly weathered blue-grey laminite From 33.72m to 34.01m coal, low strength, moderately to highly weathered black coal				23.99m: DB 24.24m: DB From 24.59m to 24.66m, J (MFr), 70°, stepped, ro 24.78m: DB From 24.88m to 25.06m, J (MFr), 70°, pl, sm From 25.23m to 25.37m, Fr, fg 25.5m: DB 25.6m: DB 25.6m: DB 25.79m: DB From 25.79 to 25.87m, J (MFr), 60°, pl, ro From 25.88m to 25.91m,	С	100	48	
	- 35 - - - - -					J, 30°, un, ro 25.98m: DB 26.07m: MFr, irregular, stepper ro From 26.18m to 26.34m, MFr, irregular un, ro From 26.34m to 26.41m	с	100	100	
	- 36 - 37 - 37 - 38	From 37.88m to 38.07m, low strength, moderately to highly weathered laminite				r, fg From 26.92m to 27.13m, MFr, 80°, pl, sm, fe, ca 27.21m: DB 27.37m: DB 27.47m: DB 27.67m: DB 27.67m: DB 27.67m: DB 27.67m: DB 28.78m: DB 28.78m: DB 28.78m: DB 28.78m: DB 28.78m: DB 28.95m: DB 28.95m: DB 28.95m: DB 28.95m: DB 28.95m: DB 28.95m: DB 28.95m: DB 29.09m: DB 29.09m: DB 29.36m: DB 29.36m: DB 29.36m: DB 29.36m: DB 29.36m: DB 29.36m: DB	C	100	89	
	- 39 - - - - - - -					30.27m: DB 30.29m: DB 30.47m: DB 30.53m: DB 30.56m: DB 30.67m: DB 30.67m: DB 31.01m: DB	с	100	90	

RIG: Scout 103

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DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 5 OF 9

Γ		Description	Degree of Weathering .≌	Rock Strength	_	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
ā	Depth (m)	of Strata	Graph Graph	Ex Low Very Low High Ex High Ex High	Wate	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
		LAMINITE - High to very high strength, slightly weathered blue-grey laminite <i>(continued)</i>					31.29m: DB 31.69m: DB 31.69m: DB 31.77m: DB 31.77m: DB 31.87m: DB 431.87m: DB 431.87m: DB 45.75m 31.94m to 31.95m, P, sh, fg 45.75m 32.04m to 32.21m, 45.75m 52.28m to 32.78m, 57.76 pp	С	100	90	
	- 42						 33:: DB From 33.3m to 33.45m, J (MFr?), 75°, pl, sm From 33.45m to 33.46m, P, sh, un, clay filled From 33.46m to 33.56m, J (MFr?), 80°, curved slickensided From 33.50m to 33.58m, J (MFr?), 80°, irregular, slickensided slickensided 33.65m: DB 33.65m: DB From 33.75m to 34.01m, Fr, fg From 34.06m to 34.07m 	С	100	98	
	- 44						Fr, fg 34.11m: P, sh, pl, fg 34.28m: DB 34.46m: DB From 37.40m to 37.49m, J, 60°, pl, sm 35.17m: DB	с	100	84	
	-45 -46 -47						36.43m: DB 36.48m: DB 36.55m: DB 36.75m: DB 36.75m: DB From 36.79m to 36.82m, J, sv, un, sm, fe 36.82m: DB 36.84m: DB 36.84m: DB 36.84m: DB 36.91m: DB From 36.94m to 37.01m, J (MFr?), 80°, pl, sm, fe 36.95m: DB 36.95m: DB	С	100	100	
	- 48 - 48 						37.09m: DB 37.15m: DB From 37.21m to 37.4m, J, 70°, un, sm 37.24m: DB 37.33m: DB 37.36m: DB 37.36m: DB 37.37m: DB 37.41m: DB 37.44m: DB 37.44m: DB 37.48m: DB 37.57m: DB 37.59m: DB 37.67m: DB 37.67m: DB	С	100	97	

RIG: Scout 103

CLIENT:

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Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U X W C
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 6 OF 9

Γ		Description	Degree of Ueathering ⊡	s	Rock	Fr	acture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of Strata	Graph 6		Medium Medium Very High Ex High	0.01 0.05 C	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
		LAMINITE - High to very high strength, slightly weathered blue-grey laminite <i>(continued)</i>						From 37.77m to 37.89m, Fr, sv, irregular, sm, ca 37.89m: P, sh, fg 37.92m: P, sh, fg 37.98m: DB 38.05m: DB	с	100	97	
	- 50.8 - 51 	COAL - Medium to high strength, moderately weathered, black coal highly fractured						38.11m: P, sh, pl, clay filled 38.17m: P, sh, pl, clay filled From 38.23m to 38.29m, J, (MFr?), 65°, pl, sm 38.29m: DB 38.31m: DB	с	100	66	
	- 53 8	From 53.14m to 53.24m very low to low strength, moderately to highly weathered light grey/white tuff						38.43m: DB 38.46m: DB 38.71m: DB 38.89m: DB 38.99m: DB 38.96m: DB 39.32m: DB 39.43m: DB From 39.51m to 39.56m, J, 60°, pl, sm From 39.57m to 39.60m, J, 60°, pl, sm 39.65m: DB 39.77m: DB	С	100	100	
	55.32 55.32 55.32 56.21	LAMINITE - High to very high strength slightly weathered, blue grey slightly fractured laminite From 54.28m, coal lenses 2mm thick approximately 120mm spacing COAL - Medium to high strength, moderately to slightly weathered, black coal with bands of carbonaceous mudstone, approximately 50mm to 100mm spacing, highly fractured LAMINITE - High to very high strength, slightly weathered, blue grey laminite, slightly fractured COAL - Medium to high strength, moderately to slightly weathered, black coal LAMINITE - High strength, fresh, grey laminite (90% siltstone/10%						39.81m: DB 39.87m: P, sh, un, stepped, sm, ca From 38.87m to 40.04m, J, 80°, un, sm-ro 40.04m: DB 40.15m: DB 40.48m: DB From 40.63m to 40.7m, J, 70°, un, sm 40.75m: P, sh, pl, sm, ca 40.81m: P, sh, pl, clay filled 40.83m: DB 41.26m: DB 41.27m: DB 41.39m: DB 41.44m: DB 41.44m: DB 41.44m: DB 41.44m: DB	С	100	89	
	- 58	sandstone) with carbonaceous laminations						41.53m: DB 42.13m: DB 42.13m: DB 42.31m: DB 42.31m: DB From 42.41m to 42.5m, J, 75°, pl, sm 42.5m: DB From 42.50m to 42.63m, J, sv, un, he From 42.61m to 42.95m, J, sv, pl, sm 42.64m: DB 42.87m: DB From 42.92m to 42.97m, Fr, fg 43.14m: DB 43.37m: DB 43.37m: DB 43.46m: DB 43.55m: DB 43.55m: DB 43.58m: DB 43.58m: DB	С	100	90	

RIG: Scout 103

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DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

- A D B U X W C

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 7 OF 9

Γ		Description	Degree of Weathering .≅	Rock Strength	-	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of Strata	HW MW SSW Graph	Very Low Very Low Nedium Very High Ex High	0.01	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	-61	From 59.9m to 61m (90% siltstone/10% sandstone) LAMINITE - High strength, fresh, grey laminite (90% siltstone/10% sandstone) with carbonaceous laminations <i>(continued)</i>					43.7m: DB 43.79m: DB 43.83m: DB 43.89m: DB 43.99m: DB 43.99m: DB 43.97m: DB 44.13m: DB 44.13m: DB 44.35m: DB 44.35m: DB 44.35m: DB 44.35m: DB 44.71m to 44.82m, From 44.71m to 44.82m, J, 70°, pl, sm 44.97m: DB 45.3m: DB 45.35m: DB 45.35m: DB 45.61m: DB	С	100	96	
	- 63 - 64 - 65	From 63.13m to 63.42m, sandstone inclusions light grey From 63.6m, sandstone inclusion at 70° From 64.05m, sandstone inclusion, sh-70°					From 45.61m to 45.81m (MFr), irregular, ro, fr 745.79m: DB 745.86m: DB 745.86m: DB 745.95m: DB 745.95m: DB 745.95m: DB 746.05m: DB 746.05m: DB 746.05m to 46.27m, J (MFr), 70°, pl, sm, fr, multiple joint sets 746.11m: DB 746.11m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.41m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB 746.44m: DB	С	100	92	
	- 66 - 67 - 68 - 69						46.9m: DB 46.93m: DB From 46.98m to 47.11m, J (MFr), 70°, pl, sm 47m: DB 47.05m: DB 47.14m: DB 47.35m: DB 47.35m: DB 47.4m: DB 47.51m: DB From 47.61m to 47.7, J (MFr), fr From 47.76m to 47.88m, J (MFr), 65°, un, ro From 47.83m to 47.99m, J (MFr), 70°, irregular, sm 48.16m: DB 48.19m: DB 48.24m: DB From 48.26m to 48.34m, J (MFr), 70°, un, sm 48.36m: DB 48.36m: DB 48.43m: DB 48.43m: DB 48.43m: DB	С	100	100	
	-						48.64m: DB 48.64m: DB 48.82m: DB 48.82m: DB 48.9m: DB	С	100	100	

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Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 8 OF 9

		Description	Degree of	Rock	<u> </u>	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
Ч	Depth (m)	of Strata	Graph Graph	Kery Low Addium Addi	Wate	Spacing (m) ଅନ୍ୟୁନ୍ତ୍ରି	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	- 71 38	LAMINITE - High strength, fresh, grey laminite (90% siltstone/10% sandstone) with carbonaceous laminations (<i>continued</i>) From 70.5m, (sandstone 90%)					48.98m: DB 49.02m: DB 749.18m: DB From 49.25m to 49.33m, J (MFr), sv, pl, sm 49.33m: DB From 49.44m to 49.5m, J (MFr), 50°, pl, sm 749.51m: DB From 49.52m to 49.65m,	С	100	100	
	-72	VOID					J (MFr), 70°, pl, sm 49.6m: DB 49.78m: DB 49.92m: DB 50.17m: DB 50.25m: DB From 50.30m to 50.45m, J (MFr?), 75°, un, sn-ro, pyrite 50.72m: DB From 50.8m to 51.17m,				
	73 73.1 73.3 73.66 73.82 74	From 72.88m, rubble SILTSTONE/LAMINITE - High strength, fragmented grey siltstone/laminite VOID From 73.55m, rubble COAL - Medium strength, moderately weathered, black coal SANDSTONE - Very high strength, fractured, grey sandstone					Fg 51.25m: DB 51.4m: DB From 51.51m to 51.71m, Fg From 52.26m to 52.37m, J, sv, un, ro From 52.87m to 53.0m, J, 80°, un, ro From 53.40m to 53.50m, J, 80°, un, fg From 54.11m to 54.32m, Fr, 5° to 30°, un, sm From 54.43m, J, 30°, un, sm, coal	С	76	71	
	75 76 77						From 54.48m to 55.0m, highly fractured, P, sh-10°, pl, sm, spacing 50mm to 100mm 54.82m: J, 70°, un, ro, pyrite 55.11m: P, sh, un, sm, coal 55.3m: P, 5°, un, sm, coal From 55.54m to 55.83m, Fr, sh-30°, 10mm to 80mm spacing, sm-sl 56.21m: P, 5°, un, sm, pyrite 56.39m: P, 5°, un, sm, pyrite, coal 56.68m: DB 56.84m: P, 5°, un, ro, CBS, he 56.98m: P, 5°, un, ro, CBS, he	С	100	100	
	78 79 79	Bore discontinued at 77.9m, limit of investigation					CBS 57.22m: DB 57.37m: P, 5°, un, sm, CBS 57.5m: DB 57.6m: P, 5°, un, sm, CBS, poss DB 57.62m: P, 5°, un, sm, CBS, poss DB 57.66m: P, 5°, un, sm, CBS, poss DB 57.66m: P, 5°, un, sm, CBS, poss DB 57.68m: P, 5°, un, sm, CBS, poss DB 57.73m: DB 58.06m: P, 5°, un, sm,				

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DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

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 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

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 Photo ionisation detector

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 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 201** PROJECT No: 39663D DATE: 23 Apr 08 SHEET 9 OF 9

