

BORE REPORT

**BUTLER
PARTNERS**

Client: Metro Property Development Pty Ltd
Project: High Rise Residential Development
Location: 29-35 Campbell Street, Bowen Hills
Project No: 010-203A

BORE 4

Page No: 1 of 2
Date: 4 - 5 October 2010
Ground Surface Level: RL18.2m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery (%)	RQD (%)	Sample ID	Test Results	Groundwater Monitoring Well Details
0	CONCRETE SLAB	18.2											
	FILL - brown, clayey sand, with fine gravel			0.52m to 0.79m, J, 90, vii, Fe, Cl, 1mm		(S)	0.5						
				0.84m, J, 45, iv, Fe, Cl, 4mm	4	C	0.52						
				0.9m, J, 0, vii, Cl, 1mm	10	C	0.57	1.6(i)	100	0			
1	TUFF (HW) - high to very high strength, pale grey, iron staining, with clay bands	17.0		1.2m, J, 0, iv, Cl, <1mm			0.79						
				1.32m, J, 0, iv, <1mm			1.01						
2	TUFF (MW) - high to very high strength, pale grey-red, iron staining	16.0		2.07m, J, 0, iv, <1mm	3	C	1.73	3.1(d) 3.4(a)	90	100			
				2.39m, J, 0, iv, <1mm			2.48						
				2.56m, 2.58m, J, 10, iv, Cl, Fe, 2mm			2.49	1.8(d) 3.3(a)					
				2.7m, J, 10, iv, Fe, healed									
				2.92m, J, 0, iv, Fe, 1mm									
3		15.0		3.26m, 3.3m, J, 0, iv, 1-2mm			3.6	2.3(d) 2.2(a)					
				3.59m, J, 0, iv, Fe, 2mm	2-3	C			100	97			
4		14.0		4.28m, J, 20, vii, Fe, Cl, 4mm			4.46	3.3(d) 4.0(a)					
	- very high strength			4.99m, J, 0, iv, Fe, 2mm			5.34						
5		13.0		6.0m, J, 70, iv, <1mm			5.46	3.7(d) 6.0(a)					
6		12.0		6.45m, J, 80, iv, healed									
				6.9m, J, 0, iv, <1mm	1-2	C	6.87	3.6(d) 4.2(a)	100	100			
7		11.0		8.3m, J, 0, iv, 2mm			7.33	4.1(d) 6.0(a)					
8		10.0		8.81m to 9.36m, J, 70-80, iv, Fe, healed with B, 0, iv, Fe, healed			8.4	5.3(d) 5.7(a)					
				9.36m to 15.0m, generally B, 0, iv, Fe, healed			8.42						
9		9.0		10.02m to 15.0m, numerous healed joint and bedding defects, 45-75 and 0, with Fe staining	1-2	C	9.44	5.9(d) 4.1(a)	100	100			
10							9.46						

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

E Environmental Sample
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
() No Sample Recovery

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Mobile B40L

Drilling Method: Auger to 0.33m, casing to 0.9m, wash bore to 0.52m, then NMLC core to 15.0m

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level interpolated from RPS Australia East Pty Ltd's, 'Detail Survey' Dwg. No. 103356-1, dated 30 July 2010

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11	TUFF (MW) - high strength, pale grey-red, iron staining	7.0		10.14m to 10.23m, XW zone with Clay (XW) extremely low strength and fine subangular gravels	1-2	C	10.49	4.0(d) 4.3(a)	100	99			
12		6.0		11.9m to 13.3m, thin interbeds of clay	2		11.0 11.52 11.76	4.1(d) 4.5(a)					
13	- high strength, medium strength zones	5.0			7-8		12.42	3.5(d) 1.5(a)					
14		4.0			1-2	C	13.3 13.65	0.8(d) 2.1(a)	100	85			
15	End of Bore at 15 m	3.0			1	C	14.5 14.78 15.0	1.0(d) 1.9(a)					
16		2.0											
17		1.0											
18		0.0											
19		-1.0											
20													

