BEKKER

bekker engineering design buro pty limited
abn 79 159 165 563
po box 591, northbridge, nsw 1560
suite 1/6-7 gurrigal st, Mosman 2088
telephone **02 9960 6944**
facsimile **02 9960 6911**
email address **bekker@spin.net.au**

Project No.: 63407
February 27, 2018

STRUCTURAL
CIVIL
AND
WATERPROOFING
ENGINEERS

STRUCTURAL GEOTECH ASSESSMENT

FOR THE

STEVENSON LIBRARY UPGRADE

THE SCOTS COLLEGE

29-53 VICTORIA ROAD

BELLEVUE HILL

February 27, 2018

This document has been prepared as part of the submission to Department of Planning for Consent Approval and does not form part of the Approved For Construction documentation

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CONTENTS

1- Geotechnical Assessment

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Project No.: 63407
February 27, 2018

STRUCTURAL GEOTECHNICAL ASSESSMENT
STEVENSON LIBRARY
SCOTS COLLEGE
29-53 VICTORIA ROAD
BELLEVUE HILL

Project Description:

The Scots College Council are preparing a submission to the Department of Planning for proposed works including the upgrade of the Stevenson Library.

In support of the submission it is required to provide structural geotechnical details of the site.

Site Description:

The portion of the Scots College School site where the Stevenson Library is located lies to the east of Victoria Rd, the north of Cranbrook Rd and on the western side of Cranbrook Lane. This portion of the school site has a total area of 44,730 m^2. The site survey confirms the site area and that the site slopes approx. 2.2% from southwest to northeast of the site. The site contains the Main School building and Oval. The average ground level of the oval varies between RL54.9 and RL52.2 with the Main School ground floor at RL56,0 and the Stevenson Library ground floor level at RL56.2.

Along Victoria Road on the western boundary the site for the Main School Building has been excavated into a rocky outcrop with rock exposed at the ground surface all the way to the basement level of the building.

GEOTECHNICAL CONSIDERATIONS:

The School has engaged numerous Geotech investigations over the years. This Report is a summary of the investigations to date making recommendation on future direction

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School site Description

The School site lies at the junction between the flat alluviated valley of Rose Bay and the steep hillsides of Bellevue Hill. Rose Bay and Double Bay are located several hundred meters to the north-east and north-west respectively. The existing Main School area is relatively flat and level and has been cut into the rock hillside to the west.

The 1:100,000 Geological map of Sydney indicates that the site is underlain by aeolian (windblown) sands overlying the Hawksbury Sandstone. The more pertinent details of the subsurface profiles are shown in the attached borehole logs

General Description of site subsurface soil

The general the profile of the soils on site are natural sands then clays overlying weathered sandstone bedrock

- Generally the sands are very loose to dense sands with depth. Sands are silty at the surface with clean sand at depth.
- Clays are in thin layers of stiff to very stiff of low to medium plasticity generally of residual origin
- Weathered sandstone is of initially low strength due to the weathering but quickly increase in strength with depth
- Groundwater percolates through the soils above the rock running down the slope on the rock surface. This groundwater has affected the strength of the upper surface of the rock creating a weathered zone at the surface.

Recommendations for the Library Extension

As the existing Library is a substantial heavy five level concrete framed building without structural defect and the sandstone bedrock is quite shallow it can quite safely be assumed that the library building was built off pads or piers supported on the bedrock foundation below.

The School is looking to obtain Council Records for the original School construction

If this is the case all footings must be taken down to the sandstone bedrock to ensure minimal differential settlement between the existing and new works.

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Borehole analysis

Boreholes confirm that the sandstone bedrock beneath the sand overlay slopes quite rapidly down the hillside slope toward Rose Bay.

