NSW Health Infrastructure

23 February 2010

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Westmead Hospital

Geotechnical Interpretive Report

Westmead Hospital

Geotechnical Interpretive Report

Prepared for

NSW Health Infrastructure

Prepared by

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DRAFT	05-Feb-2010	DRAFT	Steve Coates Senior Engineer	
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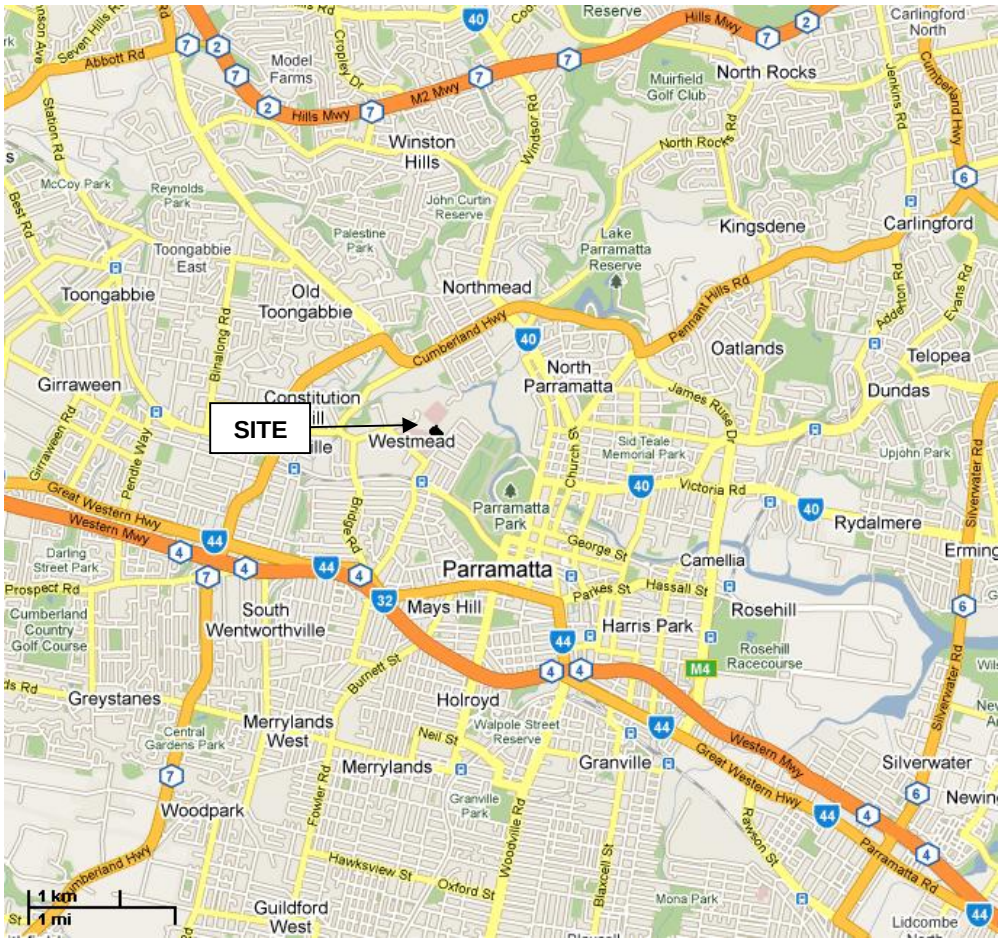
1.0 Introduction

This report presents the results and interpretation of the geotechnical investigation carried out for the proposed new development at Westmead Hospital located at the corner of Darcy Rd and Hawkesbury Rd, Westmead, NSW. The work was carried out by AECOM Australia Pty Ltd at the request of Frank Hennessey of Capital Insight Pty Ltd on behalf of NSW Health Infrastructure.

The location of the site is shown on Figure 1, Location Plan. The site is approximately 110m by 100m and is currently occupied by two buildings and bitumen car parks. The majority of the site is level approximately RL21m, but rises rapidly at the southern boundary with on Hawkesbury Road to approximately RL25m.

We understand that the proposed development is to be a building of up to 7 storeys with two levels of basement car park.

Figure 1 Site Locality Plan



2.0 Scope of Work

The investigation was generally carried out in accordance with the scope of works as described in our proposal letter to Frank Hennessey, dated 4 December 2009, comprised the following activities:

- Task 1 - Preparation of scope of works document, specification and tender documents to enable pricing to be sought from suitable borehole contractors
- Task 2 – Review returned pricing documents from borehole contractors and recommend the successful contractor
- Task 3 – Site kick off meeting and two subsequent visits to site to review progress and manage the contractor
- Task 4 – Prepare Geotechnical Interpretative Report (GIR) based on the information gathered from the borehole logs

An environmental investigation was undertaken in conjunction with the geotechnical investigation, which in some instances used the same test locations to undertake the environmental sampling. The results of the environmental investigation are reported in separation to this report.

3.0 Site investigation

3.1 Field Work

A site investigation comprising five, boreholes to depths between approximately 10.10m and 10.25m was undertaken between the 18 and 22 January 2010. The site investigation was performed under the technical direction and full-time presence of an AECOM Geotechnical Engineer. The drilling was undertaken using a truck mounted drill rig supplied and manned by Macquarie Drilling Pty Ltd.

A summary of the borehole locations, reduced levels and depths below surface level is presented in Table 1. A borehole location plan is provided in Appendix A and borehole logs are provided in Appendix B.

Table 1 Summary of Borehole Locations

BH	Easting[2] (m)	Northing[2] (m)	Reduced Level[1] (m AHD)	Borehole End Depth (m)
BH01	313080.900	6252872.300	23.30	10.25
BH02	313073.000	6252914.400	21.00	10.25
BH03	313016.100	6252907.700	20.10	10.07
BH04	313044.000	6252889.700	20.80	10.10
H05	313047.200	6252836.200	21.10	10.10

Notes:

1) *AHD Australian Height Datum*

2) *Coordinate System MGA94 Zone 56*

4.0 Subsurface Conditions

4.1 Geology

The Sydney geological map indicates that the site is underlain with Bringelly Shale of the Wianamatta Group. Bringelly Shale comprises carbonaceous claystone, laminate, fine to medium grained lithic sandstone and some minor coal bands.

4.2 Subsurface Conditions

Based on the results of the fieldwork, the geology within the investigation area is consistent with the regional geology. The borehole information shows a thin layer of fill generally consisting of sandy silt and gravels overlying shale that generally increased in strength with depth from high except BH03 where a layer of residual soil was identified to approximately 1.3m depth. There were several zones of core loss evident in the cored bores. It is likely that this core loss was due to weaker, friable or fragmented bands in the rock strata. The general subsurface conditions as observed within each borehole is summarised in Table 2, below.

Table 2 Approximate arrangement of subsurface strata as observed within boreholes

Bore hole	Fill	Residual Soil	Bringelly Shale			
			CLASS V	CLASS IV	CLASS III	CLASS II
	Approximate RL of top of material strata (m)					
BH01	23.30	-	23.1	21	21	17
BH02	21.00	-	20.8	-	19	15.5
BH03	20.10	19.9	18.8	17.5	15	13.5
BH04	20.80		20.5	18.3	16.3	15.3
BH05	21.10		21	-	20	19

4.3 Groundwater

Groundwater was generally not encountered in the augered sections of the boreholes. Due to the use of drilling fluid during rock coring, monitoring of the water table was not possible at the time of the investigation.

Wells were installed in all five boreholes at the time of the geotechnical investigation. Details of well installation and water monitoring results are provided in the separate environmental report.

4.4 Laboratory Results

Rock core was colour photographed and transported to Australian Soil Testing Pty Ltd, where point load index tests and unconfined compression tests (UCS) were carried out on samples taken from the rock core. The results of the tests are provided in Appendix C.