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BORE 5

Page No: 1 of 2
Date: 30 September 2010
Ground Surface Level: RL18.4m*

Depth (m)	Description	RL (m)	Lithology	Structures	Average Number of Defects/m	Sample Type	Sample Depth (m)	Is(50) (MPa)	Core Recovery (%)	RQD (%)	Sample ID	Test Results	Groundwater Monitoring Well Details
0	CONCRETE SLAB	18.4				D/E	0.0						
	FILL - orange-brown, gravelly clayey sand, fine to medium grained subangular to subrounded gravel, fine to coarse sand					D	0.25					30 for 90mm HB	
1	TUFF (XW) - extremely low strength, pale grey-white with mottled orange	17.0				S	0.59						
						D	0.75						
						D	1.0						
2	TUFF (HW) - very low to low strength, pale grey-white	16.0					1.25						
						S	2.0					20 for 55mm HB	
							2.055						
3		15.0					3.5						
						S	3.6					30 for 100mm HB	
4	TUFF (MW) - medium strength, pale grey-white and mottled orange, with thin clay bands	14.0		4.2m, defects typically J,0-30, iv-vii, Cl-XW,Fe, 1-5mm	2	C	4.2	0.4(d) 0.5(a)	100	27			
							4.42						
5	- medium to high strength	13.0			2	C	4.77		100	36			
					-	C	5.29		100	-			
6	TUFF (HW) - low strength, pale mottle orange and pale grey-white	12.0		5.68m, clay zone, 10mm	1	C	5.69	0.2(d) 0.2(a)	100	95			
							6.76						
7	- very low strength	11.0		6.74m, J,0,vii,Xw,8mm 7.06m, clay zone, 15mm 7.32m, clay zone, 20mm	4	C	7.68 7.72	0.1(d) 0.0(a)	100	53			
							8.3	0.1(d) 0.3(a)	100	73			
8	TUFF (MW) - very low strength, pale grey-white with mottled orange, thin bands of clay, interbedded with (XW//HW) bands	10.0		7.85m, J,45,vii,Cl,1-3mm 8.05m, clay zone, 5mm 8.1m, XW zone, 20mm 8.42m, XW zone, 25mm 8.53m, J,45,vii,Cl,4mm 8.76m, XW zone, 20mm 8.9m, XW zone, 30mm	4	C	8.63						
9		9.0		9.3m to 9.5m, J,45,vii,Cl,1-3mm 9.6m to 10.04m, J,45,vii,Cl,1-4mm	>10	C	9.81	0.1(d) 0.1(a)	100	0			

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Drilling Method: Auger to 2.0m, casing to 2.0m, wash bore to 4.2m, then NMLC core to 15.0m

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11	TUFF (MW) - low to medium strength, pale grey-white with mottled orange, thin bands of clay, interbedded with (XW/DW) bands and very high strength zones	8.0			0	C	10.68 10.91 11.09	0.2(d) 3.1(i)	100	100			
12	FAULT BRECCIA (MW) - high strength, pale lime-green, with very high strength quartz bands and thin bands of clay with zones of phyllite (parent rock)	7.0			8	C	11.84 11.94	1.6(d) 2.0(a)	100	0		pp=350	
13	- medium strength	6.0		12.4m, crush zone and quartz, 35mm 12.52m, C, 45, XW, 4mm 12.55m, quartz, 8mm 12.57m, crush zone, 20mm 12.74m, J, 0, vii, quartz, 4mm 13.0m, XW zone, 40mm 13.17m, quartz, 3mm 13.26m, quartz, 5mm	7	C	12.7	0.6(d) 0.9(a)	100	28			
14	- 100mm zones of tuff between 13.7m and 13.8m depth	5.0		13.59m to 13.8m, crush zone 13.7m to 13.8m core loss 14.0m to 14.13m, crush zone			13.61 13.7	0.5(d) 0.6(a)					
15	End of Bore at 15 m	4.0		14.37m to 14.45m, crush zone and quartz 14.4m to 14.82m, quartz seam	>10	C	14.27	0.7(d)	92	0			
16		3.0					15.0						
17		2.0											
18		1.0											
19		0.0											
20		-1.0											

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Remarks: *Approximate ground surface level interpolated from RPS Australia East Pty Ltd's, 'Detail Survey' Dwg. No. 103356-1, dated 30 July 2010

Notes on Description and Classification of Soil

The methods of description and classification of soils used in this report are generally based on Australian Standard AS 1720.1 *Geotechnical Site Investigations*.

Soil description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures or in undisturbed samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

In the case of cone or piezocone penetrometer tests, actual soil samples are not recovered and soil description is inferred based on published correlations, past experience and comparison with bore and/or test pit data (if available).

Soil classification is based on the particle size distribution of the soil and the plasticity of the portion of the material finer than 0.075mm. The description of particle size distribution and plasticity is based on the results of visual field estimation, laboratory testing or both. When assessed in the field, the properties of the soil are estimated. Precise description will always require laboratory testing to define soil properties.