Γ		Description	Degree of Weathering	<u>.</u>	Rock Strength	<u>_</u>	Fracture	Discontinuities	Sampling	& In Situ Testing
R	Uepth (m)	of	liteationing	iraph Log		Nate	(m)	B - Bedding J - Joint	/pe ore c. % QD	× Test Results
		Strata	M H M S S S S S S S S S S S S S S S S S	U U	Ex Low Medi High Ex H	0.01	0.05 0.10 0.50 1.00	S - Shear D - Drill Break	Re C	Comments
	- 81							CBS, poss DB 58.23m: J, 20°, un, sm 58.35m: DB From 58.48m to 58.7m, J, 30°, un, sm spacing 10mm to 40mm 58.77m: J, 40°, un, he 58.85m: DB 59.05m: P, 5°, un, ro, CBS, poss DB		
	- 82							si, CBs, he 59.21m: J, 20°, un, sm 59.39m: DB 59.51m: DB 59.59m: DB 59.66m: DB 60.45m: DB 60.61m: DB 60.61m: DB		
	- 83							(60.83m to 60.96m) 60.94m: J, 65°, un, he, ca (60.87m to 61.01m) 61.02m: J, 70°, un, sm, ca (60.94m to 61.09m) 61.22m: J, 80°, un, he 61.46m: J, 65°, pl, sm, ca (61.4m to 61.53m)		
	- 84 - 84 							61.61m: J, 50° to 70°, pl, sm, ca (61.55m to 61.67m) 61.94m: J, 70°, pl, sm (61.85m to 62.02m) 62.34m: J, 70°, pl, sm (62.22m to 62.46m) 62.53m: DB		
	- 85 							62.63m: DB 62.7m: DB 62.76m: DB 62.85m: P, 5°, un, sm, coal - 10mm 63.1m: DB 63.32m: DB, coal lense 63.38m: DB 63.57m: DB		
	- 87							From 63.62m to 63.79m, fractures, sv-60°, un, he 63.85m: J, 40°, un, sm 63.95m: J, 50°, un, sl From 64.0m to 71.38m, DB spaced 0.05m to 0.75m 74.72m: DB 75.4m: DB 75.7m: DB 75.89m: Di on CBS Iam 75.98m: Di on CBS Iam		
	- - 88 - - - - -							77.11m: DB 77.73m: DB		
	- 89 - 89 									

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear/Benson

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.4m. HQ wireline from 5.4m to 77.9m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 50% water loss in coal at 13.6m

SAMPLING & IN SITU TESTING LEGEND

A D B

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling U, W C

 pp
 Pocket penetrometer (kPa)

 pP
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 202** PROJECT No: 39663D **DATE:** 14 Apr 08 **SHEET** 1 OF 9

Γ		Description	Degree of	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
뉟	Depth (m)	of			B Spacing (m)	B - Bedding J - Joint	be	re . %	D D	Test Results
	(,	Strata	G G G	Ex Low Very Low High Very F Ex Hig	0.01 0.10 0.50	S - Shear D - Drill Break	Ţ	Co	RO%	& Comments
	-	CLAY - Very stiff to hard, light grey brown mottled orange brown clay								
							А			
	0.75			1			pp S			400 kPa 4 9 10
	0.75	SILTSTONE/CLAYSTONE - Extremely low to very low strength.								N = 19
	[extremely to highly weathered, light					s			9,11,10
	-	siltstone/claystone								N = 21
	-									
	2	From 1.8m, increased drilling								
	-									
	-						<u>s</u>			
	-3									
	-									
	-					From 38.35m to 38.55m,				
	-					fr and p, 5mm to 50mm spacing				
	3.95									
	-	strength, highly to moderately				4.04m: J, sv, un, sm, cy, extend to 4.14m				
		orange laminated siltstone								
	-					4.6m: P, 0°-10°, un, ro				
	-5		· · · · · · · · · · · · · · · · · · ·			4.75m to 4.87m, J, 80°, pl, ro, fe	С	100	97	
	-					└4.98m to 5.07m, J, 80°, ∖ un, sm, cy				
						¹ 5.16m: P, 0°-10°, un, ro				
	-				i i h i i	5.65m: P, 0°-10°, un, ro				
	-6) 5 95m [.] CB				
	-	From 6.0m, interbedded sandstone				5.98m: P, 0°-10°, un, ro				
	[6.17m: Di	С	100	90	
	-					6.5m: J, 65°, he				
	-7				li ii l i	6.91m: Cy filled (10mm)				
	-	SANDSTONE - Medium strength,				7.14m: DB				
	[grey-brown mottled orange			╎╺┽╝╷╷	7.16m: DB 7.2m: DB				
		sandstone			i ii i	^L 7.27m: Cy filled (10mm), he				
	-8	laminations spacing 5mm to 140mm				7.4m: Fe 7.42m: Fe	С	97	96	
						7.47m: Fe				
	- 8.5	\Box From 8.47m, clay, and gravel band (8.15m: DB				
	8.55 8.78	CORE LOSS - From 8.5m to 8.55m				50mm				
	-9 0.05	SANDSTONE - Medium strength,				8.78m: CORE LOSS: 270mm				
	9.05	orange brown sandstone								
		CORE LOSS - From 8.78m to					С	91	87	
		From 9.55m, medium strength,								
	-	moderately weathered, orange				9.78m: J, sv, un, ro, fe				
RI	G: Scou	it 103 DRILL	ER: Total (Shedd	on) LC	GGED: Bear	CASI	NG:	HW t	o 4.0	m
T١	PE OF E	BORING: Solid flight auger to 3.95m,	then HQ wireline	coring from 3.95	m to 80.95m					
w	ATER O	BSERVATIONS: No free groundwate	r observed							

10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND CHECKED
 pp
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep
 Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C Initials: Date:

PROJECT: LOCATION:

CLIENT:

Coal & Allied Operations Pty Ltd Proposed Residential Subdivision Minmi



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 2 OF 9

Π		Description	Degree of Weathering	<u>.0</u>	Rock Strength	_	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of	Wednering	Log		Vate	Spacing (m)	B - Bedding J - Joint	bе	re . %	D D	Test Results
	(,	Strata	H H M K N M M K F R S K	ō	Ex Lo Very L High Ex Hig		0.05 0.10 0.50 1.00	S - Shear D - Drill Break	Ту	Rec	RO 80%	& Comments
	- 11	brown SANDSTONE - Extremely low strength, extremely weathered, grey brown sandstone (clayey sand properties) (continued) At 10.02m to 10.18m, increased weathering along joint, extremely low to low strength, extremely to highly weathered From 10.18m, very low to medium strength, highly to moderately						9.94m: J, 35°, he 10.1m: J, 60°, he, cy From 10.3m to 10.45m, highly fractured 10.75m: P, 0°-10°, un, ro 11m: Cy filled (10mm) 11.23m: P, 0°-10°, un, ro 11.28m: J, sv, un, sm, di 11.28m: J, sv, un, sm, di	С	91	87	
	- 12 12.15 - - - - - - - - - - - - - - - - - - -	From 10.38m, extremely low strength, extremely weathered From 10.45m, low to medium strength, moderately weathered, interbedded sandstone with carbonaceous laminations to 10.75m				> <		11.5m: Possible DB 11.5m: Possible DB 11.7m: DB 11.83m: DB 12.15m: CORE LOSS: 650mm				
	- 13 - 13.08 	From 11.1m to 11.25m, carbonaceous laminations 5mm to 50mm spacing From 11.28m to 11.4m, siltstone, grey From 11.65m to 12.1m,					جل الا 	12.93m: P, 0°-10°, un, ro 13.02m: P, 0°-10°, un, ro 13.06m: P, 0°-10°, un, ro 13.2m: L sy un ro fe	С	77	61	
	- 14 .	carbonaceous laminations spacing 1mm to 60mm CORE LOSS - From 12.15m to 12.8m SILTSTONE - Very low strength, highly weathered, grey brown						(13.08m to 13.3m) From 13.3m to 13.38m, P, spacing 20mm 13.5m: J, 80°, un, ro 13.74m: J, 55°, he, un, fe				
	- 15	From 12.93m, medium strength, moderately weathered From 13.02m to 13.06m, extremely low to very low strength, extremely to highly weathered From 13.06m to 13.08m, clay band SANDSTONE - Medium strength, moderately weathered, light brown sandstone						13.78m: P, fe 13.84m: J, 40°, he, fe 13.96m: he 14.05m: P, 0°-10°, un, ro 14.18m: J, 70°, pl, ro, fe 20mm wide From 14.25m to 14.4m, highly fr to fg (10mm to 20mm) 14.65m: DB 14.65m: DB	С	83	67	
	- - - 16.75 - - 17 - - 17.2 - - - 17.3	From 13.30m to 13.38m, extremely low to low strength, extremely to highly weathered From 13.38m to 13.77m, carbonaceous laminations, spacing 1mm to 30mm From 13.44m, clay band 8mm						14.70m: DB 14.96m: P 15.45m: J, 75°, pl, ro, fe 90mm wide (15.38m to 15.56m) 15.92m: P 16m: J, 60°, he				
	17.55 17.81 18 19	CLAYSTONE - Very low to low strength, moderately weathered, grey claystone From 14.05m, extremely weathered at parting At 14.96m, increased weathering at parting, extremely low strength, extremely weathered (possible core loss) At 15.14m, clay band, 5mm At 15.3m to 15.56m, highly weathered, increased weathering at joint At 15.92m, extremely low to low strength, extremely weathered, inceased weathering at parting (possible core loss)					<u> </u>	16.07m: P, 0°-10°, un, ro 16.15m: P, fg, 16.12m to 16.16m From 16.27m to 16.35m, fg From 16.65m to 16.75m, fg 16.75m: CORE LOSS: 450mm 17.3m: CORE LOSS: 250mm 17.55m to 17.72m, fg 17.81m to 17.89m, fg (0.01m) 17.89m to 18.0m, fg (0.03m)	С	92	29	

RIG: Scout 103

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m **WATER OBSERVATIONS:** No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 pp
 Pocket penetrometer (kPa)

 D
 Distrubed sample
 PID
 Photo ionisation detector

 B
 Bulk sample (x mm dia.)
 PL
 Point load strength Is(50) MPa

 W
 Water sample
 V
 Shear Vane (kPa)

 C
 Core drilling
 >
 Water seep



CLIENT: Coal & Allied Operations Pty Ltd PROJECT: Proposed Residential Subdivision

Minmi

LOCATION:

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 3 OF 9

Γ		Description	Degree of	Rock Strength	r	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of Strata		Ex Low Very Low Medium Very High Ex High	Wate	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	2	At 16.15m, extremely low to low						С	92	29	
	20.25 20.33 - 21 21.52	Inceased weathering at parting (possible core loss) From 16.27m to 16.35m, extremely low to very low strength, highly weathered CORE LOSS - From 16.75m to 17.2m CLAYSTONE - Extremely low to low strength, highly weathered, grey					20.25m: CORE LOSS: 80mm 20.33m to 250.5m, fr 0.02m 20.82m: J, sv, un, ro (20.75m to 20.9m)_ 21.13m: J, 45°, he, pl, cy 21.35m: J, sv, un, ro (21.18m to 21.52m)	С	93	0	
	22 23 ^{22.95}	claystone CORE LOSS - From 17.3m to 17.55m CARBONACEOUS SILTSTONE - Very low to medium strength, highly weathered, grey carbonaceous siltstone COAL - Medium strengthm, moderately weathered, black coal with seams of 5mm to 250mm thick clay/tuff at 10mm to 270mm spacing (continued) CORE LOSS - From 20.25m to					21.66m: J, 60°, ne, un 21.75m: J, 50°, un, ro 21.85m: DB 21.95m: J, 70°, un, he 22.04m: DB 4 From 22.1m to 22.32m, 1g -22.33m: J, 30°, un, ro 22.38m: J, 30°, pl, sm -22.43m: J, 15°, un, ro 22.52m: P, 10°, un, ro, 1di -22.58m: J, 20°, pl, sm -22.69m: J, 40°, un, sm -22.74m: J, 35°, un, sm -22.92 920 to 20.92 800	С	100	56	
	24 ^{23.93}	20.33m COAL - Medium strength, moderately weathered, black coal with bands of light brown/brown 5mm to 200 thick clay/tuff at approximately 5mm to 400mm spacing CARBONACEOUS SILTSTONE - Medium strength, moderately weathered, grey carbonaceous siltstone From 21.58m, high strength, slightly weathered					rom 22.82m to 22.86m, fg 22.95m: P, sh, he, un 23.2m: Possible DB 23.28m: Possible DB 223.37m: J, 75°, pl, he (23.28m to 23.46m) 23.47m: DB 24.47m: DB 24.45m: DB 24.43m: P, 0°-10°, un, ro 24.46m: J, 15°, un, sm 24.46m: DB, on	С	100	95	
	25.75 25.8 26	SANDSTONE - High strength, slightly weathered, fractured, grey sandstone with carbonaceous laminations 10mm to 100mm apart LAMINITE - High strength, slightly weathered, grey/dark grey laminite					Laminations -24.6m: DB, on Laminations -24.68m: P, sh, un, ro, pyrite -24.8m: DB -24.96m: J, 10°, un, sm, pyrite coal	с	95	85	
	-27 -28 -29	CORE LOSS - From 25.75m to 25.8m LAMINITE - High strength, slightly weathered, grey/dark grey laminite (80% siltstone/20% sandstone) with carbonaceous laminations From 27.0m to 27.1m, sandstone From 27.3m to 28.18m, sandstone					25.02m: Set of joints, 15°, un, ro, pyrite, coal 25.04m: Set of joints, 15°, un, ro, pyrite, coal 25.25m: DB 25.36m: DB 25.47m: DB 25.47m: DB 25.48m: J, 70°, un, ro, fe (25.35m to 25.58m) 25.66m: DB 25.75m: CORE LOSS: 50mm 25.81m: DB 25.93m: DB 26.09m to 26.19m, highly fr 26.35m: P, 5°, un, ro, pyrite 26.35m: DB on	С	100	96	
	-	affected zone				╡╺┽┫	laminations 26.45m: DB on laminations	с	100	100	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 PID
 Photo ionisation detector