The results of the point load tests varied between 0.12MPa and 2.33MPa which corresponds to very low strength to high strength rock respectively. USC test results range between 11.3MPa and 29.8MPa.

5.0 Discussion and Recommendations

5.1 General

Based on our understanding of the proposed development, suitable foundation systems may include pad on ground and bored pile foundations and excavation retention systems.

General guidance on aspects of the design and construction activities are discussed below. It is expected that this information will assist in a more detailed design of the various components.

5.2 Excavation Conditions

It is important that the factual information within this report be made available to any parties involved in the pricing and construction of the excavation so that they can make their own assessment of the plant required to excavate the varying rock strengths encountered in the investigation and assess the risk of strength variations across the excavation areas.

5.3 Vibration

Vibration from construction activities, particularly during excavation of the proposed basement, has the potential to cause damage to nearby structures. It is recommended that the following steps be taken to assess the potential for damage and develop appropriate management of the risks:

- Assess the proximity and nature of vibration sensitive structures and/or infrastructure to the proposed development
- Set a limit to peak particle velocity (PPV)
- Carry out a dilapidation surveys prior to commencement of excavation or any other construction activities which could be the source of unacceptable levels of vibration
- Prepare a vibration management plan
- where required install vibration monitor systems and monitor appropriately

5.4 Groundwater

Groundwater conditions will be dependent on seasonal variations in groundwater recharge, proximity to other excavations and the permeability of the macro rock mass and joint system. Seepage into the excavation could occur through fissures in residual soil and joints and bedding planes within the rock and should be managed through a collection system in the base of the excavation.

5.5 Excavation Induced Ground Movements

We understand that the footprint of the proposed development will occupy the majority of the site area; as such there is potential for the basement excavation to be in close proximity to adjacent buildings and infrastructure. The impact of excavation induced ground movements should be given due consideration when selecting the excavation retention system and the detailed design thereof.

5.6 Excavation Support Requirements

Suitable retention systems could consist of either bored soldier pile walls or a dowel and shotcrete system. The chosen retention system will need to account for any requirements to limit excavation induced ground movements.

5.7 Foundations

Pad and strip footings should be founded on the Class V shale or better. An allowable bearing capacity of 700kPa can be adopted for a footing embedded a minimum of 0.3m into Class V shale. The allowable bearing capacity may be increased to 1000kPa where the foundation is founded through the Class V shale to Class IV shale or better.

Bringelly shales are known to be reactive to moisture and may soften when excavated. The base of foundations should be dewatered and cleaned and a blinding layer placed as a matter of urgency. An experienced geotechnical engineer should inspect the base prior to the blinding layer being placed to confirm that the founding material meets or exceeds the design assumptions or other relevant information contained on the for construction drawings.

The bearing capacity typically adopted for pile foundation design is summarised in Table 3, below.

Table 3 Approximate arrangement of subsurface strata as observed within boreholes

Geological Unit	Shale Class	Typical Allowable Bearing Pressure (kPa)	Typical Allowable Shaft Adhesion[(1)] (kPa)
Residual Soil - Hard Clay		175	
Shale	V	700	50
	IV	1000	75
	III or better	2000	150

Notes

(1) Subject to socket roughness category being R2 or better.

6.0 Limitations

This report has been prepared for the NSW Health Infrastructure and it is not intended for parties other than those of the Client (Health Infrastructure) and the Client's respective consulting advisers.

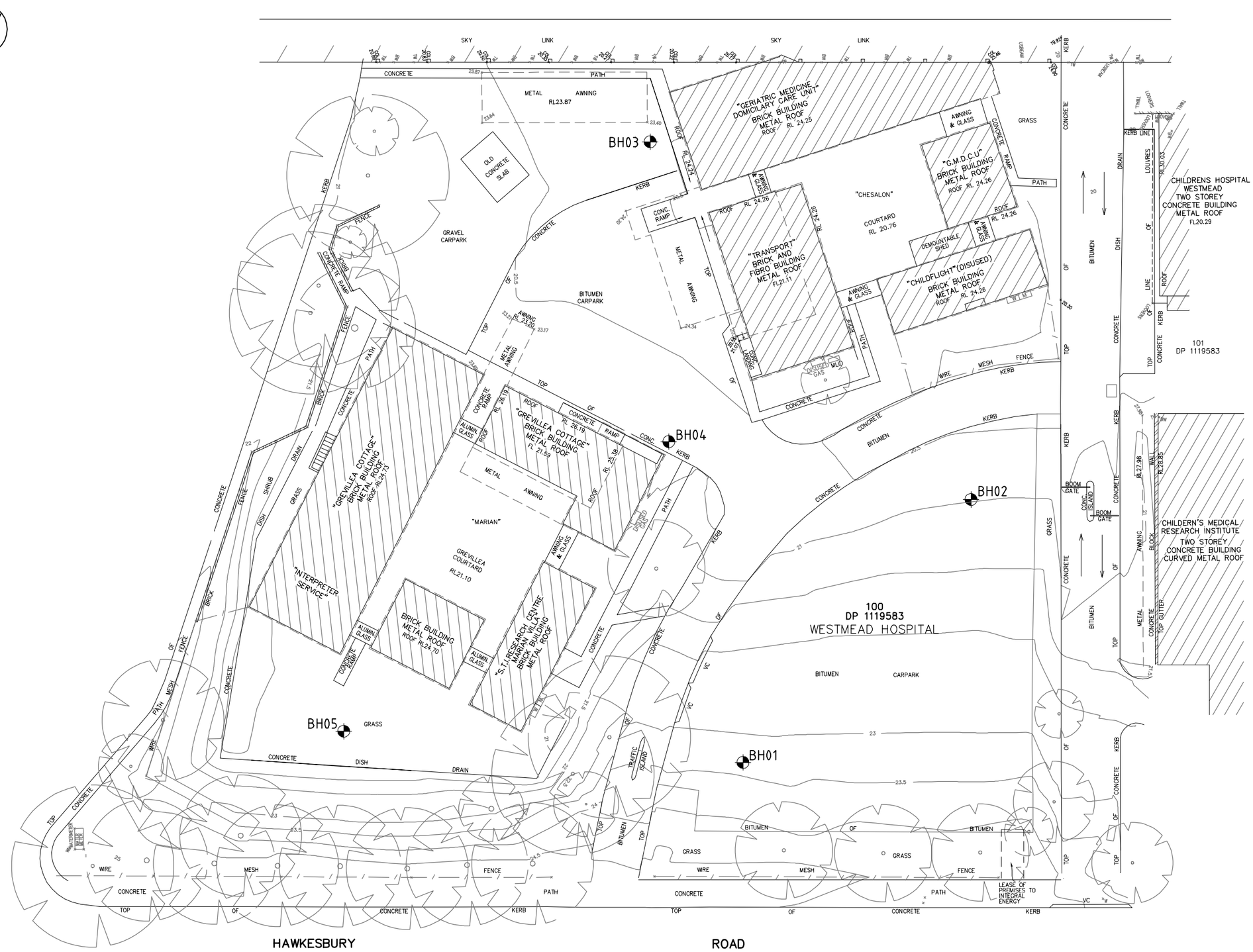
The data presented in this report are the result of a specific geotechnical investigation undertaken in accordance with industry standards and practice. As subsurface conditions may vary, the results of this investigation represent subsurface conditions at the specific test locations only. Hence, it is unlikely that the measurements and values obtained from sampling and testing during a geotechnical investigation will accurately represent the actual range of values present across the site. Further, subsurface conditions including groundwater levels can change over time. This should be borne in mind particularly if the report is used after a protracted delay.