Where soil can be clearly identified as a fill this will be noted as the main soil type followed by a description of the composition of the fill (e.g. yellow-brown, fine to coarse grained gravelly clay fill with concrete rubble). If the soil is assessed as possibly being fill this will be noted as an additional observation.

Soils are generally described using the following sequence of terms. In certain instances, not all of the terms will be included in the soil description.

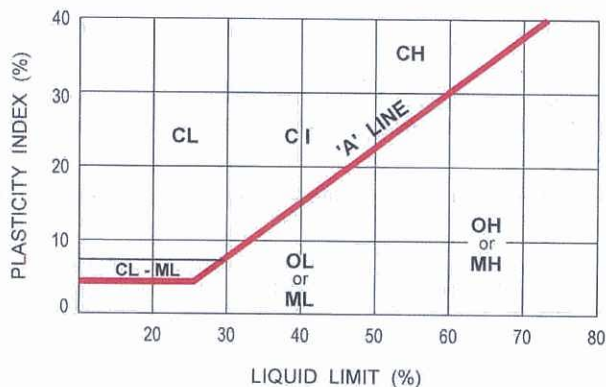
MA, T, A, U, MB

strength/density, colour, structure/grain size, secondary and minor components, additional observations

Information on the definition of descriptive and classification terms follows.

Soil Types and Classification

Major Divisions	Particle Size	Classification	Typical Names
GRAVELLY SANDS more than half of material is larger than 0.075 mm	0.075 – 2 mm		
	0.075 – 2 mm		
	coarse 0.075 – 2 mm Medium 0.075 – 2 mm Fine 0.075 – 2 mm		Well graded gravels, gravel/sand mixtures, little or no fines.
			Poorly graded gravels and gravel/sand mixtures, little or no fines, uniform gravels.
			Silty gravels, gravel/sand/silt mixtures.
			Clayey gravels, gravel/sand/clay mixtures.
			Well graded sands, gravelly sands, little or no fines.
			Poorly graded sands and gravelly sands, little or no fines, uniform sands.
FINE GRAINED SANDS more than half of material is smaller than 0.075 mm	coarse 0.075 – 2 mm Medium 0.075 – 2 mm Fine 0.075 – 2 mm		Silty sands, sand/silt mixtures.
			Clayey sands, sand/clay mixtures.
			Inorganic silts and very fine sands, silty/clayey fine sands or clayey silts with low plasticity.
			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
			Organic silts and organic silty clays of low plasticity.
			Inorganic silts, micaceous or diatomaceous fine sandy or silty soils.
			Inorganic clays of high plasticity.
			Organic clays of medium to high plasticity, organic silts.
			Peat and other highly organic soils.

PLASTICITY INDEX (PI) FOR CLASSIFICATION OF FINE GRAINED SOILS

Reference Australian Standard AS 1720.1 Geotechnical site investigations

DESIGNATION TERMS FOR MATERIAL PROPERTIES

Coarse Grained Soils		Fine Grained Soils	
Fines	Modifier	Fines	Modifier
5	omit, or use 'trace'	15	omit, or use trace.
5 – 12	Describe as 'with clay/silt' as applicable.	15 – 20	Describe as 'with sand/gravel' as applicable.
12	Prefix soil as 'silty/clayey' as applicable	20	Prefix soil as 'sandy/gravelly' as applicable.

STRENGTH TERMS – SOILS

Strength Term	Undrained Shear Strength	Field Guide to Strength
Very soft	< 12 kPa	Exudes between the fingers when squeezed in hand.
Soft	12 – 25 kPa	Can be moulded by light finger pressure.
Firm	25 – 50 kPa	Can be moulded by strong finger pressure.
Stiff	50 – 100 kPa	Cannot be moulded by fingers, can be indented by thumb.
Very stiff	100 – 200 kPa	Can be indented by thumb nail.
Hard	> 200 kPa	Can be indented with difficulty by thumb nail.

DESIGNATION TERMS – SOILS

Consistency Term	Consistency Index	SPT "N"	Penetration Resistance
Very loose	< 15	< 5	< 2 MPa
Loose	15 – 25	5 – 10	2 – 5 MPa
Medium dense	25 – 35	10 – 20	5 – 15 MPa
Dense	35 – 45	20 – 30	15 – 25 MPa
Very dense	> 45	> 30	> 25 MPa

COLOUR

The colour of a soil will generally be described in a 'moist' condition using simple colour terms (eg. black, grey, red, brown etc.) modified as necessary by "pale", "dark", "light" or "mottled". Borderline colours will be described as a combination of colours (eg. grey/brown).