Borehole data

Douglas Partners 2011 confirm the sand and clay overlays extend down to the sandstone bedrock between RL52.0 and RL51.0 toward the southern end of the site.
J&K investigation 2012 for an extension to the Main School building confirms that rock Approx 4m from the front of the Main School building is around 9m below ground ie approx. RL50.0 with rock close to the building being around 4m deep or RL55.0
The J&K investigation 2016 for an extension to the Annex building confirms that rock is approx 4m from the surface near Victoria Street at around RL59.0

As can be seen from the boreholes the new building extension needs to have piles taken down to the underlying rock at either RL55.0 on the Victoria Rd side of the site or around RL50.0 on the oval side of the new addition

Excavation and Retention system

Reference should be made to the latest version of the Workcover Authority of NSW Code of Practice-Excavation work to cover work methodology for excavation and shoring works.

Batters

Due to the nature of the overlying sands, temporary batters of maximum slope 1:H to 2:V will be required. Due to the proximity of the existing buildings we consider that temporary batters may not be achievable over all the site. Where not appropriate excavations will therefore require temporary or permanent shoring

Shoring system

Due to equipment access problems shoring will become an important issue for this project. Given that the western side of the site may have rock exposed one floor level above the basement the only real alternative for shoring will be a contiguous concrete pile wall.

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These walls are drilled with a Continuous Flight Auger (CFA) through the sand and rock to below the basement and foundation levels. The unsupported pilings will require temporary anchor support.

Lateral soil pressures on a propped pile wall can be assumed to 8HkPa where H is the height of the sand behind the shoring wall.

Continuous concrete Castec walls or Sheet piles or other hammered in shoring support systems will not be suitable due to the elevated level of the rock exposed above the base floor level.

Bulk excavation in front of the shoring wall is expected to encounter sandy soils above the weathered sandstone bedrock.

Excavation in the sandy soils will be easily achievable using conventional earth moving equipment. Rock excavation should be undertaken using rock saws, ripping hooks and rotary grinders to limit vibrations being transmitted to the existing buildings.

Groundwater will be encountered on the rock surface. This will need to be captured and diverted to the site drainage system. As the site is on a long down slope from the upper reaches of the sub catchment there will be a large amount of water expected. This should be monitored and treated accordingly.

Footings

Pad footings need to be located below the surface of the weathered elements of the rock. Thus 300mm below the surface of the rock an allowable bearing capacity of 800kPa is expected.

For piling to 1.0m into the bedrock the base of the pile will have an allowable safe bearing capacity of 1500kPa.