Any interpretation or recommendation given in this report shall be understood to be based on judgement and experience and on greater knowledge of the facts than the reported investigations would imply. The interpretation and recommendations are therefore opinions provided for our client's sole use in accordance with a specific brief. As such they do not necessarily address all aspects of ground behaviour on the subject site.

Appendix A

Borehole Location Plan

Cad ref: K:\60146790_Westmead\Hspgeo\5. CADD\5.3 Working\DRG\60146790-GT-SK-001.dwg Last modified: 28 Jan 10 - 10:53



This drawing is confidential and shall only be used for the purposes of this project.

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
0	J.L	28.01.10	FOR INFORMATION	

SCALES:

2.5 0 2.5 5 7.5m

1 : 250 FULL SIZE A1

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000

DESIGNED	J.L	CHECKED	
DRAWN	C.Y	CHECKED	
APPROVED		DATE	

CONTRACTOR:

DESIGNER:

AECOM

AECOM Australia Pty Ltd A.B.N. 20 093 846 925

WESTMEAD HOSPITAL

GEOTECHNICAL INVESTIGATION
BOREHOLE LOCATION PLAN

SHEET 1 OF 1

STATUS: FOR INFORMATION

DRAWING NO: 60146790-GT-SK-001

REV: 0

Appendix B

Borehole Logs

NON-CORE ENGINEERING BOREHOLE LOG

HOLE NO : BH01
FILE / JOB NO : 60146790
SHEET : 1 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313080.900, N: 6252872.300 (Zone 56 MGA94)	SURFACE ELEVATION: 23.300 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 13/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 13/1/10	DRILLER: JW	CHECKED BY: BE

DRILLING							MATERIAL					
progress												
drilling & casing	water	drilling penetration	groundwater levels	samples & field tests	reduced level (m)	depth (m)	graphic log	classification symbol	material description SOIL NAME, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency	structure of soil, additional observations
AD/T		E				0			SANDY GRAVEL: Grey-brown, fine to medium gravel. Fine to coarse grained sand. with clay.			FILL 0.00: The ground surface comprises 20 mm of asphaltic concrete
									0.20m SHALE: Pale grey and brown, iron stained			ROCK
		H				1				D		
									1.50m: Becoming dark grey and brown			
						2			2.00m Continued as Cored Drill Hole			
						3						
						4						
						5						
						6						
						7						
						8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : **BH01**
FILE / JOB NO : 60146790
SHEET : 2 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313080.900, N: 6252872.300 (Zone 56 MGA94)		SURFACE ELEVATION: 23.300 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 13/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 13/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

PROGRESS: drilling & casing; water

TCR % (RQD %)

samples & field tests

reduced level (m)

depth (m)

graphic log

description
ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

weathering

estimated strength Is(50)
● - Axial
○ - Diametral
EL -0.03 | VL -0.1 | L -0.3 | M -1 | H -3 | VH -10 | EH

defect spacing (mm)
20 | 40 | 100 | 300 | 1000

visual

additional data
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

depth (m)	TCR % (RQD %)	samples & field tests	description	weathering	additional data
2.00m			2.00m START CORING AT 2.00m		
2.00m	100% (0%)		SHALE: Dark grey, pale grey and brown, distinct, very thinly laminated, iron stained Class IV	EW to HW	SM 0° Clay FILLED PR RF 50 mm BP 0° Fe VR PR RF 0 mm BP 0° Fe VR PR RF 0 mm SM 0° Clay FILLED ST S 8 mm BP 0° Fe VR UN S 0 mm SM 0° Clay FILLED PR S 10 mm BP 0° Fe VR PR RF 0 mm SM 0° Clay FILLED PR S 7 mm 3 SMs 0° Clay FILLED PR S 5 - 8mm BP 0° Fe VR ST S 0 mm BP 0° Fe VR ST S 0 mm BP 0 - 5° Fe VR PR S 0 mm JT 30° Fe VR ST S 0 mm BP 0 - 30° Fe VR PR S 0 mm BP 0° Fe VR UN S 0 mm SM 0° Fe FILLED PR S 80 mm with root fibres JT 60° Fe FILLED PR S 5 mm 11 BPs 0-5° Fe VR PR S 0mm JT 35° Fe VR UN S 0 mm 5 BPs 0-5° Fe VR PR/ST S 0mm JT 35° Fe VR UN S 0 mm JT 30° Fe VR PR S 0 mm BP 0° Fe VR PR S 0 mm JT 45° Fe VR PR RF 4 mm BP 0° Fe VR PR RF 0 mm JT 80° Fe FILLED PR S 5 mm BP 0 - 5° Fe VR ST S 0 mm BP 0° Fe VR PR S 0 mm JT 40° Fe VR PR S 0 mm JT 10° Fe VR PR S 0 mm BP 0° Fe VR UN S 0 mm 0 mm 4 JTs 5-55° Fe VR PR/ST/UN sm JT 35° Fe FILLED UN S 3 mm 4 BPs 0-5° Fe VR PR/ST S 0mm BP 0° Fe VR ST S 0 mm BP 0° Fe VR PR S 0 mm JT 25° Fe VR UN S 0 mm BP 0° Fe VR PR S 0 mm JT 35° Fe VR PR RF 0 mm JT 20° Fe VR UN S 0 mm BP 0° Fe VR PR S 0 mm BP 0° Fe VR PR S 0 mm JT 30° Fe VR PR S 0 mm JT 35° Fe VR PR S 0 mm JT 25° Fe VR PR S 0 mm 3 JTs 35-45° Fe VR PR S 0mm JT 45° Fe VR PR S 0 mm
2.45m			Class III	MW	
2.60	100% (14%)				
3.75m		Is(50) a=0.12 d=0.04 MPa			
5.50m		Is(50) a=0.17 d=0.12 MPa			
5.73	100% (56%)				
6.39m			6.39m: Becoming dark grey Class II	F	
6.53m		UCS =11.3 MPa			
6.65m					
7.40m		Is(50) a=0.6 d=0.38 MPa			
7.75m		UCS =12.1 MPa			
7.90m					

NMLC

(11/02/2010)

See Explanatory Notes for details of abbreviations & basis of descriptions.

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CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH01
FILE / JOB NO : 60146790
SHEET : 3 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313080.900, N: 6252872.300 (Zone 56 MGA94)		SURFACE ELEVATION: 23.300 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 13/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 13/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ●- Axial ○- Diametral: EL .03, VL .1, L .3, M 1, H 3, VH 10, EH	defect spacing (mm): 20, 40, 100, 300, 1000	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC		100% (56%)			8		SHALE: Dark grey, pale grey and brown, distinct, very thinly laminated, iron stained *(continued)*	F				DB 0° CR FILLED PR S 20 mm
		8.70 100% (56%)			9							DB 10° CN PR S 0 mm
			9.80m Is(50) a=1.11 d=0.15 MPa		10							JT 30° CN PR SL 0 mm
		10.25					10.25m					BP 0° CN ST S 0 mm
							BOREHOLE BH01 TERMINATED AT 10.25 m TARGET DEPTH					SZ 20° CR FILLED PR SL 280 mm
					11							SM 0° Clay FILLED PR S 50 mm
					12							
					13							
					14							
					15							
					16							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

NON-CORE ENGINEERING BOREHOLE LOG

HOLE NO : BH02
FILE / JOB NO : 60146790
SHEET : 1 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313073.000, N: 6252914.400 (Zone 56 MGA94)	SURFACE ELEVATION: 21.000 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 13/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 14/1/10	DRILLER: JW	CHECKED BY: BE