EXAMPLE

e.g. A/D – medium dense, grey/brown, fine to medium grained with silt.

Indicates a medium dense, grey/brown, fine to medium grained clayey sand with silt.

Notes on Description and Classification of Rock

The methods of description and classification of rock used in this report are generally based on Australian Standard AS 1721 Geotechnical site investigations.

Rock description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures, or in core samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

Notes outlining the method and terminology adopted for the description of rock defects are given below, however, detailed information on defects can generally only be determined where rock core is taken, or excavations or exposures allow detailed observation and measurement.

Rocks are generally described using the following sequence of terms. In certain instances not all of the terms will be included in the rock description.

Typical terms used are: AT, MB, strength, colour, grain size, defect frequency

Information on the definition of descriptive and classification terms follows.

Rock Type

In general, simple rock names are used rather than precise geological classifications.

Rock Material's Weathering Classification

Term	Weathering Symbol	Definition
Residual soil	SS	Soil developed from extremely weathered rock; the mass structure and substance fabrics are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered	EE	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water.
Distinctly weathered	DE	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Highly weathered	HE	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	ME	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock may be no longer recognisable.
Lightly weathered	LE	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh	FE	Rock shows no sign of decomposition or staining.

* Subdivision of this weathering grade into highly and moderately may be used where applicable.

Strength of Rock Material

Term	Symbol	Point Load Index P_{50} (kPa)	Field Guide to Strength
Extremely low	EL	0.001 – 0.01	Easily remoulded by hand to a material with soil properties.
Very low	VL	0.01 – 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 10 mm thick can be broken by finger pressure.
Low	L	0.1 – 1.0	Easily scored with a knife; indentations 1 mm to 5 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	1.0 – 10.0	Easily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	10.0 – 100.0	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very high	VLH	100.0 – 1000.0	Hard specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely high	ELH	1000.0	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:

- These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
- The field guide visual assessment for rock strength may be used for preliminary assessment or when point load testing is not available.
- Anisotropy of rock may affect the field assessment of strength.

Rock Colour

The colour of a rock will generally be described in a 'moist' condition using simple colour terms (e.g. black, grey, red, brown, etc.) modified as necessary by 'pale', 'dark', 'light' or 'mottled'. Borderline colours will be described as a combination of colours (e.g. grey-brown).

GRA SIE

descri term	Particle Size Range
coarse grained	2.0 – 2.0mm
Medium grained	2.0 – 2.0mm
fine grained	2.0 – 2.0mm

DEFECT FREQUENCY

Where appropriate, a defect frequency may be recorded as part of the rock description and will be expressed as the number of natural or interpreted natural defects present in an equivalent one metre length of core by use of the following defect frequency descriptive terms or both. The descriptive terms refer to the spacing of all types of natural defects along which the rock is discontinuous and include, bedding plane partings, joints and other rock defects, but excludes known artificial fractures such as drilling breaks.

defect Frequency	description
fragmented	Rock core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter.
highly fractured	Core lengths are generally less than 20mm to 100mm with occasional fragments.
fractured	Core lengths are mainly 100mm to 1000mm with occasional shorter and longer sections.
fractured to lightly fractured	Core lengths are mainly 1000mm to 10000mm with occasional shorter to longer sections.
lightly fractured	Core lengths are generally 10000mm to 100000mm with occasional longer sections and occasional sections of 1000mm to 10000mm.
Unbroken	The core does not contain any fractures.

EXAMPLE

e.g. A D T low strength, pale brown, fine to coarse grained, slightly fractured.

ROCK DEFECTS

Defects are discontinuities in the rock mass and include joints, sheared zones, cleavages and bedding partings. The ability to observe and log defects will depend on the investigation methodology. Defects logged in core are described using the abbreviations noted in the following tables.

The *depth* noted in the description is measured in metres from the ground surface, the *defect angle* is measured in degrees from horizontal, and the defect *thickness* is measured normal to the plane of the defect and is in millimetres (unless otherwise noted).

Defects are generally described using the following sequence of terms:

Depth, Defect Type, Defect Angle (dip), Surface Roughness, Infill, Thickness

DEFECT TYPE

B	– Bedding
J	– Joint
C	– Cleavage
S	– Shear zone

SURFACE ROUGHNESS

i	rough or irregular, stepped
ii	smooth, stepped
iii	slickensided, stepped
iv	rough or irregular, undulating
v	smooth, undulating
vi	slickensided, undulating
vii	rough or irregular, planar
viii	smooth planar
ix	slickensided, planar

INFILL

Infill refers to secondary minerals or other materials formed on the surface of the defect and some common descriptions are given in the following table together with their abbreviations.

ls	limonite staining
fe	iron staining
cl	clay
Mn	manganese staining
qtz	quartz
ca	calcite
lean	no visible infill

EXAMPLE

3.59m, J, 90, vii, ls, 1mm

indicates a joint at 3.59m depth that is at 90° to horizontal (i.e. vertical) is rough or irregular and planar, limonite stained and 1mm thick.