 B
 Bulk sample
 S
 Standard penetration test

 Ux
 Tube sample (x mm dia.)
 PL
 Point load strength Is(50) MPa

 W
 Water sample
 V
 Shear Vane (kPa)

 C
 Core drilling
 P
 Water seep



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 4 OF 9

Γ		Description	Degree of Weathering .≅	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
Я	Depth (m)	of	raph Burger		Spacing (m)	B - Bedding J - Joint	be	ore C. %	۵%	Test Results
	. ,	Strata	N N N N N N N N N N N N N N N N N N N		0.05	S - Shear D - Drill Break	Ļ	ပိမ္ရွိ	<u>ж</u> ,	Comments
	-31	LAMINITE - High strength, slightly weathered, grey/dark grey laminite (80% siltstone/20% sandstone) with carbonaceous laminations (<i>continued</i>) From 31.4m to 31.65m, sandstone				26.65m: DB on laminations 26.75m: DB 26.81m: Possible DB 27.06m: Possible DB 27.16m: Possible DB 27.26m: Possible DB 27.4m: Possible DB 27.4m: Possible DB 27.7m: Possible DB 27.7m: Possible DB 27.9m: P, 15°, un, ro 28.19m: P, 0°-10°, un, ro 28.42m: J, 60°, ro, un, pyrite 28.52m: J, 65°, ro, un, pyrite	С	100	100	
	- 33 - 34 - 35 - 35,4	From 34.1m to 35.4m, sandstone				28.65m: Possible DB 28.75m: Possible DB 29.07m: P, pyrite 29.3m: J, 85°, pl, he, sm 29.5m: J, 75° to 90°, un, sm 29.68m: J, 75°, un, sm 29.68m: J, 75°, un, sm 29.68m: Possible DB 30.06m: Possible DB 30.4m: J, 70° to sv, un, ro (30.17m to 30.62m) 30.68m: Possible DB 30.83m: Possible DB 31.15m: J, 80°, un, ro, some fe 31.33m: J, 10°, pl, ro 31.77m: DB 32.18m: DB 32.65m: DB 32.65m: DB 32.91m: DB	С	99	100	
	- 36 - 36.42 - 37 - 37 - 37.44	LAMINITE - High strength, slightly weathered, light grey/dark grey laminite with carbonaceous laminations (70% sandstone, 30% siltstone) From 36.27m to 36.33m, heat affected zone with calcite in fractures/ COAL - Medium strength, moderately weathered, black coal with bands of 3mm to 40mm thick clay/tuff at ~ 250mm spacing LAMINITE - High strength, slightly weathered, light grey/dark grey laminite (80% siltstone/20%				33.15m: DB 33.35m: DB 33.55m: DB 33.78m: DB 34.08m: DB 34.4m: DB 34.4m: DB 34.4m: DB 34.88m: J, 80°, he un 35.65m: DB 36.23m: DB 35.65m: DB 36.45m: P, 0°-10°, un, ro 36.61m: P, 0°-10°, un, ro 36.72m: P, 0°-10°, un, ro	С	100	92	
	- 38 - 38.55 - 38.65 - 38.77 - 39 	Sandstone) with carbonaceous laminations CORE LOSS - From 38.55m to 38.65m COAL - Medium strength, moderately weathered, black coal LAMINITE - High strength, slightly weathered, light grey/grey laminite (60% sandstone/40% siltstone) with carbonaceous laminations				38.83m: P, 0°-10°, un, ro 37.03m: P, 0°-10°, un, ro 37.25m: J, sv, st, sl From 37.34m, to 37.44m, fg 38.27m: P, 0°-10°, un, ro 38.55m: CORE LOSS: 100mm 38.71m to 37.77m, fg 38.79m: P, 0°-10°, un, ro 38.82m: P, 0°-10°, un,	с	97	83	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

A Auger sample pp Pocket penetrometer (kPa)	
D Disturbed sample PID Photo ionisation detector	
B Bulk sample S Standard penetration test IIII B Bulk sample Doub	AAKC
U _x Tube sample (x mm dia.) PL Point load strength Is(50) MPa	1613
W Water sample V Shear Vane (kPa)	
C Core drilling ▷ Water seep 🐨 Water level □ Date: □ 🖬 Geotechnics • Environment • Grou	undwater

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 5 OF 9

		Description	Degree of .9		Rock Strength	_	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
坧	Depth (m)	of Strata	Graph	Log	Vate Vate Vate Vate Vate Vate Vate Vate	vvale	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	-	LAMINITE - High strength, slightly weathered, light grey/grey laminite (60% sandstone/40% siltstone) with carbonaceous laminations (continued)						39.35m: DB 39.69m: DB 39.94m: J, 10°, un, ro From 40.45m to 40.50m, sv fractures 40.75m: DB	с	97	83	
	- 41 - 42 - 42.52 - 42.62	From 42.5m to 42.52m, clay/tuff CORE LOSS - From 42.52m to 42.62m		<u>: : : : </u>				41.15m: J, 20°, un, sm 41.42m: J, 35°, un, sl 41.45m: DB 41.64m: Possible DB 41.69m: Fr, sh - 30°, st, sm 41.75m: DB 41.88m: J, 40°, un, sm 41.94m: J, 50°, un, sm From 41.94m to 42.42m, J, 60° - sv, un, sm, mineral deposits and highly fractured along	С	96	66	
		LAMINITE - High strength, slightly weathered, light grey/grey laminite (50% sandstone/50% siltstone0						joint 142.29m: J, 10°, un, sm 142.29m: J, 15°, un, sm 142.4m: J, 30°, un, ro, mineral deposit 142.43m: DB 142.5m: P, 0°-10°, un, ro 142.52m: CORE LOSS: 100mm From 42.62m to 42.78m, parallel joints J, 70°, un, ro	С	100	89	
	- 45 - 46	From 45.76m to 45.81m, grey brown heat affected zone? From 46.20m to 46.29m, dark grey band From 46.36m to 46.61m, bedding angle changes rapidly?						42.97m: J, sv, un, ro 43.23m: P, 0°-10°, un, ro 43.68m: J, 55°, he, un 43.73m: Joint sets, 5°, st, sm 43.8m: Joint sets, 5°, st, sm 43.81m: J, 60°, sv, un, ro 43.85m: Joint sets, 5°, st, sm 43.99m: Parallel joints, 75°, un, he 44.05m: Parallel joints,	С	100	95	
	-47 -48 -48.71 -49	From 47.1m to 47.35m, blue grey siltstone From 47.35m to 47.5m, pale brown At 47.55m, clay, 10mm thick From 47.95m to 48.65m, green-grey LAMINITE - High strength, slightly weathered, light grey/grey laminite (70% siltstone/30% sandstone) From 49m, carbonaceous lamination From 49.95m, grey green (various shades)						75°, un, he 44.18m: Parallel joints, 75°, un, he 44.25m: F, 70°, sv, un, sm 44.66m: DB 44.92m: Possible DB 44.92m: Possible DB 45.03m: DB 45.19m: DB 45.23m: J, 5°, pl, sm 45.42m: J, 75°, un, sm, he (45.34m to 45.5m) 45.5m: J, 75°, un, he 45.5m: J, 75°, un, he 45.6m to 45.8m) 46.02m: DB 46.65m: J, 70°, pl, he 46.65m: J, 70°, pl, he 46.68m: P, 0°-10°, un, ro 46.71m: DB	С	100	93	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

Γ	SAMPLING &	IN SITU TESTING LEGEND	CHECKED]
	A Auger sample	pp Pocket penetrometer (kPa)		
	D Disturbed sample	PID Photo ionisation detector Standard penetration test	Initials:	
	U _x Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		+ [1//] Douglas Partners
	W Water sample C Core drilling	V Shear Vane (kPa) ▷ Water seep ¥ Water level	Date:	Geotechnics • Environment • Groundwate

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 202** PROJECT No: 39663D **DATE:** 14 Apr 08 **SHEET** 6 OF 9

Π		Description	Degree of Weathering .≌	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
RL	Depth (m)	of	raph graph	Vate	Spacing (m)	B - Bedding J - Joint	ype	ore c. %	۵D %	Test Results &
		Strata	M M M M M M M M M M M M M M M M M M M	High Kery Very Kery	0.05	S - Shear D - Drill Break	Ĥ	Ú e 100	Ř 84	Comments
	- - - - - -	LAWINT IE - High strength, slightly weathered, light grey/grey laminite (70% siltstone/30% sandstone) (continued)				47.07m: Possible DB 47.07m: Possible DB 47.43m: Possible DB 47.54m: P, 0°-10°, un, ro 47.61m: P, sh, un, ro, he 47.61m: P, sh, un, ro, he	0	100	04	
	-51	From 51.0m to 51.15m, grey From 51.19m to 51.55m, grey				47.65m: P, 5°, un, ro, fg to 47.68m 47.67m: J, 75°, un, he 47.78m: P, un, ro, cy 48.04m: J, 20°, un, ro 48.37m: J, 60°, un, ro 48.37m: P, 0°-10°, un, ro 49.24m: DB	С	100	84	
	-53					49.39m: Possible DB 149.72m: Possible DB 49.88m: Possible DB 50.16m: P, 5°, un, sm, cy 50.31m: DB 50.48m: p, 5° pl sm				
	- ₅₄ 53.98	At 53.62m, clay band, 25mm thick				50.62m: D, Sv, Di, Shi, 50.62m: DB 50.75m: J, 60°, pl, he 50.82m: J, sv, pl, he 50.84m: J, 60°, un, sm 51.05m: Dossible DB 51.05m: Dossible DB				
	- - - - - -	slightly weathered, pale brown/cream sandstone with significant clay content				51.3m: J, 65°, un, he 51.3m: J, 65°, un, he 51.42m: J, 10°, un, sm 51.42m: J, 10°, un, sm 51.46m: J, 10°, un, sm 51.48m: J, sv, un, sm with fr	с	100	96	
	- 55.85					51.51m: J, 10°, un, sm 51.78m: J, 75°, pl, he 52.35m: Possible DB 52.56m: Possible DB 52.66m: Possible DB 52.85m: J, 75°, un, ro, be				
	- 56	COAL - Medium strength, moderately weathered, black coal (Young Wallsend) with bands of tuff and carbonaceous mudstone				52.91m: Fr 53.08m: J, 60°, un, he (53m to9 53.15m) 53.26m: J, 55°, cu, he 53.34m: DB 53.4m: DB 53.5m: J, 75°, un, sm				
	- 57					53.62m: DB -53.62m: Cy filled 25mm -From 53.69m to 53.97m, fr 10mm to 60mm spacing -53.7m: J, 70° to sv, sm, un, he -53.8m: J, 70° to sv, sm,	с	100	100	
	- 50 50 0	CARBONACEOUS SILTSTONE -				un, he 53.94m: J, 70° to sv, sm, un, he 54.13m: P, 0°-10°, un, ro 54.25m: J, 10°, un, ro, calcite 54.27m: J, 20° un ro				
	-	carbonaceous siltstone				calcite 54.31m: P, 0°-10°, un, ro 54.49m: J, 70°, un, ro, he 54.9m: J, 75°, un, ro, he 55.7m: J, 60°, un, ro, he	с	100	87	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m **REMARKS:**

	SAMPLING & IN	I SITU TESTING LEGEND	CHECKED]
A	Auger sample	pp Pocket penetrometer (kPa)		
D B	Disturbed sample Bulk sample	PID Photo ionisation detector S Standard penetration test	Initials:	
U	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		+ L 1 / / I DUUUIAS
W	Water sample	V Shear Vane (kPa)	Deter	
C	Core drilling	Water seep ¥ Water level	Dale.	🔄 📰 🛲 Geotechnics • Envira
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SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 7 OF 9