DRILLING							MATERIAL					
progress												
drilling & casing	water	drilling penetration	groundwater levels	samples & field tests	reduced level (m)	depth (m)	graphic log	classification symbol	material description SOIL NAME, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency	structure of soil, additional observations
DT/V HA		E		0.10m D 0.20m		0			SANDY GRAVEL: Grey-brown, fine to medium gravel. Fine to medium grained sand. with clay.			FILL 0.00: The ground surface comprises 20 mm of asphaltic concrete
		F							0.20m 0.30m SHALE: Red-brown, indistinct, remoulds to brown SANDY CLAY with gravel, extremely weathered, extremely low strength			RESIDUAL SOIL
AD/T		H		0.70m D 1.00m		1			SHALE: Pale grey and brown, distinct, very thinly laminated, with ironstone bands, Returns as brown GRAVEL with sand, iron stained defects, highly weathered, very low to low strength	D		ROCK
									1.50m Continued as Cored Drill Hole			
						2						
						3						
						4						
						5						
						6						
						7						
						8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : **BH02**
FILE / JOB NO : 60146790
SHEET : 2 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313073.000, N: 6252914.400 (Zone 56 MGA94) | SURFACE ELEVATION: 21.000 (AHD) | ANGLE FROM HORIZONTAL : 0°

RIG TYPE : Truck mounted hydropower | DATE STARTED : 13/1/10 | CONTRACTOR: Maquarie Drilling | LOGGED BY: JL

MOUNTING: Truck | DATE COMPLETED: 14/1/10 | DRILLER: JW | CHECKED BY: BE

CASING DIAMETER: HQ | BARREL (Length): 3.00 m | BIT: Shale bit | BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral: EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH	defect spacing (mm): 20, 40, 100, 300, 1000	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0							
					1							
							1.50m START CORING AT 1.50m					
NMLC		82% (0%)					CORE LOSS 0.20m (1.50-1.70)					
						1.70m	1.70m SHALE: Brown and grey, distinct, very thinly laminated, iron stained defects Class III	HW MW				3 BPs 0° Fe VR PR SM JT 90° Fe VR UN S SM 0° Fe Clay FILLED PR RF 110 mm BP 0° Fe VR UN RF JT 90° Fe VR PR S 3 SMs 0° CL/CR FILLED PR SM 3-20mm BP 0° Fe VR PR S SM 0° CR FILLED PR S 40 mm SM 0° Clay FILLED PR S 4 mm JT 45° Fe VR PR S JT 85 - 90° Fe VR UN S 4 BPs 0-5° Fe VR PR/UN SM 2 SMs 0° Clay/Fe Clay FILLED PR SM 3mm BP 0° Fe FILLED PR S 2 mm 2 SMs 0-5° Fe Clay FILLED PR/ST SM 2-3mm BP 0° Fe VR PR S JT 90° Clay VR PR S 9 BPs 0° Fe VR PR SM JT 45° Fe VR ST S SM 0° Fe VR PR S 30 mm SM 0° Clay VR PR S 1 mm JT 55° CN PR S BP 0° Fe VR PR S JT 80° Fe VR PR S JT 30° Fe VR PR S BP 0° Fe VR PR S BP 0° Clay VR PR S JT 50° Fe VR PR S SM 0° Fe Clay FILLED PR S 3 mm JT 35° Fe VR PR S JT 90° Clay FILLED PR S 1 mm JT 10° Clay VR PR S SM 0° Clay FILLED PR S 30 mm JT 60° Fe VR PR S SM 0° CR FILLED PR S 50 mm JT 0 - 60° Fe VR UN S SM 0 - 30° CR FILLED ST S 40 mm BP 0° Fe VR ST S 5 JTs 25-55° Fe VR PR S SM 20° CR FILLED PR RF 6 mm BP 0° Fe VR UN S JT 10° Fe VR PR S BP 0° Fe VR ST S 2 JTs 40-45° Fe/CLay VR PR S SM 0° Clay FILLED PR S 60 mm 3 BPs 20° Fe VR PR S JT 45° Fe VR PR S 3 BPs 15° Fe VR PR S SM 30° Fe Clay FILLED PR S 30 mm 2 BPs 0-25° Fe VR ST S 2 JTs 25-30° CN PR S BP 0° Fe VR PR RF 2 JTs 55° Fe VR PR S BP 0° Fe VR PR RF SM 0° CR FILLED PR S 20 mm 2 JTs 30° CN PR S
	(11/02/2010)				2							
		2.59 100% (0%)										
			3.60m Is(50) a=0.14 d=0.1 MPa		3							
	(12/02/2010)				4							
		4.72 71% (0%)					4.72m CORE LOSS 0.25m (4.72-4.97)					
					5	4.97m	4.97m SHALE: Brown and grey, distinct, very thinly laminated Class III	MW				
		5.59 100% (53%)	5.65m Is(50) a=1.19 d=1.08 MPa			5.61m	5.51m: Becoming grey Class II	F				
					6							
					7							JT 25° Clay FILLED PR S 5 mm JT 25° CR FILLED PR S 5 mm
					8	8.00m						

Post well developmnt level =4.33m, (12/02/2010)

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH02
FILE / JOB NO : 60146790
SHEET : 3 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313073.000, N: 6252914.400 (Zone 56 MGA94)		SURFACE ELEVATION: 21.000 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 13/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 14/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING						MATERIAL				FRACTURES		
PROGRESS												
drilling & casing	water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	defect spacing (mm) 20 40 100 300 1000	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC		100% (53%)	8.32m UCS =18.5 MPa 8.47m		8		SHALE: Grey, distinct, very thinly laminated	F				JT 30° CN PR S JT 45° CN PR S
		8.62 100% (95%)	8.60m Is(50) a=0.58 d=0.71 MPa		9							JT 30° CN PR S
							9.37m INTERBEDDED SHALE AND SANDSTONE: Pale grey and grey, fine to medium grained, distinct, thinly to very thinly laminated					JT 30° CN PR S SM 0° CR CN PR S 20 mm
			9.90m UCS =20.5 MPa 10.00m		10							
		10.25	10.20m Is(50) a=2.52 d=0.91 MPa				10.25m BOREHOLE BH02 TERMINATED AT 10.25 m TARGET DEPTH					
					11							
					12							
					13							
					14							
					15							
					16							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

File: 60146790 BH02 3 OF 3

NON-CORE ENGINEERING BOREHOLE LOG

HOLE NO : BH03
FILE / JOB NO : 60146790
SHEET : 1 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313016.100, N: 6252907.700 (Zone 56 MGA94)		SURFACE ELEVATION: 20.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 14/1/10	DRILLER: JW	CHECKED BY: BE

DRILLING							MATERIAL					
progress		drilling penetration	groundwater levels	samples & field tests	reduced level (m)	depth (m)	graphic log	classification symbol	material description SOIL NAME, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency	structure of soil, additional observations
drilling & casing	water											
DT		VH				0			Reinforced concrete slab, underlain by 50mm of sand, yellow, medium grained.			FILL
									0.20m			
HA		E							CLAY: Red-brown. with silt.			RESIDUAL SOIL
								CI		M		
		F		1.10m SPT 3, 7, 13 N=20		1			0.75m: With pale and dark grey shale fragments, and iron stone bands.			
				1.45m					1.30m			
AD/V		H		1.55m					SHALE: Pale grey, iron stained, extremely weathered, extremely low strength			ROCK
AD/T		H								D		
						2			2.00m			
									Continued as Cored Drill Hole			
						3						
						4						
						5						
						6						
						7						
						8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH03
FILE / JOB NO : 60146790
SHEET : 2 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313016.100, N: 6252907.700 (Zone 56 MGA94)		SURFACE ELEVATION: 20.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 14/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