*High Rise Residential Development
29 - 35 Campbell Street, Bowen Hills
Project No. 010-203A
18 February 2011*

APPE ☐ ☐ ☐ ☐ B

☐ AB ☐ RA ☐ ☐ R ☐ ☐ ES ☐ RES ☐ ☐ ☐ S

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EMERSON CLASS NUMBER

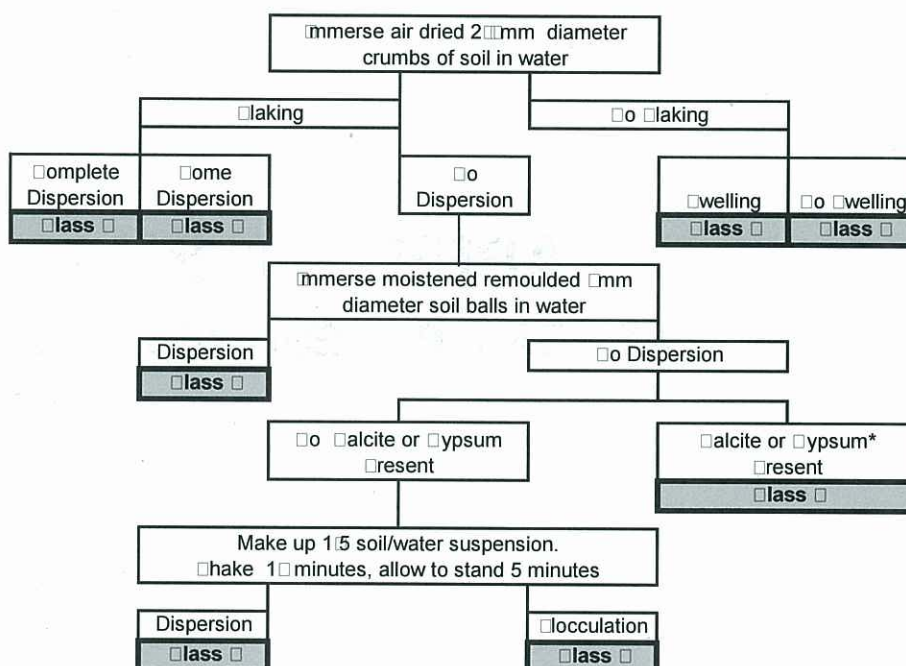
Test Procedure: AS1289.3.8.1 - 2006

and

EMERSON REPORT

Test Procedure: AS1289.4.3.1 - 1997

Client	Metro Property Development Pty Ltd	Tested by	M
Project	High Rise Residential Development	Date	
Location	Sam Bell Street	Checked by	M
Project no	A	Date	
		Report no	A E

Determination of Emerson Class Number

Test Number	B	B	B		
Sample Identification	B	B	B		
	mm	mm	mm		
Source	In Situ	In Situ	In Situ		
Date Sampled					
Material Description	Fine Gravel Sand Clay (P) dark brown	Fine Gravel Sand Clay (P) grey brown orange	Fine Gravel Sand Clay (P) orange brown grey		
Water Type (distilled, potable, site)	Distilled	Distilled	Distilled		
Water Temperature (°C)					
Emerson Class Number					
Conductivity (mS/cm)					
pH					

PAR ☐ **E** ☐ **S** ☐ **E** ☐ **S** ☐ **R** ☐ **B** ☐ ☐ ☐ ☐ **E** ☐ **S** ☐ **R** ☐ **E** ☐ **P** ☐ **R** ☐

Test Procedure: AS1289.3.6.1 – 2009

Test Procedure: AS1289.2.1.1 – 2005

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Client:	Metro Property Development Pty Ltd	Tested by:	MH
Project:	High Rise Residential Development	Date:	12/10/10
Location:	29-35 Campbell Street, Bowen Hills	Checked by:	MH
Project No.:	010-203A	Date:	13/10/10
		Report No.:	010-203A_PSD_2_1

Sample No.:	010-203A_2_1
Borehole:	2
Depth (m):	0.5-0.95
Sample Moisture Content (%):	17.8