Γ		Description	Degree of Weathering	Rock Strenath	ŗ	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
ā	Depth (m)	of Strata	Graph Graph	Ex Low Very Low Medium Very High	Wate	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	⁻⁶¹ 61.05	COAL - Medium strength, moderately weathered, black coal (Young Wallsend) with bands of 10mm to 200mm thick carbonaceous mudstone and clay at 20mm to 400mm spacing (continued) LAMINITE - High strength, fractured, grey/dark grey laminite with carbonaceous laminations (80% sandstone/20% siltstone)					55.81m: P, 0°-10°, un, ro 55.91m: P, 5°, pl, sm, tuff/clay 55.96m: P, 10°, st, ro 56.12m: Fr 56.17m: P, un, ro, tuff 56.17m to 56.23m, J, 80°, un, ro 56.29m: DB 56.35m: Fr 56.4m: P, 0°-10°, un, ro 56.54m: Fr, sh 56.65m: Fr, sh	С	100	87	
	63	From 62.40m to 62.42m, fragmented					56.7m: Fr, sh 56.74m: Fr, sh 56.79m: Fr, sh 56.87m: J, 60°, un, ro 57.1m: Fr 57.2m: J, sv, he, un 57.3m: Fr 57.37m: P, sh, pl, CBS				
	- 64	From 63.18m to 63.19m, coal lense					MS 57.5m: Fr 57.6m: J, sv, un, ro 57.8m: J, 20°, pl, he 57.95m: J, sv, un, he 58m: J, sv, un, he 58.30m to 58.48, fg along joints 58.4m: J, 75°, un, ro 58.55m: P, sh, pl, ro, CBS MS 58.77m: P, 10°, pl, ro 59.12m: P, 3h, DB	с	100	100	
	- 66 - 66 - 67	∖At 66.96m, clay 15mm From 66.97m to 67.05, coal					59.16m: J, 30°, un, sm 59.16m: J, 30°, un, he 59.20m to 59.26m, fractures 59.26m: DB 59.27m: DB 59.39m: DB 59.43m: DB 59.53m: DB 59.53m: DB 59.64m: DB 59.70m: P, 0°-10°, un, ro 59.89m: J, 80°, pl, ro 60.04m: P, 0°-10°, un, ro 60.08m: P, 0°-10°, un, ro	С	100	100	
	68						60.3511. J, 20°, un, ro 60.41m: J, 20°, un, he 60.53m: J, 20°, pl, sm, cu 60.62m: J, 40°, un, ro 60.73m: P, 0°-10°, un, ro 60.78m: J, 80°, un, ro 60.80m to 60.89m, highly fractured 61.01m: J, 30°, un, ro 61.18m: P, 0°-10°, un, ro 61.22m: P, 0°-10°, un, ro 61.35m: J, 85°, pl, sm, possible DB 62.05m: J, 40°, un, sm 62.24m: Possible DB	С	100	100	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

	SAMPLING 8	IN SITU TESTING LEGEND	CHECKED		
A	Auger sample	pp Pocket penetrometer (kPa)			
B	Disturbed sample Bulk sample	PID Photo ionisation detector S Standard penetration test	Initials:	T 1	Douglas Dartnars
U	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa			Duyias rai lieis
C	Voter sample Core drilling	V Shear Vane (kPa) ▷ Water seep ¥ Water level	Date:		Geotechnics • Environment • Groundwater

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 8 OF 9

		Description	Degree of Weathering	Rock Strenath	Fracture	Discontinuities	Sa	amplir	ng & I	In Situ Testing
Я	Depth (m)	of Strata	Graph Craph	A High	(m) (m) (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	- 71	LAMINITE - High strength, fractured, grey/dark grey laminite with carbonaceous laminations (80% sandstone/20% siltstone) (continued)				62.48m: P, sh, pl, ro 62.59m: J, 25°, pl, he 62.82m: Fr, sh, un, ro 62.93m: Fr, 30°, st, sm 63.17m: DB 63.8m: DB 63.8m: DB 64.07m: J, 30°, pl, he 64.23m: DB	С	100	100	
	-72 -73 -74					64.58m: DB 64.95m: DB 65.24m: DB 65.24m: P, sh, pl, sm 65.62m: p, sh, un, sm, DB? 65.73m: P, sh, un, sm, core grind 65.92m: P, sh, pl, ro, DB? 66.07m: P, sh, un, sm 66.26m: DB 66.7m: J, 30°, un, sm, cy? 66.93m: P, sh, pl, sm 66.93m: P, sh, pl, sm 66.97m to 67.05, miltiple fractures coal filled 67.17m: P, sh, un, ro, di 67.66m: P, sh, un, ro, di 67.9m: J, 40°, pl, sm 66.9m to 67 of notes the sta	С	100	100	
	75					68.05m: DB 68.05m: DB 68.16m: DB 68.2m: DB 68.38m: DB 68.49m: DB 68.49m: DB 68.69m: DB 69.08m: DB 69.29m: DB 69.29m: DB 69.45m: DB 69.58m: DB 69.86m: DB 69.88m: DB 69.89m: DB 70.03m: DB	С	100	100	
	-78 -78 -78.25 -78.35 -79 -79	VOID: Water filled (when rods lowered air pushed out) CORE LOSS - From 78.25m to 78.35m COAL - Extremely low strength, extremely weathered, black coal, fragmented/silty From 78.4m, medium strength, moderately weathered, fragmented to highly fragmented At 78.58m, floor coal divide				70.51m: DB 70.79m: DB 71.73m: DB 71.73m: DB 72.12m to 72.22m, fault 5mm to 1mm 72.14m: J, 25?8, un, ro, possible m fr 72.15m: J, 75°, un, he 72.22m: DB 72.96m: DB 72.96m: DB 73.11m: DB 73.38m: J, 70°, pl, ro calcite (73.29m to 73.46m) 73.82m: DB 73.98m: DB, possible m fr, 10°, un, ro 74.69m: P, 0°-10°, un, ro 74.69m: P, 0°-10°, un, ro 74.85m to 75.23m, M fr, sv, un, ro, he 75.11m: P, 0°-10°, un,	С	55	49	
RI	G: Scou	ut 103 DRILL	ER: Total (Shedd	on) I	LOGGED: Bear	CASI	NG:	HW t	o 4.0	 m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

	SAMPLING	& IN SITU TESTING LEGEND	CHECKED		
A	Auger sample	pp Pocket penetrometer (kPa)			
D	Disturbed sample	PID Photo ionisation detector	1		
B	Bulk sample	S Standard penetration test			Doualos Doutnovo
U,	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		+	Dugias Partiers
Ŵ	Water sample	V Shear Vane (kPa)			
C	Core drilling	Water seep ¥ Water level	Date:		Geotechnics • Environment • Groundwater

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 202 PROJECT No: 39663D DATE: 14 Apr 08 SHEET 9 OF 9

Γ		Description	Degree of	. <u>.</u>	Rock	_	Fracture	Discontinuities		Sampling & In Situ Testing			
ā	Depth (m)	of		Graph		Wate	Spacing (m)	B - Bedding J - Joint	ype	core sc. %	%D%	Test Results &	
		Strata	M H M S L C	<u> </u>	Higt EX F		0.05	S - Shear D - Drill Break	-	O Å	R	Comments	
	-	SANDSTONE - Very high strength, fresh, grey sandstone with carbonaceous laminations, spacing 0.1m to 1.0m <i>(continued)</i>						75.28m to 75.74m, M fr, 70° - sv, un, ro 75.7m to 75.8m, M Fr, 60°, un, ro 75.82m to 76.03m, M Fr , 75°, un, ro, he	с	55	49		
	- 81 00.00	Bore discontinued at 80.95m, limit of investigation						76.1m to 76.2m, M Fr, 80°, un, ro, he 78.25m: CORE LOSS: 100mm From 78.35m to 78.68m, fg to highly fr 79.31m: DB 79.71m: DB 80.1m: DB 80.75m: DB 80.88m: DB					
	- 83												
	- 84												
	- 85												
	- 87												
	- 89												
	- - - - - -												

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

TYPE OF BORING: Solid flight auger to 3.95m, then HQ wireline coring from 3.95m to 80.95m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: 10% water loss from 12.15m (approximately). 100% water loss at 34.8m. At 37.45m, 75% water return. Water flow from approximately 37m to 47m (into and out of fractures), 100% water loss 76.3m

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 PID
 Photo ionisation detector

 B
 Bulk sample
 S
 Standard penetration test

 U,
 Tube sample (x mm dia.)
 PL
 Point load strength Is(50) MPa

 W
 Water sample
 V
 Shear Vane (RPa)

 C
 Core drilling
 >
 Water seep



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D DATE: 12-13/05/08 SHEET 1 OF 7

Γ		Description	Degree of		Rock Strength		Fracture	Discon	tinuities	Sa	ampli	ng &	In Situ Testing
씸	Depth (m)	of Strata	Graph	Log	With the section of t	01	Spacing (m) ଅକ ଜଣ	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %	Test Results &
\mid	-	CLAY - Brown clay with some weathered coal. M≽ Wp		\square		0							Comments
	-									D	-		
	-1 1.0	CLAYSTONE/SILTSTONE - Extremely weathered, extremely low strength, grey brown claystone/siltstone.											
	-2	From 1.5m, increased strength and less weathering siltstone								D			
	-									D			
	-3												
										D			
	-7									D			
	9 - - - - - - -	From 9.5m, brown								D			

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

		SAMPLING &
4	Auger sample	

IN SITU TESTING LEGEND

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling DBU WC
- pp
 Pocket penetrometer (kPa)

 PID
 Photic ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level

CHECKED Initials: Date:



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D DATE: 12-13/05/08 SHEET 2 OF 7

Γ		Description	Degree of Weathering	. <u>u</u>	Rock Strength	L	Fracture	Discontinuities	Sa	amplinç	g & I	n Situ Testing
R	Depth (m)	of		Log		Nate	(m)	B - Bedding J - Joint	/be	o ce	<u>,</u>	Test Results
		Strata	M M M M M M M M M M M M M M M M M M M		Ex L Low High Ex H	_	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	ŕ		ř	Comments
	-11 11.0	CLAYSTONE/SILTSTONE - Extremely weathered, extremely low strength, grey brown claystone/siltstone. <i>(continued)</i> From 10.5m to 11m, clay, brown SANDSTONE/SILTSTONE - Brown sandstone and siltstone interbedded							D			
	- 13								D			
	- 16								D			
	- 19	At 19.0m, silty clay From 19.6m to 20.6m, coal, black (yard seam)							D			

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

- **SAMPLING & IN SITU TESTING LEGEND** Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
 - PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level ter (kPa)

CHECKED Initials: Date:



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D DATE: 12-13/05/08 SHEET 3 OF 7

ſ		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities	San	npling & l	n Situ Testing
li	교 Depth (m)	of Strata	EW HW SW FR Graph	Ex Low Very Low Low Medium High Ex High	2000 (m) 00100 00100 0010	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. % RQD %	Test Results & Comments
	-	SANDSTONE/SILTSTONE - Brown sandstone and siltstone interbedded (continued)					D		
	-21 21.2 -22 -23	At 21.0m, coal, black (200mm) LAMINITE - Grey laminite (80% sandstone)					D		
	24.5 25 26 27	CLAYSTONE/SILTSTONE - Grey interbedded claystone and siltstone					D		
	- 29						D		

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

SAMPLING & IN SITU TESTING LEGEND A D B

ter (kPa)

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level

CHECKED Initials: Date:



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D DATE: 12-13/05/08 SHEET 4 OF 7

Γ		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities	Sam	pling &	In Situ Testing
ā	Depth (m)	of Strata	Graph Graph	Ex Low Very Low High Ex High	Spacing (m) (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type Core	Rec. % RQD %	Test Results & Comments
	-31	CLAYSTONE/SILTSTONE - Grey interbedded claystone and siltstone (continued)					D		
	- 33						D		
	37.7	From 37.2m, uneven drilling, possible goaf COAL - black coal (Young Wallsend Seam)					D		
	- 39 - - - - - - - - - - - - - - - - - - -						D		

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

PD Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep Water level ter (kPa)





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 301 PROJECT No: 39663D DATE: 12-13/05/08 SHEET 5 OF 7