drilling & casing	water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral (EL, VL, L, M, H, VH, EH)	defect spacing (mm) (20, 40, 100, 300, 1000)	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0							
					1							
					2		2.00m START CORING AT 2.00m					
NMLC	(11/02/2010)	75% (0%)			2		CORE LOSS 0.45m (2.00-2.45)					
						2.45m	2.45m					
							SHALE: Pale grey and red brown, distinct, laminated, clay seams up to 150mm thick, with bands of HW shale and iron stone, iron stained defects Class IV	EW				
					3							
						3.52m	3.52m					
							SHALE: Dark grey and brown, distinct, very thinly laminated, with clay seams up to 100mm thick and and iron stone bands, iron stained defects Class IV	HW				
		3.82			4							
		100% (0%)										
		5.13			5	5.13m	5.13m					
		100% (10%)					SHALE: Dark grey and brown, distinct, vey thinly laminated, bedding planes spaced at max 15mm, iron stained defects Class III	MW				
	Post well developmnt level =5.40m, (12/02/2010)				6							
			6.50m Is(50) a=0.97 d=0.04 MPa			6.40m	6.40m					
							SHALE: Grey, distinct, very thinly laminated Class II	F				JT 10° CN PR S JT 10° CN PR S JT 45° CN PR S
		7.12			7							BP 0° CN PR S JT 55° CN PR S
		100% (76%)	7.25m Is(50) a=0.88 d=0.26 MPa									JT 10° CN PR S
						7.57m						
			7.84m UCS =20.4 MPa				INTERBEDDED SHALE AND SANDSTONE: pale grey and grey, distinct, very thinly to thinly laminated					
					8							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH03
FILE / JOB NO : 60146790
SHEET : 3 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313016.100, N: 6252907.700 (Zone 56 MGA94)	SURFACE ELEVATION: 20.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 14/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING						MATERIAL				FRACTURES		
PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	defect spacing (mm) (20, 40, 100, 300, 1000)	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC		100% (76%)	7.98m		8		INTERBEDDED SHALE AND SANDSTONE: pale grey and grey, distinct, very thinly to thinly laminated *(continued)*	F				
		8.39										
		100% (89%)	8.60m Is(50) a=1.63 d=1.42 MPa									BP 5° CN PR RF
					9			MW				SM 0° CR FILLED PR S 70 mm
			9.50m UCS =29.8 MPa 9.65m					F				
			9.85m Is(50) a=2.47 d=1.72 MPa									
		10.07			10		10.07m BOREHOLE BH03 TERMINATED AT 10.07 m TARGET DEPTH					
					11							
					12							
					13							
					14							
					15							
					16							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

NON-CORE ENGINEERING BOREHOLE LOG

HOLE NO : BH04
FILE / JOB NO : 60146790
SHEET : 1 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313044.000, N: 6252889.700 (Zone 56 MGA94)		SURFACE ELEVATION: 20.800 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 15/1/10	DRILLER: JW	CHECKED BY: BE

DRILLING						MATERIAL					
progress											
drilling & casing	water	drilling penetration	groundwater levels	samples & field tests	reduced level (m)	depth (m)	graphic log	classification symbol	material description SOIL NAME, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency	structure of soil, additional observations
HA		E		0.30m		0			SANDY GRAVEL: Brown, fine to coarse gravel. Fine to coarse grained sand.			FILL 0.00: The ground surface comprises 20 mm of asphaltic concrete
		F		D 0.40m					0.30m SHALE: Pale grey mottled orange, returns as GRAVELLY CLAY, with some sand, with ironstone gravel, iron stained shale fragments, extremely weathered			ROCK
ADV		F		0.90m SPT 1.00m 1, 1, 7 Nc=8 1.35m 1.50m		1				D	St	0.90: SPT Recovery: 0.3 m
ADT		H		D 1.60m		2			2.00m Continued as Cored Drill Hole			
			Not Observed			3						
						4						
						5						
						6						
						7						
						8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH04
FILE / JOB NO : 60146790
SHEET : 2 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313044.000, N: 6252889.700 (Zone 56 MGA94)		SURFACE ELEVATION: 20.800 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 15/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

drilling & casing	water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	defect spacing (mm) 20 40 100 300 1000	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC					0							
					1							
					2		2.00m START CORING AT 2.00m					
		61% (0%)					CORE LOSS 0.65m (2.00-2.65)					
							2.65m					
							2.69m SHALE: Pale grey mottled orange, indistinct to distinct, very thinly laminated	EW				BPS at max 10mm spacing Fe VR PR SM
								HW				SM 0° Clay FILLED PR S 50 mm
					3		SHALE: Dark grey and brown, distinct, very thinly laminated, with clay seams CLASS IV, iron stained defects	EW				SM 0° Clay FILLED PR S 50 mm
							Class IV	HW				BPS at max 10mm spacing Fe VR PR SM
								EW to HW				SM 0° Clay FILLED PR S 70 mm
		3.65										BPS at max 10mm spacing Fe VR PR SM
		153% (0%)						MW - MW				SM 0° CL & CR FILLED PR S 270 mm
					4							BPS at max 10mm spacing Fe VR PR SM
												JT 35° Fe VR PR S
												JT 25° Fe VR PR S
												7 BPs 0° Fe VR PR S
												3 BPs 0-10° Fe FILLED PR S 1-5mm
					5							BP 0° Fe VR PR S
												JT 25° Fe FILLED UN S
												7 BPs 0° Fe VR PR S
												JT 30° Fe FILLED PR S 2 mm
												BP 0° Fe VR PR S
												JT 10° Fe FILLED PR S 3 mm
												3 BPs 0° Fe VR PR S
												JT 15° Fe FILLED PR S 3 mm
												3 BPs 0° Fe VR PR S
												JT 15° Fe VR UN S
												BP 0° Fe VR PR S
												SM 0° Fe Clay FILLED PR S 12 mm
												JT 0° Fe VR UN S
												SM 0° Fe FILLED PR S 15 mm
												BP 0° Fe VR PR S
												JT 50° Fe VR PR S
												SM 0° CR FILLED PR S 30 mm
												2 BPs 0° Fe VR PR S
												SM 0° Fe FILLED PR S
												6 BPs 0° Fe VR PR S
												2 JTs 30° Fe PR S
												JT 0° Fe VR PR S
												JT 10° Fe VR PR S
												BP 0° Fe VR PR S
												JT 10° Fe VR PR S
												JT 45° Fe PR S
		5.55										
		100% (44%)	5.30m Is(50) a=0.45 d=0.03 MPa				5.50m					
			5.75m Is(50) a=0.69 d=0.62 MPa				SHALE: Grey, distinct, very thinly laminated	F				
					6		Class II					
												JT 0 - 5° Fe VR PR S
			7.28m UCS =19.3 MPa 7.43m		7							
												JT 70° Fe VR PR S
												BP 0° Fe VR PR S
			7.75m Is(50) a=0.43 d=0.09 MPa									
					8							BP 0° Fe Clay VR PR S

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

File: 60146790 BH04 2 OF 3

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH04
FILE / JOB NO : 60146790
SHEET : 3 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313044.000, N: 6252889.700 (Zone 56 MGA94)		SURFACE ELEVATION: 20.800 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 14/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 15/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING						MATERIAL			FRACTURES		
PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral: EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH	defect spacing (mm): 20, 40, 100, 300, 1000	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC		100% (44%)			8		SHALE: Grey, distinct, very thinly laminated *(continued)*	F				
		8.50										
		100% (79%)	9.02m UCS =18.9 MPa 9.16m; Is(50) a=1.14 d=0.58 MPa		9							
							9.60m					
							INTERBEDDED SHALE AND SANDSTONE: Dark grey and pale grey, fine to medium grained, distinct, very thinly to thinly laminated					SM 0° CR FILLED PR S 7 mm
		10.10			10		10.10m					SM 0° CR FILLED PR S 15 mm
							BOREHOLE BH04 TERMINATED AT 10.10 m TARGET DEPTH					
					11							
					12							
					13							
					14							
					15							
					16							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