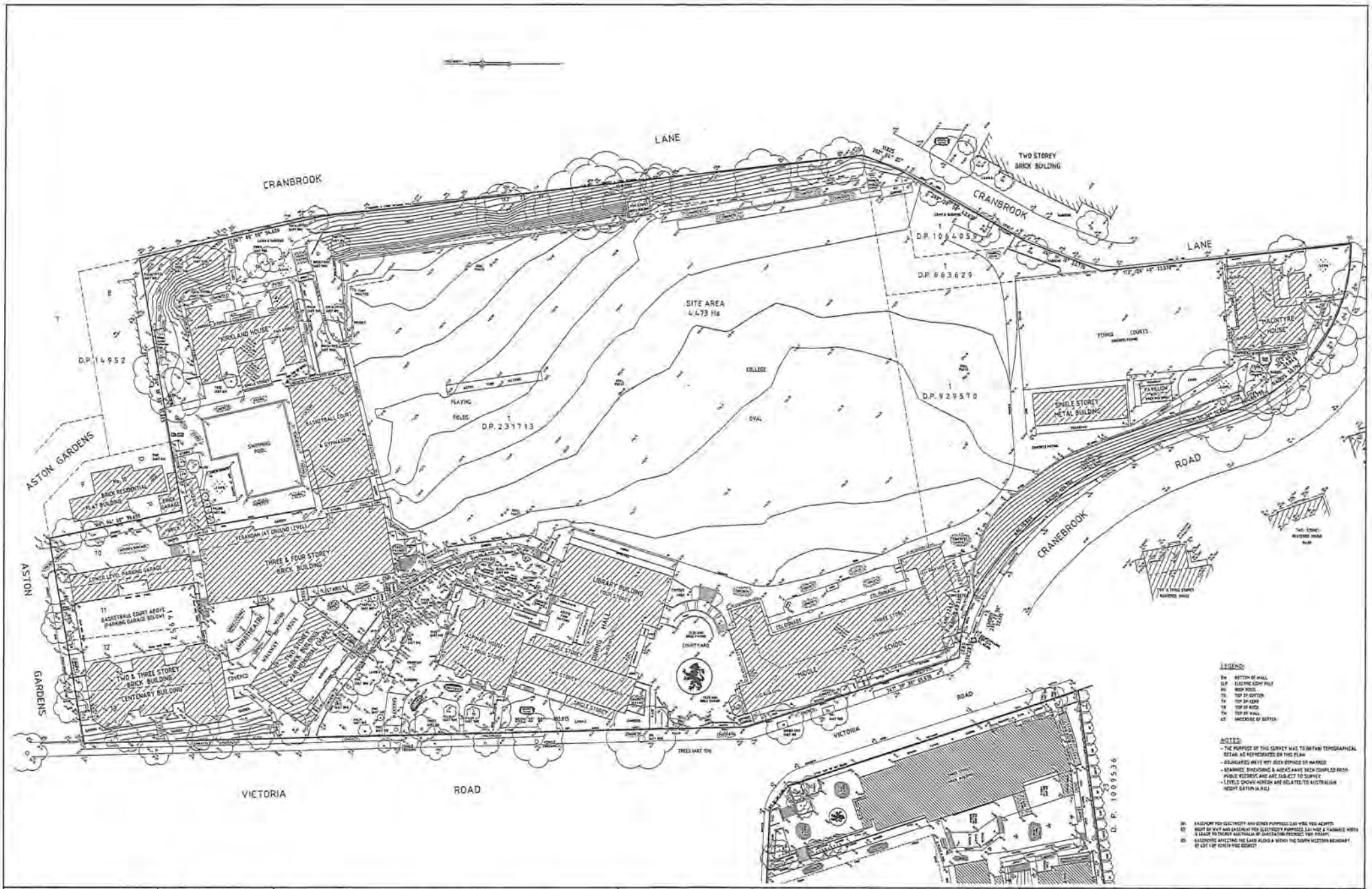
All excavation to be cleaned and inspected by a Geotech prior to pouring concrete'

Yours faithfully,

PAUL BEKKER ENGINEERING DESIGN BURO PTY LTD

Paul Bekker BE. M IEAust. CP Eng. M ACEA

2 - Site & Survey Details



AMENDMENTS: - ADDITIONAL LEVELS ADJACENT TO ASPINALL HOUSE, WAR MEMORIAL CHAPEL & LIBRARY 9-2-2011	DRAWN: D.H.	CLIENT: THE SCOTS COLLEGE C/- CONYBEARE MORRISON INTERNATIONAL PTY LTD	TITLE: PLAN OF THE SCOTS COLLEGE VICTORIA ROAD BELLEVUE HILL IN THE LGA OF WOOLLAHRA	DUNLOP THORPE & CO. PTY. LTD. SURVEYORS 447 KENT STREET SYDNEY 2000 DX 892 SYDNEY ABN 78 003 532 103 PHONE (02) 9283 8877 FAX. (02) 9283 8800 Email : dunlop@ozemail.com.au	REDUCTION RATIO 1:500 SIZE A1
	SURVEYED: D.G.W.				LEVEL DATUM A.H.D.
	DESIGNED:				DATE 24.07.2009
					SHEET 1 OF 2 SHEETS
					REFERENCE No. 16849