		Description	Degree of	<u>ں</u>	Rock Strength	Frac	cture	Discontinuities	Sa	mpli	ng & i	In Situ Testing
R	Depth (m)	of Strata		Graph Log	Ex Low Very Low Medium High Very High Ex High	Spa (r	n)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	- 41 	COAL/CBS SILTSTONE - Interbedded (continued)							D			
	42.5	LAMINITE - Grey laminite							D			
	-46	LAMINITE - High strength, slightly weathered, grey laminite From 46.75m to 46.77m, clay From 46.79m to 46.81m, clay						From 45.05m to 45.18m, highly fr 45.29m: DB 45.31m: DB 45.31m: DB 45.56m: DB 45.66m: DB 45.66m: DB 46.05m: DB 46.05m: DB 46.05m: DB 46.25m: DB 46.64m: DB 46.64m: DB 46.64m: DB 46.64m: DB 46.64m: DB 46.77m: DB 46.95m: DB 47.19m: DB 47.59m: DB 47.59m: DB	С	100	100	
	- 48 - 48.7 - 49 	SANDSTONE - High strength, slighly weathered, fragmented, grey sandstone						47.97m: DB 47.97m: J, 65°, pl, sm 48.14m: DB 48.38m: J, 35°, pl, sm, poss MFr 48.44m: DB 48.53m: DB 48.63m: J, 20°, un, sm, poss DB/MFr 48.68m: J, 65°, pl, he, poss MFr 48.78m: DB 49m: J, 20°, pl, sm, poss MFr	С	100	10	

RIG: Scout 103

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. **WATER OBSERVATIONS:**

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

	SAMPLING & IN SITU	J TESTING LEGEND	CHECKED]		
A D B U W	Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample	pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa)	Initials:		b	Douglas Partners
С	Core drilling	▷ Water seep ¥ Water level	Dale.			Geotechnics • Environment • Groundwater



Coal & Allied Operations Pty Ltd Proposed Residential Subdivision Minmi

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D

Γ		Description	Degree of	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
R	Depth (m)	of	Wednering	Log		Spacing (m)	B - Bedding J - Joint	be	re . %	D Q	Test Results
	(,	Strata	H M M M M M M M M M M M M M M M M M M M	ō	Kery Low High Ex High	0.01	S - Shear D - Drill Break	Тy	Co Rec	R0%	& Comments
	- 51	SANDSTONE - High strength, slighly weathered, fragmented, grey sandstone <i>(continued)</i>					49.09m: J, 10°, un, sm, poss MFr 49.3m: DB 49.68m to 50.11m, M Fr, 70°, sv, un, ro 50.37m: DB 50.62m: J, 30°, un, ro, poss MFr 50.64m: J, 35°, un, ro, Poss MFr	С	100	10	
	- 52						51.65m: DB/MFr 51.77m: DB/MFr	С	100	100	
	- 54						53.42m: DB 53.71m: P, 10°, un, ro, coal, di 53.97m: DB 54.2m: DB 54.2m: DB 54.61m: DB 54.83m: DB 54.83m: DB 55.06m: DB 55.37m: DB 55.59m: P, 10°, un, ro	С	100	100	
	-56 56.0 	VOID From 56.8m, rubble SILTSTONE/SANDSTONE - High strength, fragmented, grey siltstone/sandstone VOID From 58.65m, rubble SILTSTONE - High strength, fragmented, grey siltstone VOID From 59.26, rubble					57.25m: Fr, 80 ^{°°} , pl, sm	С	100	100	
	59.76	CLAYSTONE - Medium strength,					59.65m: J, 50°, un, ro, poss Fr				
R	G: Scou	it 103 DRIL I	ER: Total (Sh	l neddo	on) LC	DGGED: Bear	CASI	NG:	150m	Im P\	/C to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

- **SAMPLING & IN SITU TESTING LEGEND**
 pp
 Pocket penetrometer (kPa)

 PID
 Photic ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 Water level Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

A D B U W C





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 301** PROJECT No: 39663D DATE: 12-13/05/08 SHEET 7 OF 7

Γ		Description	Degree of	U	Rock	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
R	Depth	of	vveamening	aphi		Spacing (m)	B - Bedding J - Joint	e	e %	0	Test Results
	(11)	Strata	A A A A A A A	5		0.05	S - Shear D - Drill Break	Typ	Rec. C	R0%	& Comments
	-61	COAL - Medium strength, moderately weathered, black coal SANDSTONE - High to very high strength, fresh, grey sandstone with some CBS laminations <i>(continued)</i>					61m: DB ∫61.24m: DB →61.31m: DB	с	100	100	
	- 62 						62.04m: DB				
	- 63.05 - - - - -	Bore discontinued at 63.05m, limit of investigation					63m: DB				
	- 64 - - - -										
	- 65 65 										
	- 66 										
	- 67										
	- 68 										
	- 69										

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 2.2m

TYPE OF BORING: Air percussion drill 0m to 44.85m. HQ wireline coring from 45.05m to 63.05m. WATER OBSERVATIONS:

REMARKS: Air loss at 37.2m. 41.85m holding water. 100% water loss at 55.59mm

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level ter (kPa)

CHECKED Initials: Date:



SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 303 PROJECT No: 39663D DATE: 14-20/05/08 SHEET 1 OF 8

Г	-			Degree of		Rock						
			Description	Weathering	. <u>e</u>	Strength 5	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
ā	ᆋ	(m)	of		la b	/ate	(m)	B - Bedding J - Joint	e	e %	0	Test Results
		(11)	Strata	3 3 3 3 m m	5_		01 02 02 02 03	S - Shear D - Drill Break	T T	Col Rec.	RQ %	& Commonto
+	_		SILTY CLAY - Light brown silty clay	<u>ш́±≥́о́ш́</u> t́			<u>; ;; ;; ;</u>			<u> </u>		Comments
	F		with some sand, and dark brown			iiiiii	i ii ii					
	Ę		weathered coal, M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></wp<>									
	t				$\langle \rangle \rangle$							
	Ł				$\overline{\Lambda}$				Α			
	Ł,				1/1							
	F'			liiii	/1/1	iiiii	i ii ii		_			
	F								D			
	Ę	1.4	COAL - Dark brown weathered									
	Ę		coal/carbonaceous mudstone									
	Ł			liiii			li ii ii					
	-2											
	ł								Α			
	F											
	F								S			
	F						i ii ii					
	-3											
	ţ											
	È											
	t	3.5	SILTSTONE - Grev siltstone with	liiii	·	iiiiii	i ii ii					
	t		carbonaceous laminations		$\cdot -$							
	F.				•							
	F ⁴		From 4.1m medium strength		— ·							
	F		slightly weathered		· ·	iiiiii	i thi					
	F		0 9		$ \cdot - $							
	Ę	4.65	CLAYSTONE - Medium to high		·							
	Ę		strength, slightly weathered, grey				╠┊╎┛╎╎		C	100	80	
	-5		claystone	╎╎┏┿┛╎╎		iii h iil	┟┢╾╾┽╼┩╴╎╎			100	00	
	t		From 5.05m to 5.17m, high strength,									
	Ł		volcanic inclusion									
	ł											
	F		From 5.7m to 5.8m, heat affected			┆╎┏┿┛╎╎╎	i ii i					
	-6	6.0	rock	- i i i li i i		i i 🛶 i i i 📔	i ii i					
	F		FIOID 5.75III, IOW Strength		· —		│					
	Ę		SILISIONE - Medium strength,		— ·		╠┊╎┺┓╎		С	88	88	
	t		$_{\rm siltstone}$									
	t		From 6.6m to 6.9m, rotational	iii i	· —	i i i i i i i	i ii ii					
	L_7	6.9	shearing of rock from jamming in		$\overline{}$			6.9m: CORE LOSS:				
	Ę	7.05			<u> </u>			150mm				
	Ł		5 9m)									
	F		CLAYSTONE - Medium strength	i i i i i		iiiii	li ii r 'ii					
	F	7.7	\neg slightly weathered, grey claystone /				 -]					
	F		SILTSTONE - Medium to high		$ \cdot - $				С	100	92	
	-8		strength, slightly weathered, grey		 							
	ţ	8.27	SINSIONE	┤┆┆ <mark>╤┙</mark>								
	ţ		moderately weathered		¦∷:							
1	Ł		SANDSTONE - High strength fresh		ŀ∷⊹			\ 8.57m: J, 35°, un, ro, Fe				
1	Ł	8.75 8.85	∫grey sandstone		×			8.61m: J, 35°, un, ro, Fe				
	-9	2.00	CORE LOSS - From 8.75m to		<u> </u>			CORE LOSS: 100mm				
	F		8.85m					^L 8.9m: J, 40°, un, ro, Fe				
	F		LAMINITE - High strength, fresh,		· · · · ·			From 8.9m to 9.07m,	С	95	60	
	F		grey laminite		••••			9.3m: DB				
	ŧ							9.47m: DB				
T	ŀ						li H iiii	_ riom 9.7m to 9.9m,	1			

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 303 PROJECT No: 39663D DATE: 14-20/05/08 SHEET 2 OF 8

Γ		Description	Degree of	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
ā	Depth (m)	of Strata	Graph Craph Craph	Var Low Low Low Low Low Low Low Low Low Low	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	10.0°	LAMINITE (Continued) From 10.3m to 10.45m, claystone, low strength, highly weathered CLAYSTONE - Medium strength,				highly fr, ca, Fe 9.95m: M, fr, sv, pl, ro From 10.3m to 10.45m, fr From 10.45m to 10.6m, sv. MFr	с	95	60	
	- 11	moderately to slightly weathered, grey claystone with bands of orange brown weathering				10.7m: J, 80°, pl, ro, poss MFr 10.87m: J, 80°, un, ro 10.93m: DB 10.97m: DB 11.25m: J, 75°, pl, sm, poss MFr 11.28m: DB 11.38m: J, 75°, pl, sm,				
	12.77	At 12.0/m, coal lens From 12.08 to 12.21, very low to low strength, highly weathered At 12.23m, coal lens From 12.3m, with siltstone SANDSTONE - Low strength, highly to moderately weathered, orange brown sandstone				1235 MFT 11.4m: DB 11.45m: J, 75°, pl, sm, poss MFr 11.52m: DB 11.52m: DB 11.62m: P, sh, un, ro, Fe 11.82m: P, sh, un, ro, Fe 11.98m: P, sh, un, ro, coal	С	100	65	
	- - - 14 -	From 13.65m, medium to high strength, moderately to slightly weathered, grey and orange brown with carbonaceous laminations At 14.27m, weak, weathered lens				From 12.33m to 12.56m, P, sh, 5°, un, ro, Fe spacing 10mm to 60mm 12.45m: J, 80°, pl, he 12.67m: P, 10°, un, ro, he 12.77m: P, 15°, un, ro, he				
	- 15	At 14.77m, weak, weathered lens From 15.11m to 15.16m, low strength, highly to moderately weathered inclusion				12.93m: P, 5°, un, ro From 12.93m to 13.65m, MFr 60°, sv, un, ro, fe 13.65m: P, 5°, un, ro 13.85m: DB 14.06m: DB 14.26m: DB 14.46m: DB 14.46m: DB 15.11m: Parallel p, 15°, pl, he	С	100	96	
	- 16	From 16.41, high strength				15.16m: Parallel p, 15°, pl, he 15.24m: P, 15°, un, ro, di 15.31m: DB 15.64m: DB 16.04m: DB				
	- 17 - - - - -					16.15m: J, sv, un, sm, Fe 16.41m: DB 16.81m: P, sh, pl, sm, di 16.99m: DB 17.15m: DB 17.73m: P, 5°, un, ro, Fe	с	100	100	
	- 18					17.76m: DB 17.78m: DB 17.81m: DB 17.83m: DB 17.93m: DB	с	100	90	
	- 19					18m: Fr, 5°, un, ro 18.16m: DB From 18.2m to 18.27m, Fr, sh-sv, un, ro, Fe 18.35m: DB 18.43m: J, 50°, pl, sm 19.1m: J, 65°, pl, ro, Fe 19.2m: DB 19.3m: J, 35°, pl, ro 19.55m: J, 65°, pl, ro, Fe	С	100	100	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 303 PROJECT No: 39663D DATE: 14-20/05/08 SHEET 3 OF 8