NON-CORE ENGINEERING BOREHOLE LOG

HOLE NO : BH05
FILE / JOB NO : 60146790
SHEET : 1 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313047.200, N: 6252836.200 (Zone 56 MGA94)	SURFACE ELEVATION: 21.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 18/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 18/1/10	DRILLER: JW	CHECKED BY: BE

DRILLING						MATERIAL					
progress											
drilling & casing	water	drilling penetration	groundwater levels	samples & field tests	reduced level (m)	depth (m)	graphic log	classification symbol	material description SOIL NAME, plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency	structure of soil, additional observations
AD/T		F		D		0			0.10m SANDY SILT: Brown, low plasticity. Fine to coarse grained sand. with clay.			TOPSOIL
AD/T		H		0.20m					SHALE: Pale grey and orange, with iron stone bands, iron stained			ROCK
AD/T		H								D		
						1			1.00m Continued as Cored Drill Hole			
						2						
						3						
						4						
						5						
						6						
						7						
						8						

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH05
FILE / JOB NO : 60146790
SHEET : 2 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313047.200, N: 6252836.200 (Zone 56 MGA94)		SURFACE ELEVATION: 21.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 18/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 18/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	defect spacing (mm) (20, 40, 100, 300, 1000)	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0							
					1		1.00m START CORING AT 1.00m					
NMLC		88% (9%)					1.20m CORE LOSS 0.20m (1.00-1.20)					
					2		SHALE: Dark grey and brown, distinct, very thinly laminated, iron stained defects	MW				BPs at max 10mm spacing 0° Fe VR PR SM/RF SM 0° Clay FILLED PR S 40 mm BP 0° Fe VR PR S BPs at max 10mm spacing 0° Fe VR PR SM/RF BP 0° Fe VR PR S SM 0° CR FILLED PR S 6 mm 2 BPs 0° Fe VR PR S JT 90° Fe VR UN S SM 0° CR FILLED PR S 30 mm BP 0° Fe VR PR S BP 0° Fe FILLED PR S 3 mm BP 0° Fe VR PR S 3 SMs 0° Fe FILLED PR S 2mm SM 0° Clay FILLED PR S 20 mm JT 20° Fe VR PR S 3 BPs 0° Fe Clay FILLED PR S 1mm 4 BPs 0° Fe VR PR S BP 0° Fe VR PR S BP 0° Fe VR PR S BP 0° Fe VR PR S JT 60° Fe VR PR RF BP 0° Fe VR PR S BP 0° Fe VR PR S
			2.30m Is(50) a=1.25 d=0.05 MPa					SW	○ ●			
		2.73					2.47m: Becoming dark and pale grey and less iron and less iron stained					
		100% (42%)			3							
					4							BP 0° Fe VR PR S BP 0° Fe VR PR S BP 0° Fe VR PR S JT 5° Fe VR PR S JT 50° Fe VR PR S BP 0° Fe VR PR S JT 60° Fe VR UN S
			4.30m UCS =18.6 MPa 4.46m					F				
					5				○ ●			JT 45° CN PR S SM 0 - 5° CR FILLED PR S 20 mm
			5.40m Is(50) a=0.86 d=0.21 MPa									
		5.79										
		100% (58%)			6							JT 20° CN PR SL BP 0° CN PR S BP 0° CN PR S JT 20° CN PR S
			7.45m Is(50) a=1.05 d=0.18 MPa		7				○ ●			JT 20° CN PR S
					8							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

CORED ENGINEERING BOREHOLE LOG

HOLE NO : BH05
FILE / JOB NO : 60146790
SHEET : 3 OF 3

PROJECT: Westmead Hospital
LOCATION: Cnr Darcy Rd and Hawkesbury Rd, Westmead

POSITION: E: 313047.200, N: 6252836.200 (Zone 56 MGA94)		SURFACE ELEVATION: 21.100 (AHD)	ANGLE FROM HORIZONTAL : 0°
RIG TYPE : Truck mounted hydropower	DATE STARTED : 18/1/10	CONTRACTOR: Maquarie Drilling	LOGGED BY: JL
MOUNTING: Truck	DATE COMPLETED: 18/1/10	DRILLER: JW	CHECKED BY: BE
CASING DIAMETER: HQ	BARREL (Length): 3.00 m	BIT: Shale bit	BIT CONDITION: N/A

DRILLING | MATERIAL | FRACTURES

PROGRESS: drilling & casing	PROGRESS: water	TCR % (RQD %)	samples & field tests	reduced level (m)	depth (m)	graphic log	description: ROCK TYPE, colour, grain size, structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	weathering	estimated strength Is(50) ● - Axial ○ - Diametral (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	defect spacing (mm) (20, 40, 100, 300, 1000)	visual	additional data (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC		100% (58%)	8.50m UCS =18.6 MPa 8.64m		8		SHALE: Dark grey and brown, distinct, very thinly laminated, iron stained defects *(continued)*	F				JT 35° CN PR S
		8.73 100% (88%)	8.80m Is(50) a=1.03 d=0.18 MPa		9							JT 25° CN PR S
												JT 30° CN PR S
												JT 40° CN PR S
												JT 60° CN PR S
		10.10			10	10.10m	BOREHOLE BH05 TERMINATED AT 10.10 m TARGET DEPTH					JT 30° CN PR S
					11							
					12							
					13							
					14							
					15							
					16							

See Explanatory Notes for details of abbreviations & basis of descriptions.

AECOM

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Appendix C

Test Results

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
24 Bermill Street, Rockdale, NSW, 2216 P.O. Box 2014, Rockdale D.C. NSW 2216
Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

POINT LOAD STRENGTH INDEX TEST REPORT

CLIENT: **AECOM**
Level 11 44 Market St, Sydney NSW 2000
PROJECT: **Westmead Hospital, Westmead**

LAB. NO.	SAMPLE SOURCE	LITHOLOGY	PLATEN SEPARATION		TEST ORIENTATION	POINT LOAD STRENGTH	POINT LOAD STRENGTH
			DIAM	HEIGHT			
	BH 1		(mm)	(mm)		Is (MPa)	$Is_{(50)}$ (MPa)
56294	3.75m	Siltstone	51.7		Diametral	0.04	0.04
				34.7	Axial	0.12	0.12
56295	5.5m	Siltstone	51.9		Diametral	0.12	0.12
				46.5	Axial	0.16	0.17
56296	7.6m	Siltstone	51.3		Diametral	0.37	0.38
				44.1	Axial	0.58	0.60
56297	9.8m	Siltstone	51.9		Diametral	0.15	0.15
				36.1	Axial	1.12	1.11

NOTES TO TESTING

Testing Device: ELE Point Load Tester

Sample History: Unsoaked

Sampled by: Client

Job Number: 062-039

Date Tested: 20.01.10

Test method: AS 4133.4.1 2007

Form R04 File C:\Excel Reports\Point Load Strength Index Issue 4 September 2001 CWS

Signed: Name: Chris Lloyd

Title: Manager Date: 21.01.10

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
24 Bermill Street, Rockdale, NSW, 2216 P.O. Box 2014, Rockdale D.C. NSW 2216
Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

POINT LOAD STRENGTH INDEX TEST REPORT

CLIENT: **AECOM**
Level 11 44 Market St, Sydney NSW 2000
PROJECT: **Westmead Hospital, Westmead**