AS SIEVE SIZE (mm)	PERCENT PASSING
75.0	
37.5	
26.5	
19.0	100
13.2	97
9.5	94
6.7	90
4.75	85
2.36	79
1.18	74
0.600	62
0.425	58
0.300	54
0.150	48
0.075	42

Sample No.:	010-203A_3_1
Borehole:	3
Depth (m):	0.5-0.95
Sample Moisture Content (%):	24.6

AS SIEVE SIZE (mm)	PERCENT PASSING
75.0	
37.5	
26.5	100
19.0	84
13.2	78
9.5	68
6.7	62
4.75	56
2.36	47
1.18	37
0.600	28
0.425	25
0.300	22
0.150	17
0.075	14

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1 – 2009

Test Procedure: AS1289.2.1.1 - 2005

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 enquiries@butlerpartners.com.au

Client:	Metro Property Development Pty Ltd	Tested by:	MH
Project:	High Rise Residential Development	Date:	12/10/10
Location:	29-35 Campbell Street, Bowen Hills	Checked by:	MH
Project No.:	010-203A	Date:	13/10/10
		Report No.:	010-203A_PSD_5_1

Sample No.:	010-203A_5_1
Borehole:	5
Depth (m):	0.25-0.59
Sample Moisture Content (%):	18.7

AS SIEVE SIZE (mm)	PERCENT PASSING
75.0	
37.5	
26.5	
19.0	100
13.2	97
9.5	95
6.7	93
4.75	91
2.36	84
1.18	74
0.600	62
0.425	57
0.300	52
0.150	44
0.075	38

ATTERBERG LIMITS TEST REPORT

Test Procedure: AS1289.2.1.1 - 2005

Test Procedure: AS1289.3.1.2 - 2009

Test Procedure: AS1289.3.2.1 - 2009

Test Procedure: AS1289.3.3.1 - 2009

Test Procedure: AS1289.3.4.1 - 2008

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Client:	Metro Property Development Pty Ltd	Tested by:	E
Project:	High Rise Residential Development	Date:	12/10/10
Location:	29-35 Campbell Street, Bowen Hills	Checked by:	MH
Project No.:	010-203A	Date:	13/10/10
		Report No.:	010-203A_ATL_2_2

Sample No.:	010-203A_2_2
Borehole:	2
Depth (m):	3.5-3.6

Liquid Limit (%)	47
Plastic Limit (%)	29
Plasticity Index (%)	18
Linear Shrinkage (%)	8.5
Sample Moisture Content (%)	27.5

Remarks: The sample was tested, oven dried, dry sieved and tested in a 127mm mould.

* Crumbling occurred

+ Curling occurred



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1018532	Page	: 1 of 9
Client	: BUTLER PARTNERS PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: MR LUKE AMIES	Contact	: Carsten Emrich
Address	: P O BOX 2267 FORTITUDE VALLEY BC QLD, AUSTRALIA 4006	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lukeamies@butlerpartners.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 38523800	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 38523808	Facsimile	: +61 7 3243 7218
Project	: 010-203A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 3328	Date Samples Received	: 15-OCT-2010
C-O-C number	: 010-230A/1	Issue Date	: 25-OCT-2010
Sampler	: Keiron Nicholson	No. of samples received	: 6
Site	: Bowen Hills	No. of samples analysed	: 6
Quote number	: BN/329/10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Matt Frost	Senior Organic Chemist	Inorganics
Matt Frost	Senior Organic Chemist	Organics

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Page : 3 of 9
Work Order : EB1018532
Client : BUTLER PARTNERS PTY LTD
Project : 010-203A

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^A = This result is computed from individual analyte detections at or above the level of reporting

- ANC not required because pH KCl less than 6.5
- EG005T (Total Metals) - Sample EB1018532 - 002 (BH1_0.5-0.52) shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.
- EP080 Volatile TPH/BTEX: Sample BH2_0.5-0.95 shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.
- Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- Pesticides: Sample shows poor matrix spike recovery due to matrix interference.



Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL	Client sample ID Client sampling date / time							
Compound	CAS Number	LOR	Unit	BH1_0.0-0.25 30-SEP-2010 15:00 EB1018532-001	BH1_0.5-0.62 30-SEP-2010 15:00 EB1018532-002	BH2_0.5-0.95 30-SEP-2010 15:00 EB1018532-003	BH3_0.0-0.25 30-SEP-2010 15:00 EB1018532-004	BH3_0.25-0.5 30-SEP-2010 15:00 EB1018532-005
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit			6.4		
Titratable Actual Acidity (23F)		2	mole H+ / t			<2		
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S			<0.02		
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S			<0.005		
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t			<10		
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-			1.5		
Net Acidity (sulfur units)		0.02	% S			<0.02		
Net Acidity (acidity units)		10	mole H+ / t			<10		
Liming Rate		1	kg CaCO3/t			<1		
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)		1.0	%	18.6	17.5	12.8	13.8	13.5
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	2	4	7	7
Copper	7440-50-8	5	mg/kg	19	<5	12	9	7
Lead	7439-92-1	5	mg/kg	121	45	132	52	27
Nickel	7440-02-0	2	mg/kg	2	<2	2	<2	<2
Zinc	7440-66-6	5	mg/kg	141	53	472	38	31
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg		<0.05		<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05		<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05		<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05		<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05		<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05		<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05		<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05		<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05		<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05		<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05		<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05		<0.05	<0.05



Page : 7 of 9
Work Order : EB1018532
Client : BUTLER PARTNERS PTY LTD
Project : 010-203A

Analytical Results

Sub-Matrix: SOIL

Sub-Matrix: SOIL		Client sample ID		Client sampling date / time		BH5_0-0.25		30-SEP-2010 15:00		EB1018532-006	
Compound	CAS Number	LOR	Unit								
EA033-A: Actual Acidity											
pH KCl (23A)		0.1	pH Unit	4.1							
Titratable Actual Acidity (23F)		2	mole H+ / t	49							
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.08							
EA033-B: Potential Acidity											
Chromium Reducible Sulfur (22B)		0.005	% S	<0.005							
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10							
EA033-D: Retained Acidity											
KCl Extractable Sulfur (23Ce)		0.02	% S	<0.02							
HCl Extractable Sulfur (20Be)		0.02	% S	<0.02							
Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02							
acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10							
sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02							
EA033-E: Acid Base Accounting											
ANC Fineness Factor		0.5	-	1.5							
Net Acidity (sulfur units)		0.02	% S	0.08							
Net Acidity (acidity units)		10	mole H+ / t	49							
Liming Rate		1	kg CaCO3/t	4							
EA055: Moisture Content											
^ Moisture Content (dried @ 103°C)		1.0	%	14.1							
EG005T: Total Metals by ICP-AES											
Arsenic	7440-38-2	5	mg/kg	<5							
Cadmium	7440-43-9	1	mg/kg	<1							
Chromium	7440-47-3	2	mg/kg	4							
Copper	7440-50-8	5	mg/kg	<5							
Lead	7439-92-1	5	mg/kg	8							
Nickel	7440-02-0	2	mg/kg	<2							
Zinc	7440-66-6	5	mg/kg	17							
EG035T: Total Recoverable Mercury by FIMS											
Mercury	7439-97-6	0.1	mg/kg	<0.1							
EP068A: Organochlorine Pesticides (OC)											
alpha-BHC	319-84-6	0.05	mg/kg	<0.05							
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05							
beta-BHC	319-85-7	0.05	mg/kg	<0.05							
gamma-BHC	58-89-9	0.05	mg/kg	<0.05							
delta-BHC	319-86-8	0.05	mg/kg	<0.05							
Heptachlor	76-44-8	0.05	mg/kg	<0.05							

POINT LOAD STRENGTH INDEX TEST REPORT

Australian Standard AS1726-1993 Geotechnical site investigation

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Client:	Metro Property Development Pty Ltd
Project:	High Rise Residential Development
Location:	29 – 35 Campbell Street, Bowen Hills
Project No.:	010-203A
Tested by:	Date: 11 October 2010