Γ		Description	Degree of Weathering	2	Rock Strength	Fracture	Discontinuities	Sa	mplir	ng &	n Situ Testing
Ъ	Depth (m)	of		Log		(m)	B - Bedding J - Joint	pe	ore c. %	aD %	Test Results
	()	Strata	M M M M M M M M M M M M M M M M M M M	0	Ex Low Very Low High Very Ex Hij	0.05	S - Shear D - Drill Break	Ту	Rec	R0 %	Comments
	20.0	SANDSTONE (Continued)					^L 19.68m: DB		400	400	
	-							C	100	100	
							20.45m: J, 65°, pl, ro, Fe				
							√ 20.85m: DB, 15°				
	-21						^C From 20.93m to 20.98m, Fr/J at 60° and 50°, un.				
	-						sm, cy				
	21.60						21.62m: DB				
	- 21.03	CORE LOSS - Possibly goaf		\checkmark			21.69m: Core Loss,				
	-22			Δ			0.45m CORE LOSS: 450mm	с	85	75	
	22.32	SILISIONE AND CLAY - Extremely low to medium strength, extremely to [-/							
	-	highly weathered					22.41m: P, 5°, un, ro				
	-	fragmented				┍┷┛┊┊	22.72m: P, 5°, un, sm				
	- 23 22.99	From 22.26m, very low to low		<u> </u>			$T_{22.8m}$ P, sn, un, ro From 22.8m to 22.99m,				
	23.31	COAL - Medium strength,		_	╽╎╎╎┏┤┛╎╎│		fg 23.01m: J, 80°, pl, sm				
	23.58	moderately weathered, black coal (vard seam)					23.45m: J, sv, st, ro				
	-	From 22.41 to 22.48m, very low to		_		╎╷╻┛╎	23.65m: DB 23.71m: DB				
	-24	From 22.52m to 22.58m, extremely		_			23.72m: DB				
	-	low to very low strength, extremely to				┆╵┢┿┛╎╎	sm				
		From 22.75m to 22.8m, tuff		-			23.94m: DB 24m: DB				
	-	SILTSTONE - High strength,					°24.05m: MFr, 80°, un, sm				
	-25	COAL - Medium strength.	 				-24.14m: DB -24.23m: MFr, sv, un, sm		100	00	
	-	moderately weathered coal (yard					24.25m: DB 24.26m: MEr. 20° sv	C	100	68	
		SILTSTONE - High strength,	_				un, sm -24.27m: MEr. 20°, sv				
	-	fragmented, grey siltstone					24.2711. Wi 1, 20 , 30, un, sm				
	-26	From 24.79m to 24.88m, heat					24.3m: MFr, 20 , sv, un, sm				
	-	affected	<u>-</u>				24.31m: MFr, 20°, sv, un, sm				
							⁻ 24.4m: MFr, 20°, sv, un, sm				
	_ 26.65	CORE LOSS - Possibly goaf		_/			⁻ 24.43m: MFr, 20°, sv, un. sm				
	-27			XI			24.48m: MFr, 20°, sv,				
	-			$^{\prime}$			24.62m: MFr, 20°, sv,	С	30	0	
	27.4	SILTSTONE/CLAYSTONE -		Π			24.65m: MFr, 20°, sv,				
	-	weathered, grey siltstone/claystone				┆┖─┬──┓╎ │	un, sm (some pl) 24.66m: J, 40°, un, ro				
	- 28	From 27.75m to 27.88, very low to		+ -			⁻ 24.67m: MFr, 20°, sv, Hun, sm (some pl)				
		moderately weathered, with clay					-24.72m: MFr, 20°, sv,				
	-	From 28.02m to 28.05m, clay					-24.75m: MFr, 20°, sv,				
	-	From 28.15m, high strength	-	Ē			24.81m: MFr, 20°, sv,	с	100	87	
	-29	From 28.17m to 28.43m, fine cracks		Ē			24.85m: MFr, 20°, sv,				
		affected	 -	Ē			un, sm (some pl) 24.88m: MFr, 20°, sv,				
		rom 29.0m to 16m, heat affected		E		j j 👘	un, sm (some pl) -24.89m: J, 80°, pl, sm				
				Ē			24.93m: MFr, 20°, sv, un, sm (some pl)				
	-			1-			From 26.22m to 26.41m,	С	100	70	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 303** PROJECT No: 39663D DATE: 14-20/05/08 SHEET 4 OF 8

Γ		Description	Degree of Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ā	Depth (m)	of Strata		Graph Log	Very Low Very Low Medium High Very High	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	30.0	SILTSTONE/CLAYSTONE (Continued) From 30.43m to 30.57m, fine					fg to highly fr 26.5m: J, 80°, pl, sm 26.57m: MFr, 20°, un, sm 26.6m: L 20°, pl, sm	с	100	70	
	-31	cracking From 30.7m to 30.82m, chalky From 30.88m to 30.12m, fine cracking At 31.33m, clay (15mm) At 31.7m, clay (5mm) At 31.74m, clay (10mm)					26.65m: Core loss, 26.65m: Core loss, 0.75m CORE LOSS: 750mm 27.4m to 27.75m, fg to highly fr 28m: DB 28.05m: DB 28.3m: P, 5°, un, sm 28.34m: MFr, sv, pl, sm 28.38m: DB 28.39m: DB 28.39m: DB 28.46m: P, sh, pl, he, cy filled (5mm) 28.6m: P, sh, un, ro, cy filled (10mm)	с	100	65	
	- 33 - 34 - 35	At 32.62m, clay (5mm)					28.63m: MFr 28.73m: DB 28.79m: J, sv, un, he, poss MFr (28.66m to 28.92m) 28.82m: DB 28.88m: DB 28.94m: DB 29.14m: J, 15°, un, sm 29.25m: DB 29.35m: J, 75°, pl, ro From 29.46m to 29.66m, MFr, sv 29.56m: P, sh, un, sm 29.56m: DB 29.86m: Fr, sv, pl, sm (x 2) 29.86m: CF, sv, pl, sm (x 2) 29.93m: DB 30m: DB	с	100	33	
	- 36 - 37 - 37 - 38	From 35.65m to 35.97m, moderately weathered, medium to low strength From 36.32m to 36.4m, fine cracks					30.05m: DB 30.1m: J, 75°, un, sm, poss MFr (30.0m to 30.2m) 30.13m: J, 80°, un, he 30.14m: DB From 30.16m to 30.18m, fg 30.2m: DB 30.25m: DB From 30.25m to 30.38m, MFr, sv 30.35m: J, 70°, pl, sm, poss MFr 30.77m: J, 10°, un, sm, poss DB 30.85m: P, sh, st, sm, poss Fr 30.86m: DB	С	100	62	
	-	At 29 65m polo grov					31.24m: P, 5°, un, ro, poss Fr 31.26m: Fr, 5°, un, ro 31.26m: Fr, 5°, un, ro	с	100	26	-
	- 39 - 39 - 39.65	SANDSTONE - High strength.				cy filled (10mm) 31.3m: J, 60°, un, ro 31.37m: DB 31.54m: J, sv, un, sm, ca (31.44m to 31.64m) 31.55m: Fr, 10°, un, ro (wedge)	с	69	57	
	ŀ	slightly weathered, pale grey				╵━┯┓╹╵╵	31.65m: J, 80°, un, he, ca 31.65m: J, 15°, pl, sm,				

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

U, W C

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level




SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 303** PROJECT No: 39663D DATE: 14-20/05/08 SHEET 5 OF 8

Γ		Description	Degree of Weathering	. <u>0</u>	Rock Strenath	L	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
R	Depth (m)	of	riodatoring	Log		Vate	Spacing (m)	B - Bedding J - Joint	be	s. %	۵°	Test Results
	(,	Strata	H M M M M M M M M M M M M M M M M M M M	Ū	Ex Lo Very I High Ex Hig	>	0.05	S - Shear D - Drill Break	Ty	ပိမ္မ	R 0 %	Comments
	39.97 40.0 40.03	COAL - Medium strength, moderately weathered, black coal						ca '31.69m: J, 10°, un, ro, cy '31.85m: J, 60°, sv, un, ro	с	69	57	Cave in
	- - 41 - 41.1	COAL - Medium strength, moderately weathered, black coal						31.86m: J, 80°, un, ro 31.93m: J, 10°, un, sm, poss DB 32.02m: MFr, 50°, sv, un, he (31.93m to		70	57	
	-42							32.11m) '32.2m: MFr, sv, un, he, ca (32.09m to 32.31m) '32.31m: Fr, sh, 5° '32.39m: Fr, sh, 5° '32.43m: MFr, sv, 60°,		70	57	
	- 42.19 - 42.2' - 42.35 - 42.42' - 43.42.98	SILTSTONE - Medium to high strength, slightly weathered, grey siltstone RUBBLE/VOID COAL - Medium strength, moderately weathered, black coal SILTSTONE - High strength, slightly weathered, grey siltstone						un, ro (32.31m to 32.55m) 32.45m: Fr, sh, 5° 32.55m: Fr, sh, 5° 32.65m: DB 32.67m: DB 32.67m: DB 32.69m: J, 80°, un, sm 32.7m: J, 80°, un, sm 32.81m: DB				
	- 44	CARBONACEOUS SILTSTONE - High strength, moderately weathered, dark grey carbonaceous siltstone with bands of coal (medium strength, moderately weathered, black) 5mm to 50mm spacing From 43.25m to 43.35m, coal From 43.39m to 43.61m, coal From 43.77m to 43.83m, coal		i ! i ! i ! i ! i ! i				33.05m: P, sh, un, ro, cy (5mm) 33.07m: MFr, sv, sm, pl (33.05m to 33.11m) 33.09m: P, sh, pl, sm, cy filled 33.11m: P, sh, pl, sm, cy filled From 33.11m to 33.28m, MFr/J, sv, un, sm, he, ca	C	94	87	
	45 45.1 -46 -47	From 44.1m to 44.34m, coal From 44.5m to 44.36m, extremely low to very low strength, extremely to highly weathered From 44.66m to 45.1m, coal LAMINITE - Medium strength, slightly weathered, grey laminite From 45.14m to 45.19m, very low to low strength, highly weathered From 45.19m, high strength, fresh From 45.56m to 45.6m, coal laminations From 46.66m to 46.8m, heat affected From 47.17m to 47.2m, very low strength, highly weathered. due to						33.28m: J, 10°, un, sm, cy From 33.36m to 33.39m, P, sh, 5°, pl, sm, di 33.43m: DB 33.47m: DB From 33.47m to 33.95m, MFr, sv, un, sm (50mm spacing) -33.74m: DB -33.96m: P, 10°, un, ro -33.96m: P, 10°, un, ro -34.05m: P, sh, un, sm, poss DB -34.1m: P, 10°, pl, sm, cy veneer -34.2m: MFr, sv, un, ro (34.1m to 34.35m)	С	100	76	
	- 48 - 48 	joints From 47.46m, clay (10mm) From 48.27m to 48.45m, coal laminations						From 34.35m to 34.5m, MFr, sv, un, he (50mm spacing) 34.53m: J, 65°, un, ro 34.55m: DB 34.65m: J, 60°, pl, sm From 34.65m to 34.75m, Fr 34.85m: DB From 35.0m to 35.55m, MFr/J, sv, un with secondary fracturing 35.6m: J, 60°, un, sm, ca 35.61m: MFr, sv, un, sm 35.65m: DB 35.69m: J, 60°, un, he 35.81m: J, 10°, un, sm,	С	100	92	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 303 PROJECT No: 39663D DATE: 14-20/05/08 SHEET 6 OF 8

Γ		Description	Degree of Weathering .≅	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
	Depth (m)	of Strata		Ex Low Very Low Medium High Ex High	Spacing (m) 5000000000000000000000000000000000000	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	50.0 [/]	From 50.m to 50.04m, heat affected LAMINITE (Continued)				poss DB r35.82m: J, sv, un, he, poss MFr	с	100	92	
	-51	From 52.23m to 52.27m, affected/stain				35.9m: P, 5°, un, sm, di From 35.98m to 36.23m, J, un, sm, ca 35.99m: J, sv, pl, sm 36.03m: J, sv, pl, sm 36.08m: J, 45°, un, ro 36.22m: J, 80°, un, ro 36.22m: DB 36.26m: DB 36.26m: DB 36.28m: DB From 36.47m to 36.8m, P and fr, spacing 5mm to 50mm 36.93m: DB 37.02m: DB From 37.07m to 37.15m, sv, un, he 37.15m: J, 10°, un, ro, Fe 37.28m: J, 35°, un, ro, Fe 37.37m: J, sv, un, sm 37.53m: J, 65° pl, sm.	С	100	96	
	- 54					Fe 37.58m: J, 70°, pl, sm, Fe 37.73m: DB 38m: J, 25°, un, ro 38.05m: J, 40°, un, sm,	с	100	100	
	- 55					cy veneer From 38.15m to 38.28m, Fr, spacing 20mm 38.32m: J, 80°, pl, sm (38.28m to 38.34m) poss MFr 38.35m: J, sv, un, sm (38.28m to 38.41m) poss MFr 38.48m: J, sv, un, sm (38.36m to 38.65m) poss MFr 38.55m: J, sv, pl, sm (38.5m to 38.65m) poss MFr 38.6m: J, 60°, sv, cu, sm (38.48m to 38.65) 38.75m: J, 80°, un, sm,	С	100	100	
	- 57 - 57.52 - 58 - 58 25	VOID				Fe 38.94m: DB 39.18m: DB 39.29m: DB 39.32m: Fr, sv, pl, sm, Fe (39.34m: J, sv, pl, sm, Fe (39.3m to 39.54m) 39.45m: J, 85?8, un, sm, Fe (39.38m to 39.52) 39.54m: P, sh, un, he, cy	с	50	50	
	-59	From 58.25m, rubble				139.65m: J, 60°, pl, un 39.88m: J, sv, pl, ro 39.98m: P, 5°, un, ro, di From 41.4m to 41.35m, di, P, sh - 10°, un, sm spacing 10mm to 50mm 41.93m: J, 60°, sv, un, ro (41.83m to 42.05m) 42.2m: Core loss, 0.15m 42.45m: J, 75°, un, sm, Fe 42.46m: Fr, 75°, un, be	С	50	37	