LAB. NO.	SAMPLE SOURCE	LITHOLOGY	PLATEN SEPARATION		TEST ORIENTATION	POINT LOAD STRENGTH	POINT LOAD STRENGTH
			DIAM	HEIGHT			
	BH 2		(mm)	(mm)		Is (MPa)	$Is_{(50)}$ (MPa)
56298	3.6m	Siltstone	51.8		Diametral	0.10	0.10
				35	Axial	0.15	0.14
56299	5.65m	Siltstone	51.6		Diametral	1.07	1.08
				49.8	Axial	1.12	1.19
56300	8.4m	Siltstone	51.8		Diametral	0.70	0.71
				47.2	Axial	0.55	0.58
56301	10.1m	Siltstone	51.8		Diametral	0.89	0.91
				29	Axial	2.68	2.52

NOTES TO TESTING

Testing Device: ELE Point Load Tester

Sample History: Unsoaked

Sampled by: Client

Job Number: 062-039

Date Tested: 20.01.10

Test method: AS 4133.4.1 2007

Form R04 File C:\Excel Reports\Point Load Strength Index Issue 4 September 2001 CWS

Signed: Name: Chris Lloyd

Title: Manager Date: 21.01.10

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
24 Bermill Street, Rockdale, NSW, 2216 P.O. Box 2014, Rockdale D.C. NSW 2216
Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

POINT LOAD STRENGTH INDEX TEST REPORT

CLIENT: **AECOM**
Level 11 44 Market St, Sydney NSW 2000
PROJECT: **Westmead Hospital, Westmead**

LAB. NO.	SAMPLE SOURCE	LITHOLOGY	PLATEN SEPARATION		TEST ORIENTATION	POINT LOAD STRENGTH	POINT LOAD STRENGTH
			DIAM	HEIGHT			
	BH 3		(mm)	(mm)		Is (MPa)	$Is_{(50)}$ (MPa)
56302	6.5m	Siltstone	51.5		Diametral	0.04	0.04
				43.9	Axial	0.94	0.97
56303	7.25m	Siltstone	51.6		Diametral	0.26	0.26
				30.2	Axial	0.93	0.88
56304	8.6m	Siltstone	51.8		Diametral	1.39	1.42
				36	Axial	1.65	1.63
56305	9.7m	Siltstone	51.9		Diametral	1.69	1.72
				49.2	Axial	2.33	2.47

NOTES TO TESTING

Testing Device: ELE Point Load Tester

Sample History: Unsoaked

Sampled by: Client

Job Number: 062-039

Date Tested: 25.01.10

Test method: AS 4133.4.1 2007

Form R04 File C:\Excel Reports\Point Load Strength Index Issue 4 September 2001 CWS

Signed: Name: Chris Lloyd

Title: Manager Date: 25.01.10

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
24 Bermill Street, Rockdale, NSW, 2216 P.O. Box 2014, Rockdale D.C. NSW 2216
Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

POINT LOAD STRENGTH INDEX TEST REPORT

CLIENT: **AECOM**
Level 11 44 Market St, Sydney NSW 2000
PROJECT: **Westmead Hospital, Westmead**

LAB. NO.	SAMPLE SOURCE	LITHOLOGY	PLATEN SEPARATION		TEST ORIENTATION	POINT LOAD STRENGTH	POINT LOAD STRENGTH
			DIAM	HEIGHT			
	BH 4		(mm)	(mm)		Is (MPa)	$Is_{(50)}$ (MPa)
56306	5.3m	Siltstone	51.6		Diametral	0.03	0.03
				21.7	Axial	0.51	0.45
56307	5.75m	Siltstone	51.4		Diametral	0.61	0.62
				44.6	Axial	0.66	0.69
56308	7.75m	Siltstone	51.7		Diametral	0.09	0.09
				50.8	Axial	0.40	0.43
56309	9.3m	Siltstone	51.8		Diametral	0.57	0.58
				38.4	Axial	1.14	1.14

NOTES TO TESTING

Testing Device: ELE Point Load Tester

Sample History: Unsoaked

Sampled by: Client

Job Number: 062-039

Date Tested: 20.01.10

Test method: AS 4133.4.1 2007

Form R04 File C:\Excel Reports\Point Load Strength Index Issue 4 September 2001 CWS

Signed: Name: Chris Lloyd

Title: Manager Date: 21.01.10

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Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

POINT LOAD STRENGTH INDEX TEST REPORT

CLIENT: **AECOM**
Level 11 44 Market St, Sydney NSW 2000
PROJECT: **Westmead Hospital, Westmead**

LAB. NO.	SAMPLE SOURCE	LITHOLOGY	PLATEN SEPARATION		TEST ORIENTATION	POINT LOAD STRENGTH	POINT LOAD STRENGTH
			DIAM	HEIGHT			
	BH 5		(mm)	(mm)		Is (MPa)	$Is_{(50)}$ (MPa)
56310	2.3m	Siltstone	51.8		Diametral	0.05	0.05
				27.3	Axial	1.34	1.25
56311	5.4m	Siltstone	51.3		Diametral	0.21	0.21
				37	Axial	0.87	0.86
56312	7.45m	Siltstone	51.5		Diametral	0.17	0.18
				39.4	Axial	1.05	1.05
56313	8.8m	Siltstone	51.4		Diametral	0.18	0.18
				42.4	Axial	1.00	1.03

NOTES TO TESTING

Testing Device: ELE Point Load Tester

Sample History: Unsoaked

Sampled by: Client

Job Number: 062-039

Date Tested: 20.01.10

Test method: AS 4133.4.1 2007

Form R04 File C:\Excel Reports\Point Load Strength Index Issue 4 September 2001 CWS

Signed: Name: Chris Lloyd

Title: Manager Date: 21.01.10

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56314
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 1**	**Test Type:**	Compressive Str.
Sample No:	**BH01_UCS_01**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.4		
Dry Density (t/m^3):	2.38	**Depth (m):**	6.53-6.65m
Moisture Content (%):	3.7		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 11.3

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Length to Diameter Ratio falls outside the Standard limits of 2.5-3.0:1.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

4(a)(i) Length to diameter ratio may not conform to 2.5 due to the length of suitable sample available. The diameter of the specimen may not be ten times the size of the largest grain in the rock.

4(a)(ii) Ends of the specimen may not be parallel to within 0.05mm in 50mm due to the end preparation technique.

4(a)(iii) Ends of the specimen may not be flat to 0.02mm due to irregularities within the sample, such as solution cavities.

4(a)(iv) The sides of the specimen may not be smooth, free of abrupt irregularities and straight to within 0.3mm over the full length of the specimen. This is due to the drilling process and irregularities within the sample, such as solution cavities.

4(c) Samples were tested in the "As Received" condition. They were not conditioned in a uniform temperate and humidified environment for five or more days.

5(a) Specimens were loaded at a constant rate of load to achieve failure within 5 to 15 minutes of loading. The rate of loading was based on an initial estimate of the UCS strength. However in some cases, failure occurred before 5 minutes loading, due to lower than estimated strength.

7(i) Prior to testing, the cores were stored as received from site. ie the cores were wrapped in plastic

TEST EQUIPMENT

Test Equipment: ELE Compact 1000 Hydraulic Compression Test Machine.

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56315
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 1**	**Test Type:**	Compressive Str.
Sample No:	**BH01_UCS_02**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.8		
Dry Density (t/m^3):	2.44	**Depth (m):**	7.75-7.90m
Moisture Content (%):	4.2		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 12.1

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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TEST EQUIPMENT

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56316
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 2**	**Test Type:**	Compressive Str.
Sample No:	**BH02_UCS_01**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.7		
Dry Density (t/m^3):	2.48	**Depth (m):**	8.32-8.47m
Moisture Content (%):	2.9		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 18.5

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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TEST EQUIPMENT

Test Equipment: ELE Compact 1000 Hydraulic Compression Test Machine.