Bore	Depth (m)	Test Type	Sample Description	Point Load Strength Is(50) (MPa)	Rock Strength Category
1	1.40	Diametral	Tuff	4.3	Very High
	1.42	Axial	Tuff	3.9	Very High
	2.90	Diametral	Tuff	2.9	High
	2.95	Axial	Tuff	4.3	Very High
	3.60	Diametral	Tuff	3.7	Very High
	3.65	Axial	Tuff	2.7	High
	4.90	Diametral	Tuff	2.0	High
	4.95	Axial	Tuff	1.5	High
	5.95	Diametral	Tuff	4.7	Very High
	5.97	Axial	Tuff	5.0	Very High
	7.80	Diametral	Tuff	5.7	Very High
	7.85	Axial	Tuff	5.6	Very High
	8.55	Diametral	Tuff	3.6	Very High
	8.60	Axial	Tuff	3.3	Very High
	9.95	Diametral	Tuff	3.6	Very High
	9.97	Axial	Tuff	5.5	Very High
	10.80	Diametral	Tuff	3.1	Very High
	10.85	Axial	Tuff	4.2	Very High
	11.03	Axial	Tuff	2.7	High
	11.90	Diametral	Tuff	2.8	High
2	12.63	Diametral	Tuff	2.1	High
		Axial	Tuff	2.1	High
	13.30	Diametral	Tuff	3.3	Very High
		Axial	Tuff	4.5	Very High
	14.28	Diametral	Tuff	3.3	Very High
		Axial	Tuff	3.5	Very High
	1.75	Diametral	Tuff	0.5	Medium
	2.10	Axial	Tuff	1.9	High
	4.95	Irregular	Tuff	1.2	High
	5.90	Diametral	Tuff	3.0	High
	5.92	Axial	Tuff	4.3	Very High
	6.92	Diametral	Tuff	4.0	Very High
	6.97	Axial	Tuff	4.6	Very High
	7.90	Diametral	Tuff	3.0	Very High
		Axial	Tuff	4.2	Very High
	8.50	Diametral	Tuff	5.3	Very High
	9.50	Axial	Tuff	5.6	Very High
		Diametral	Tuff	3.0	Very High
	9.52	Axial	Tuff	4.1	Very High
	11.10	Diametral	Tuff	3.4	Very High
	11.90	Diametral	Tuff	4.0	Very High
	11.92	Axial	Tuff	5.8	Very High
	13.10	Diametral	Tuff	4.6	Very High
	13.13	Axial	Tuff	6.0	Very High
	14.25	Diametral	Tuff	5.3	Very High
	14.28	Axial	Tuff	5.9	Very High

POINT LOAD STRENGTH INDEX TEST REPORT

Australian Standard AS1726-1993 Geotechnical site investigation

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Client:	Metro Property Development Pty Ltd
Project:	High Rise Residential Development
Location:	29 – 35 Campbell Street, Bowen Hills
Project No.:	010-203A
Tested by:	
Date:	11 October 2010

Bore	Depth (m)	Test Type	Sample Description	Point Load Strength Is(50) (MPa)	Rock Strength Category
3	2.50	Irregular	Tuff	0.1	Very Low
	3.93	Irregular	Tuff	0.1	Low
	4.35	Diametral	Tuff	0.2	Low
		Axial	Tuff	0.2	Low
	5.89	Diametral	Tuff	0.1	Low
		Axial	Tuff	0.2	Low
	6.37	Diametral	Tuff	0.4	Medium
		Axial	Tuff	0.7	Medium
	7.28	Diametral	Tuff	0.7	Medium
		Axial	Tuff	1.1	High
	8.20	Diametral	Tuff	0.7	Medium
		Axial	Tuff	0.7	Medium
	9.47	Diametral	Tuff	2.1	High
		Axial	Tuff	3.4	Very High
	10.38	Diametral	Tuff	0.5	Medium
		Axial	Tuff	2.0	High
	11.25	Diametral	Tuff	1.0	Medium
		Axial	Tuff	0.7	Medium
	12.46	Diametral	Tuff	0.8	Medium
		Axial	Tuff	1.5	High
4	13.63	Diametral	Tuff	1.1	High
		Axial	Tuff	1.1	High
	14.86	Diametral	Tuff	0.8	Medium
		Axial	Tuff	0.8	Medium
	0.57	Irregular	Tuff	1.6	High
	1.73	Diametral	Tuff	3.0	Very High
		Axial	Tuff	3.4	Very High
	2.49	Diametral	Tuff	1.8	High
		Axial	Tuff	3.3	Very High
	3.60	Diametral	Tuff	2.3	High
		Axial	Tuff	2.2	High
	4.46	Diametral	Tuff	3.3	Very High
		Axial	Tuff	4.0	Very High
	5.46	Diametral	Tuff	3.7	Very High
		Axial	Tuff	6.0	Very High
	6.87	Diametral	Tuff	3.6	Very High
		Axial	Tuff	4.2	Very High
	7.33	Diametral	Tuff	4.1	Very High
		Axial	Tuff	6.0	Very High
	8.40	Diametral	Tuff	5.3	Very High
		Axial	Tuff	5.7	Very High
	9.46	Diametral	Tuff	5.9	Very High
		Axial	Tuff	4.1	Very High
	10.49	Diametral	Tuff	4.0	Very High
		Axial	Tuff	4.3	Very High
	11.52	Diametral	Tuff	4.1	Very High
		Axial	Tuff	4.5	Very High