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 303 PROJECT No: 39663D DATE: 14-20/05/08 SHEET 7 OF 8

		Description	Degree of Weathering	<u>.</u>	Rock Strength	L	Fracture	Discontinuities	Sa	amplii	ng & I	In Situ Testing
R	Depth (m)	of	riounoning	Log		Vate	Spacing (m)	B - Bedding J - Joint	be	ore S. %	مر م	Test Results
		Strata	H M M M M M M M M M M M M M M M M M M M	G	Ex Lo Very L High Very Ex Hig	>	0.01 0.10 1.00	S - Shear D - Drill Break	Тy	с я	Å0 80	Comments
	60.0 ^o 60.25 60.35 ^o 61 61.25 61.25 61.25 61.25	SILTSTONE/CLAYSTONE/RUBBLE - Extremely low to very low strength, extremely weathered to highly weathered, siltstone/claystone/rubble SILTSTONE/CLAYSTONE (Continued) SILTSTONE - Medium to high strength, slightly weathered, siltstone VOID COAL - Medium strength, moderately weathered, black coal SANDSTONE - High to very high strength, fresh, grey sandstone						Fe 42.49m: P, 10°, un, ro, cy 42.56m: J, 60°, un, he, Fe 42.59m: P, 5°, un, ro, Fe 42.62m: J, 55°, un, ro, Fe 42.65m: P, 10°, pl, ro, coal 42.68m: P, 10°, pl, ro, coal 42.79m: P, sh, pl, ro, coal 42.83m: J, 70°, pl, he 42.89m: J, 30°, pl, he, coal From 42.98m to 43.03m, Fg 42.95m: P, 5°, un, ro,	С	50	37	
	63 64 65							coal 43.11m: P, 5°, un, ro 43.22m: P, 5°, un, ro From 43.3m to 43.48m, P/Fr, sh - 5°, un, ro (50mm) 443.61m: P, sh, pl, ro 43.77m: P, 10°, pl, ro 43.77m: P, 10°, pl, ro From 44.75m to 45.1m, highly fractured 45.14m: P, sh, un, ro, poss DB 45.19m: P, sh, un, ro, poss DB 45.26m: P, 5°, un, ro 45.31m: DB 45.56m: DB 45.55m: DB 45.75m: DB 45.91m: DB 46.17m: DB 46.6m: J, 50°, pl, sm	C	100	100	
	_ 65.85 - 66 - - - -	Bore discontinued at 65.85m, limit of investigation						46.7m: J, 40°, un, he r46.88m: J, 20°, un, ro, poss DB/Fr r46.96m: J, 20°, un, ro, poss DB/Fr r47.08m: J, 20°, un, ro, poss DB/Fr r47.17m: J, 30°, un, ro				
	68							47.2m: J, 40°, un, ro 47.34m: DB 47.48m: J, 75°, pl, sm 47.56m: J, 30°, un, sm 47.74m: DB 48m: DB 48.15m: DB 48.35m: DB 48.61m: DB 48.61m: DB 48.87m: DB 48.93m: DB 49.93m: J, 20°, un, ro, coal 49.22m: DB 49.36m: DB 49.66m: DB 49.66m: DB 49.66m: DB 49.87m: DB				

RIG: Scout 103

A D B

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void

SAMPLING & IN SITU TESTING LEGEND Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 303** PROJECT No: 39663D DATE: 14-20/05/08 SHEET 8 OF 8

Γ		Description	Degree of	.u	Rock	Fracture	Discontinuities	Sa	mplir	ng & I	n Situ Testing
RL	Depth (m)	of Strata		Graph	Water	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core ec. %	RQD %	Test Results &
	- 71	Suata	E E E E E E E E E E E E E E E E E E E		Ex Ex 0 0 0		50.25m: DB 50.3m: J, 80°, pl, sm, he 50.71m: J, 30°, un, sm 50.8m: J, 80°, un, sm 50.84m: J, 20°, un, sm 50.98m: DB 51.42m: DB 51.42m: DB 51.71m: DB 51.87m: DB 53.1m: DB 53.1m: DB 53.92m: DB		<u> </u>	F	Comments
	- 72						54.23m: DB 54.76m: DB 54.76m: DB 54.86m: DB 54.86m: DB 55.3m: DB 55.68m: DB 56.18m: DB 56.34m: DB 56.51m: DB				
	73						56.7m: DB 57.34m: DB 57.34m: DB 57.43m: DB From 59.9m to 60.25m, 0.02m 62.22m: DB 62.75m: DB 63.11m: DB 63.36m: DB 64.14m: DB				
	- 75						64.42m: DB 65.31m: DB 65.41m: DB				
	- 76										
	- 77										
	-79										
	-										

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

CASING: HW to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: At 13.1m, 100% water loss. Return at 14m using drilling mud. 40.03m, 100% water loss. Return at 40.65m using drilling mud. No water in hole from void **SAMPLING & IN SITU TESTING LEGEND**

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- U, W C
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





TYPE OF BORING: Solid flight auger to 4.0m. HQ wireline coring 4.1m to 65.85m

LOGGED: Bear

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 1 OF 7

Г			Description	Degree of	0	Rock	Fracture	Discontinuities	Sa	amplii	na &	In Situ Testina
늰	De	epth	of	Weathering	aphic	Strengtn strengtn	Spacing (m)	B - Bedding L - Joint	e	e %		Test Results
[(1	m)	Strata		ر ق ق	Very Low Ow 1igh Very H Very H Very H	01 05 00 0	S - Shear D - Drill Break	Typ	Rec.	RQ %	& Comments
	-		SILTY CLAY - Brown silty clay with some sand, moist									
	-	0.5	COAL - Highly weathered, dark brown weathered coal									
	-1								D			
	-											
	-											
	-											
	-2											
		25										
		2.5	SILTSTONE/SANDSTONE - Grey						D			
	-3									-		
	-4											
	-								D			
	-											
	-5											
	-											
	-					•						
	-6				- ¦ ∶							
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RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 305 PROJECT No: 39663D DATE: 26-27/05/08 SHEET 2 OF 7

Γ		Description	Degree of	Rock Strength	Fracture	Discontinuities	Sa	mpling &	In Situ Testing
ā	Depth (m)	of Strata		Graph Graph Log Medium High Kex High	(m) (m) (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. % %	Test Results & Comments
	- 10.0	SILTSTONE/SANDSTONE - Brown siltstone/sandstone interbedded					D		
	- 13						D		
	-16						D		
	- 19						D		

RIG: Scout 103

A D B

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m **WATER OBSERVATIONS:**

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa)

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
 - xmm dia.) F
- D TESTING LEGEND

 pp
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 ¥
 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 3 OF 7

Γ		Description	Degree of	0	Rock	Fracture	Discontinuities	Sa	amplin	a &	In Situ Testina
لم ا	Depth	of	Weathering	phic o	Strengtn g	Spacing	R Redding L loint	e	<u>ه</u> %	0	Test Results
[(m)	Strata	M M M M M M M M M M M M M M M M M M M	Ű	Very Low Ow 1igh Very H Very H Very H	0.05 0.105 0.105 0.100 0.100	S - Shear D - Drill Break	Typ	Rec.	RQ %	& Comments
		SILTSTONE/SANDSTONE - Brown siltstone/sandstone interbedded (continued)						D			
	22	COAL - Black coal						D			
	- 23 - 23.65 - 23.9	SILTSTONE - Grey siltstone									
	-24	COAL - Black coal									
	- 24.2	SILTSTONE - Grey siltstone									
	-25 -26 -27	From 27m, clayetone/siltstone						D			
	- 28 - 29	n on 27 m, Gaystone/SillStone						D			

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 4 OF 7

Γ		Description	Degree of	<u>.</u>	Rock Strength	L	Fracture	Discontinuities	Sa	amplin	g & I	n Situ Testing
R	Depth (m)	of Strata	M M M S L L	Graph Log	Very Low Medium Very High Ex High	Wate	Spacing (m) 50:00:00:00:00:00:00:00:00:00:00:00:00:0	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	- 31	SILTSTONE - Grey siltstone (continued)							D			
	- 33 								D			
	- 37 - 38 38.0 - 38.75 - 39	Possible void/goaf inferred from drilling resistance, loss of air return VOID Possible void/goaf inferred from driling resistance							D			

RIG: Scout 103

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- A D B U, W C
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level





SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 5 OF 7

		Description	Degree of	Rock	Fracture	Discor	itinuities	Sa	amplii	ng &	In Situ Testina
	Depth	of	Weathering		Spacing	B - Bedding	.Iloint	e	ہ % و		Test Results
	(11)	Strata	B B C	Very H Very H Very H	₹ 1.00 1.00 1.00 1.00 1.00	S - Shear	D - Drill Break	Typ	Rec.	RQ%	& Comments
F	-	Possible void/goaf inferred from									
	-41	LAMINITE - Grey laminite (siltstone/sandstone)		· · · · · · · · · · · · · · · · · · ·							
	-										
	42										
	-			· · · · · · · · · · · · · · · · · · ·							
	-43										
	-44			• • • • • • • • • • • • • • • • • • •							
	-45			• • • • • • • • • • • • • • • • • • •							
	-										
	-46										
	-			• • • • • • • • •				D			
	-47										
	-48								1		
	-49			• • • • • • • • • • • • • • • • • • •							
	[

RIG: Scout 103

A D B

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level







SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 6 OF 7

Γ		Description	Degree of	<u>.</u>	Rock Strength	_	Fracture	Discontinuities	Sa	amplir	ng &	In Situ Testing
R	Depth (m)	of	Wednering	Log	4 1 6 4 1 6	Vate	Spacing (m)	B - Bedding J - Joint	be	ore c. %	åD %	Test Results
		Strata	M M M M M M M M M M M M M M M M M M M	Very V	Low Medit Very Ex Hi	V 10.0	0.05 0.10 1.00	S - Shear D - Drill Break	Ţ	с я В	Я,	Comments
	-	LAMINITE - Grey laminite (siltstone/sandstone) (continued)		· · · · · · · · · · · · · · · · · · · ·								
	- 51 51.05 - 52 - 53	LAMINITE - High strength, fresh, grey laminite (80% siltstone/20% sandstone) with lots CBS laminations From 51.4m (90% sandstone/10% siltstone), high to very high strength and few CBS laminations From 52.73m to 52.76m, heat affected band From 53.5m, lots CBS laminations						51.12m: DB 51.18m: DB 51.29m: DB 51.42m: Di on coal lens 51.61m: Di on coal lens 51.92m: DB 52.39m: DB 52.74m: DB 53.18m: DB 53.38m: DB 53.38m: DB 53.46m: DB 53.44m: DB	С	100	100	
	- 55 - 56 - 57 - 57 - 57 - 57 - 57 - 57	From 54.05, few CBS laminations and some higher % siltstone bands From 54.86m to 55.91m, CBS laminations 1mm-2mm spacing						53.54m: DB 53.64m: DB 53.75m: DB 53.75m: DB 53.83m: DB 53.94m: DB 54.17m: DB 54.4m: DB 54.4m: DB 54.66m: DB 55.15m: DB 55.15m: DB 55.6m: DB 55.86m: DB 56.11m: DB 56.25m: DB 56.64m: DB	C	98	100	
	- 59 59.3	From 58.0m, (90%-100% siltstone) COAL - Medium strength, moderately weathered, black coal From 59.3m to 59.32, very low to low strength, highly weathered						57.51m: DB 57.82m: DB 57.97m: DB 58.05m: DB 58.19m: DB 58.24m: DB 58.56m: DB 58.85m: DB 59.08m: J, 40°, un, sm, cy 59.15m: DB 59.3m: P, sh, pl, sm From 59.3m to 59.6m, highly fr-fa spacing	с	100	84	

RIG: Scout 103

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

- **SAMPLING & IN SITU TESTING LEGEND** ter (kPa)
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B
- PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

 Water level







SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- **BORE No: 305** PROJECT No: 39663D DATE: 26-27/05/08 SHEET 7 OF 7