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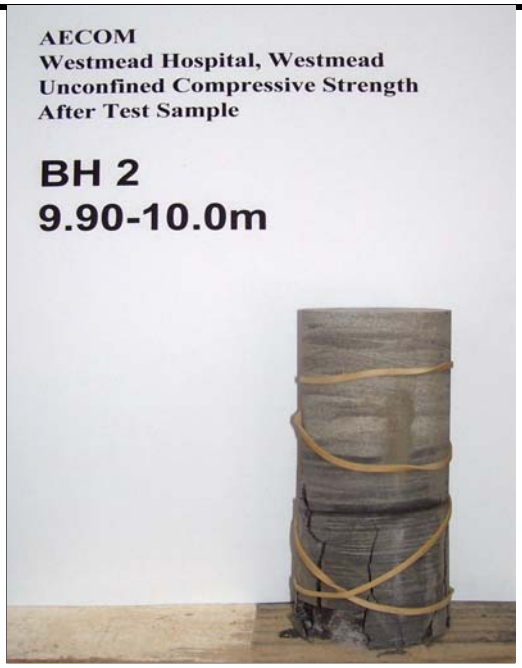
COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56317
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 2**	**Test Type:**	Compressive Str.
Sample No:	**BH02_UCS_02**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.7		
Dry Density (t/m^3):	2.58	**Depth (m):**	9.90-10.00m
Moisture Content (%):	2.0		



UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 20.5

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

4(a)(i) Length to diameter ratio may not conform to 2.5 due to the length of suitable sample available. The diameter of the specimen may not be ten times the size of the largest grain in the rock.

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7(i) Prior to testing, the cores were stored as received from site. ie the cores were wrapped in plastic

TEST EQUIPMENT

Test Equipment: ELE Compact 1000 Hydraulic Compression Test Machine.

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56318
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 3**	**Test Type:**	Compressive Str.
Sample No:	**BH03_UCS_01**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.8		
Dry Density (t/m^3):	2.49	**Depth (m):**	7.84-7.98m
Moisture Content (%):	2.3		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 20.4

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56319
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 3**	**Test Type:**	Compressive Str.
Sample No:	**BH03_UCS_02**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.6		
Dry Density (t/m^3):	2.58	**Depth (m):**	9.50-9.65m
Moisture Content (%):	2.0		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 29.8

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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TEST EQUIPMENT

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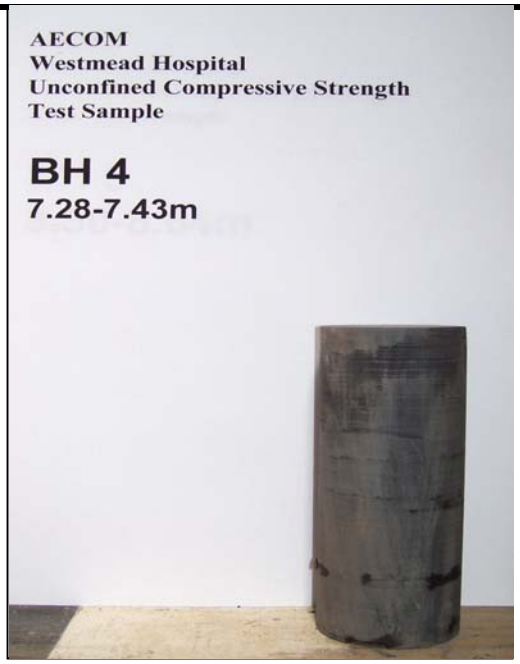
COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56320
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 4**	**Test Type:**	Compressive Str.
Sample No:	**BH04_UCS_01**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.6		
Dry Density (t/m^3):	2.52	**Depth (m):**	7.28-7.43m
Moisture Content (%):	3.1		



UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 19.3

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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5(a) Specimens were loaded at a constant rate of load to achieve failure within 5 to 15 minutes of loading. The rate of loading was based on an initial estimate of the UCS strength. However in some cases, failure occurred before 5 minutes loading, due to lower than estimated strength.

7(i) Prior to testing, the cores were stored as received from site. ie the cores were wrapped in plastic

TEST EQUIPMENT

Test Equipment: ELE Compact 1000 Hydraulic Compression Test Machine.

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56321
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 4**	**Test Type:**	Compressive Str.
Sample No:	**BH04_UCS_02**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.8		
Dry Density (t/m^3):	2.52	**Depth (m):**	9.02-9.16m
Moisture Content (%):	2.8		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 18.9

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

4(a)(i) Length to diameter ratio may not conform to 2.5 due to the length of suitable sample available. The diameter of the specimen may not be ten times the size of the largest grain in the rock.

4(a)(ii) Ends of the specimen may not be parallel to within 0.05mm in 50mm due to the end preparation technique.

4(a)(iii) Ends of the specimen may not be flat to 0.02mm due to irregularities within the sample, such as solution cavities.

4(a)(iv) The sides of the specimen may not be smooth, free of abrupt irregularities and straight to within 0.3mm over the full length of the specimen. This is due to the drilling process and irregularities within the sample, such as solution cavities.

4(c) Samples were tested in the "As Received" condition. They were not conditioned in a uniform temperate and humidified environment for five or more days.

5(a) Specimens were loaded at a constant rate of load to achieve failure within 5 to 15 minutes of loading. The rate of loading was based on an initial estimate of the UCS strength. However in some cases, failure occurred before 5 minutes loading, due to lower than estimated strength.

7(i) Prior to testing, the cores were stored as received from site. ie the cores were wrapped in plastic

TEST EQUIPMENT

Test Equipment: ELE Compact 1000 Hydraulic Compression Test Machine.

AUSTRALIAN SOIL TESTING PTY LTD. A.B.N. 79 003 493 623
24 Bermill Street, Rockdale, NSW, 2216 P.O. Box 2014, Rockdale D.C. NSW 2216
Tel: 9597 5599, 9597 3286 Fax: 9597 3442 Email: austst@bigpond.com

COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56322
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 5**	**Test Type:**	Compressive Str.
Sample No:	**BH05_UCS_01**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.5		
Dry Density (t/m^3):	2.54	**Depth (m):**	4.30-4.46m
Moisture Content (%):	2.4		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 18.6

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

Form C:\excelreports\uniaxial compressive strength test report certificate, Issue 1, September 2006 CL

Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

Test Method: AS 4133.4.2 - 1993

COMPRESSIVE STRENGTH TEST DEVIATIONS FROM THE TEST STANDARD AND TEST EQUIPMENT

TEST STANDARD : AS4133.4.2-1993. Methods of Testing Rocks for Engineering purposes. Method 4.2 - Rock Strength Tests - Determination of uniaxial compressive strength.

SAMPLE PREPARATION AND TESTING PROCEDURE

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COMPRESSIVE STRENGTH
REPORT CERTIFICATE

AS 4133.4.2

CLIENT:	**AECOM**	**JOB NO. :**	062-039
PROJECT:	**Westmead Hospital**	**LAB NO. :**	56323
LOCATION:	**Westmead**	**Date Tested:**	20.01.10
Sample Id:	**BH 5**	**Test Type:**	Compressive Str.
Sample No:	**BH05_UCS_02**	**Sample Type:**	Core
Initial Specimen:		**Rock Type**	Siltstone
Length/ Diameter Ratio:	2.7		
Dry Density (t/m^3):	2.59	**Depth (m):**	8.50-8.64m
Moisture Content (%):	2.6		

UNIAXIAL COMPRESSIVE STRENGTH
U.C.S. (MPa) = 18.6

Notes on testing: Specimen tested at the moisture condition as received.

Specimen supplied by client.

Bulk density value was detmined by vernier calliper method.

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Signed: Name: Chris Lloyd

Title: Manager Date: 27.01.10

UNIAXIAL COMPRESSION TEST REPORT

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