Γ		Description	Degree of	. <u>U</u>	Rock	_	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
ā	Depth	of	weathening	Log		Vate	Spacing (m)	B - Bedding J - Joint	be	s. %	D,	Test Results
	(,	Strata	F S S S S S S S S S S S S S S S S S S S	Ū	Ex Lo Very I High Very H	>	0.01 0.10 1.00	S - Shear D - Drill Break	Tyl	ပို ပိ	RC %	& Comments
	- 61	From 59.58m to 59.6m, clay COAL - Medium strength, moderately weathered, black coal (continued)						0.01m to 0.05m 59.48m: J, sv, pl, sm 59.5m: J, 60°, pl, sm 59.68m: J, 75°, pl, sm 59.85m: J, 80°, pl, sm From 59.97m to 60.15m, highly fr-fg 60.2m: J, sv, un, sm x 2 60.5m: J, sv, un, sm (60.3m to 60.7m) 61.06m: J, sv, pl, be.	C C	100	84	
	61.63 - 62 - 63	SANDSTONE - Very high to high strength, fresh, grey sandstone with CBS laminations						poss fr 61.21m to 61.31m, fg 61.37m: J, sv, pl, sm 61.5m: J, 60°, un, sm 62.28m: DB 62.58m: DB 62.8m: DB	С	100	100	
	- 64	At 65.33, pebbly inclusion From 65.61m to 65.69m, pebbly inclusion						63.6m: DB 63.88m: DB 64.11m: DB 64.31m: DB 64.56m: DB 64.67m: J, 10°, un, sm, pyrite 64.89m: DB 65.35m: DB 65.48m: DB	С	100	100	
	-66							∖ 65.84m: DB ∖ 65.89m: DB				
	66.15	Bore discontinued at 66.15m, limit of investigation						-\66.01m: DΒ				

RIG: Scout 103

A D B

U, W C

CLIENT:

PROJECT:

LOCATION:

Minmi

Coal & Allied Operations Pty Ltd

Proposed Residential Subdivision

DRILLER: Total (Sheddon)

LOGGED: Bear

CASING: 150mm PVC to 3.0m

TYPE OF BORING: Blade bit-air to 3.0m, air-115mm hammer from 3.0m to 51.0m. HQ wireline coring 51.1m to 66.15m WATER OBSERVATIONS:

REMARKS: Air percussion drill to 51.0m, 38m - air loss/material, return at 48m - some material return. 41.8m - rubble blocked hole overnight

SAMPLING & IN SITU TESTING LEGEND ter (kPa)

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

 PD
 Pocket penetrometer (kPa)

 PID
 Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 ▷
 Water seep

Water level





GROUNDSEARCH AUSTRALIA

(ABN 11 057 389 152)

BH 201 DENSITY 1:200

COMPANY WELL LOCATION/FIELD COUNTY LOCATION SECTION	 DOUGLAS PARTNERS BH 201 DENSITY 1:200 MINMI AUST NSW 0 	TOWNSHIP	OTHER SERVICES: DEN, DE	RANGE	: 0
DATE API NO. DRILLER LOG BOTTOM LOG TOP	: 04/30/08 : 78 : 78.00 : -1.93	PERMANENT DATUM	GL GL GL	KB DF GL	: 0 : 0 :
CASING DIAMETER CASING TYPE CASING THICKNESS RUN NO.	: 10. : STEEL 5 [.] .5 :	LOGGING UNIT	: 104 : RUTHERFORD : M LEA		
BIT SIZE MAGNETIC DECL. MATRIX DENSITY NFUTRON MATRIX CASING OD	: 9.6 : 0 : 2.8 : IMESTONE : 10.5	BOREHOLE FLUID RM RM TEMPERATURE MATRIX DELTA T	: 0 : 0 : 144	FILE TYPE THRESH	: ORIGINAL : 9035AA : 3000
WITNESSED BY	JOB NUM 39663 D	IDED SUBJECT TO STANI	DARD TERMS AND CO	NDITIONS	









GROUNDSEARCH

(ABN 11 057 389 152)

202 DENSITY 1:200

COMPANY WELL LOCATION/FIELD COUNTY LOCATION SECTION	: DOUGLAS PARTNERS : 202 DENSITY 1:200 : MINMI : AUST : NSW : 0	TOWNSHIP	OTHER SERVICES: DEN, DE	RANGE	: 0
DATE	: 04/22/08	PERMANENT DATUM	GL		
API NO. DRILLER	: 30.95			KB	: 0
LOG BOTTOM	: 80.57	LOG MEASURED FROM	GL	DF	: 0
LOG TOP	: -1.83	DRL MEASURED FROM	GL	GL	:
CASING DIAMETER	: 10.	LOGGING UNIT	: 104		
CASING TYPE	: STEEL	FIELD OFFICE	RUTHERFORD		
CASING THICKNESS RUN NO.	3 ⁻ .5	RECORDED BY	: MLEA		
BIT SIZE	: 9.6	BOREHOLE FLUID	: 0	FILE	PROCESSED
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 9035AA
MATRIX DENSITY	: 2.8	RM TEMPERATURE	: 0		
NEUTRON MATRIX		MATRIX DELTA T	: 144		
CASING OD	. 10.5			THRESH	: 3000
	JOB 39663D LOGGED IN STEEL				
WITNESSED BY	ALL SERVICES PROV	IDED SUBJECT TO STAN	DARD TERMS AND CO	NDITIONS	









GROUNDSEARCH

(ABN 11 057 389 152)

BH 301 DENSITY 1:200

COMPANY WELL LOCATION/FIELD COUNTY LOCATION SECTION	 DOUGLAS PARTNERS BH 301 DENSITY 1:200 MINMI AUST NSW 0 	TOWNSHIP	OTHER SERVICES: DEN, DE	RANGE	: 0
DATE	: 05/20/08	PERMANENT DATUM	GL		
API NO. DRILLER	: 33.3			KB	: 0
LOG BOTTOM	: 62.34	LOG MEASURED FROM	GL	DF	: 0
LOG TOP	: -1.03	DRL MEASURED FROM	GL	GL	
CASING DIAMETER CASING TYPE CASING THICKNESS RUN NO.	: 10. : STEEL S [.] .5 :	LOGGING UNIT FIELD OFFICE RECORDED BY	: 194 : RUTHERFORD : I DAVIS		
BIT SIZE	: 9.6	BOREHOLE FLUID	: 0	FILE	PROCESSED
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 9035AA
MATRIX DENSITY	: 2.8	RM TEMPERATURE	: 0		
NEUTRON MATRIX		MATRIX DELTA T	: 144		
	. 10.0			THRESH	: 3000
	LOGGED THROUGH ST JOB NO.39663D	EEL			
WITNESSED BY	ALL SERVICES PROV	IDED SUBJECT TO STAN	DARD TERMS AND CC	NDITIONS	·





SCALE: 1 M/CM CLIENT: DOUGLAS PARTNERS LOCATION: MINMI TRUE DEPTH: 36.19 M HOLE ID: BH 301 DEVIATION AZIMUTH: 300.9 DATE OF LOG: 05/20/08 DISTANCE: 0.6 M PROBE: 9055A 244 + = 20 M INCRMAG DECL: 0.0 \circ = bottom of hole **N**_{4.0M} 3.0M 2.0M 1.0M W E S



GROUNDSEARCH AUSTRALIA

(ABN 11 057 389 152)

BH 303 DENSITY 1:200

COMPANY WELL LOCATION/FIELD COUNTY LOCATION SECTION	: DOUGLAS PARTNERS : BH 303 DENSITY 1:200 : MINMI : AUST : NSW : 0	TOWNSHIP	OTHER SERVICES: DEN	RANGE	: 0
DATE API NO. DRILLER LOG BOTTOM LOG TOP	: 05/20/08 : 35.85 : 63.88 : -1.13	PERMANENT DATUM	GL GL GL	KB DF GL	: 0 : 0 :
CASING DIAMETER CASING TYPE CASING THICKNES RUN NO.	: 10. : STEEL S: .5 :	LOGGING UNIT FIELD OFFICE RECORDED BY	104 RUTHERFORD I DAVIS		
BIT SIZE MAGNETIC DECL. MATRIX DENSITY NFUTRON MATRIX CASING OD	: 9.6 : 0 : 2.8 : I IMESTONE : 10.5	BOREHOLE FLUID RM RM TEMPERATURE MATRIX DELTA T	: 0 : 0 : 0 : 144	FILE TYPE THRESH	: PROCESSED : 9035AA : 3000
WITNESSED BY	LOGGED THROUGH ST JOB NO. 39663D : ALL SERVICES PROV	EEL IDED SUBJECT TO STANI	DARD TERMS AND CC	NDITIONS	







SCALE: 1 M/CM CLIENT: DOUGLAS PARTNERS LOCATION: MINMI TRUE DEPTH: 39.76 M AZIMUTH: 162.0 HOLE ID: BH 303 DEVIATION DATE OF LOG: 05/20/08 DISTANCE: 0.7 M PROBE: 9055A 244 + = 20 M INCRMAG DECL: 0.0 \circ = bottom of hole N.4.0M 3.0M 2.0M 1.0M W E Р S



GROUNDSEARCH AUSTRALIA

(ABN 11 057 389 152)

BH305 DENSITY 1:200

COMPANY WELL LOCATION/FIELD COUNTY LOCATION SECTION	: DOUGLAS PARTNERS : BH305 DENSITY 1:200 : MINMI : : NSW :	TOWNSHIP	OTHER SERVICES: DEN,DEV	RANGE	:
DATE API NO. DRILLER LOG BOTTOM LOG TOP	: 05/27/08 : 66.15 : 64.94 : -1.58	PERMANENT DATUM LOG MEASURED FROM DRL MEASURED FROM	: :	KB DF GL	· : :
CASING DIAMETER CASING TYPE CASING THICKNES RUN NO.	: 10. : STEEL S: 0 : 1	LOGGING UNIT FIELD OFFICE RECORDED BY	: 107 : RUTHERFORD : I DAVIS		
BIT SIZE MAGNETIC DECL. MATRIX DENSITY NFUTRON MATRIX CASING OD	: 9.6 : 0 : 2.65 : SANDSTONE : 11.5	BOREHOLE FLUID RM RM TEMPERATURE MATRIX DELTA T	: 0 : 0 : 177	FILE TYPE	: PROCESSED : 9239B1
	DEN LOGGED THROUG	H RODS		IHKESI	7. 2000
	ALL SERVICES PROV	IDED SUBJECT TO STAN	DARD TERMS AND CC	NDITION	5





SCALE: 1 M/CM CLIENT: DOUGLAS PARTNERS TRUE DEPTH: 36.97 M LOCATION: MINMI HOLE ID: BH305 DEVIATION AZIMUTH: 153.1 DATE OF LOG: 05/27/08 DISTANCE: 0.5 M PROBE: 9057A 4455 + = 20 M INCRMAG DECL: 0.0 $^{\circ}$ = bottom of hole **N**_{4.0M} _3.0M 2.0M 1.0M W E S



PHOTO 2: 12.63 m to 20.36 m

Core Photos for Borehole 1	PROJECT 39663D	Douglas Partners
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Core Photos for Borehole 1	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater



Core Photos for Borehole 2	PROJECT 39663D	Douglas Partners
		Geotechnics - Environment - Groundwater



Core Photos for Borehole 2	PROJECT 39663D	Douglas Partners Geotechnics · Environment · Groundwater



Core Photos for Borehole 2	PROJECT 39663D	Douglas Partners
	39663D	Geotechnics - Environment - Groundwa


Core Photos for Borehole 2	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
		acolocimics - Livitonment - aroundwate



Core Photos for Borehole 3	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater



Core Photos for Borehole 3	PROJECT	Douglas Partners
	39663D	Douglas Partners Geotechnics - Environment - Groundwater



Core Photos for Borehole 3	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
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Core Photos for Borehole 4	PROJECT 39663D	Douglas Partners Geotechnics · Environment · Groundwater



Core Photos for Borehole 4	PROJECT 39663D	Douglas Partners
	29002D	Geotechnics - Environment - Groundwater



Core Photos for Borehole 4	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
Core Photos for Borehole 4	PROJECT 39663D	Douglas Part



Core Photos for Borehole 5	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
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Core Photos for Borehole 5	PROJECT 39663D	



Core Photos for Borehole 5	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
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Core Photos for Borehole 6	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater
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PHOTO 4: 17.72 m to 21.37 m

Core Photos for Borehole 6	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater



Core Photos for Borehole 6	PROJECT 39663D	Douglas Partners Geotechnics - Environment - Groundwater



Core Photos for Borehole 7	PROJECT 39663D	Douglas Partners Geotechnics · Environment · Groundwater