3 - Previous Geotech

Investigation Reports on the site

a – Douglas Aug 2011

b – J&K Nov 2012

c - J&K Oct 2016

Geotech Boreholes included

Douglas Partners
Geotechnics / Environment / Groundwater

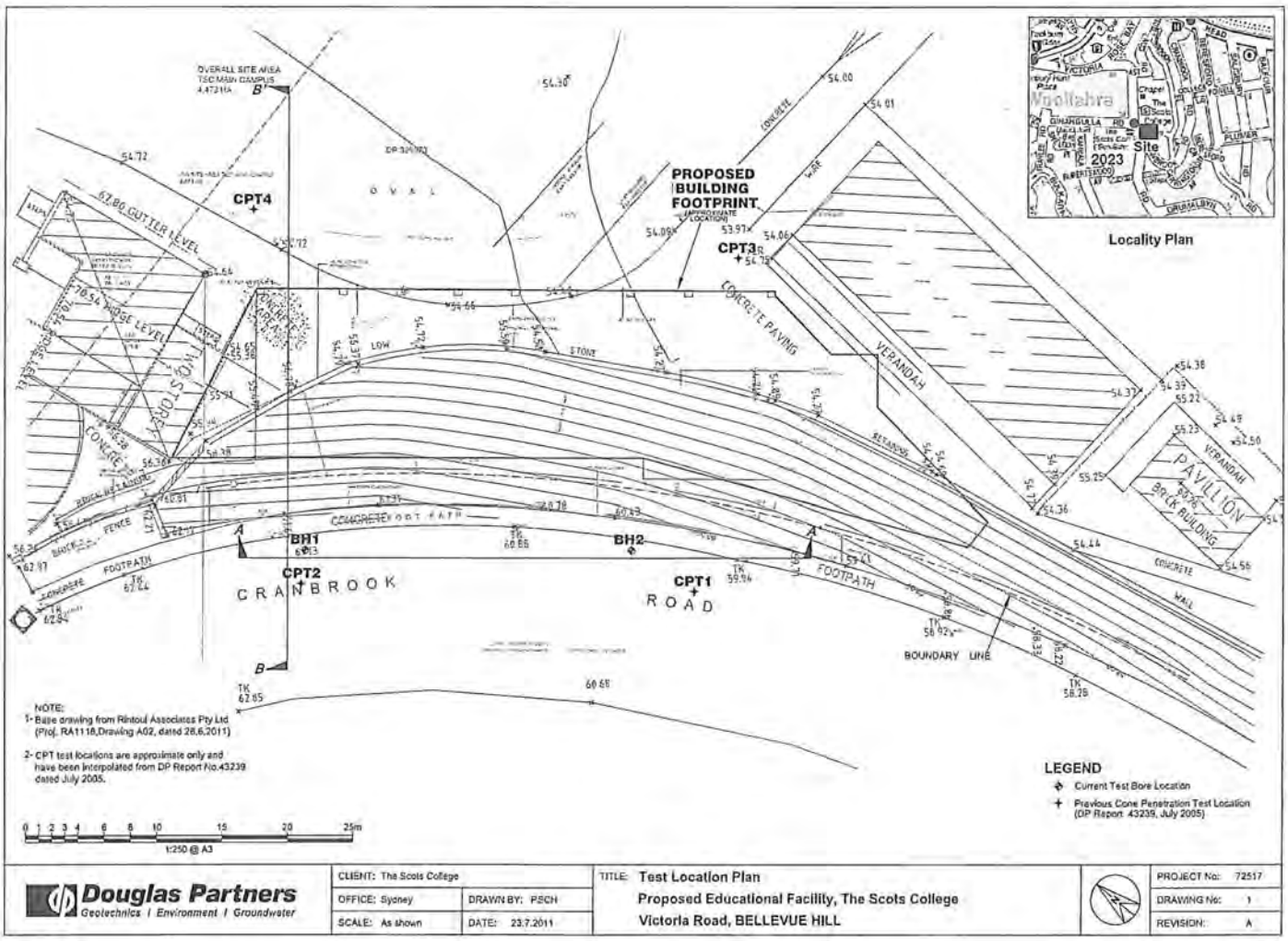
Integrated Practical Solutions

Report on
Geotechnical Investigation

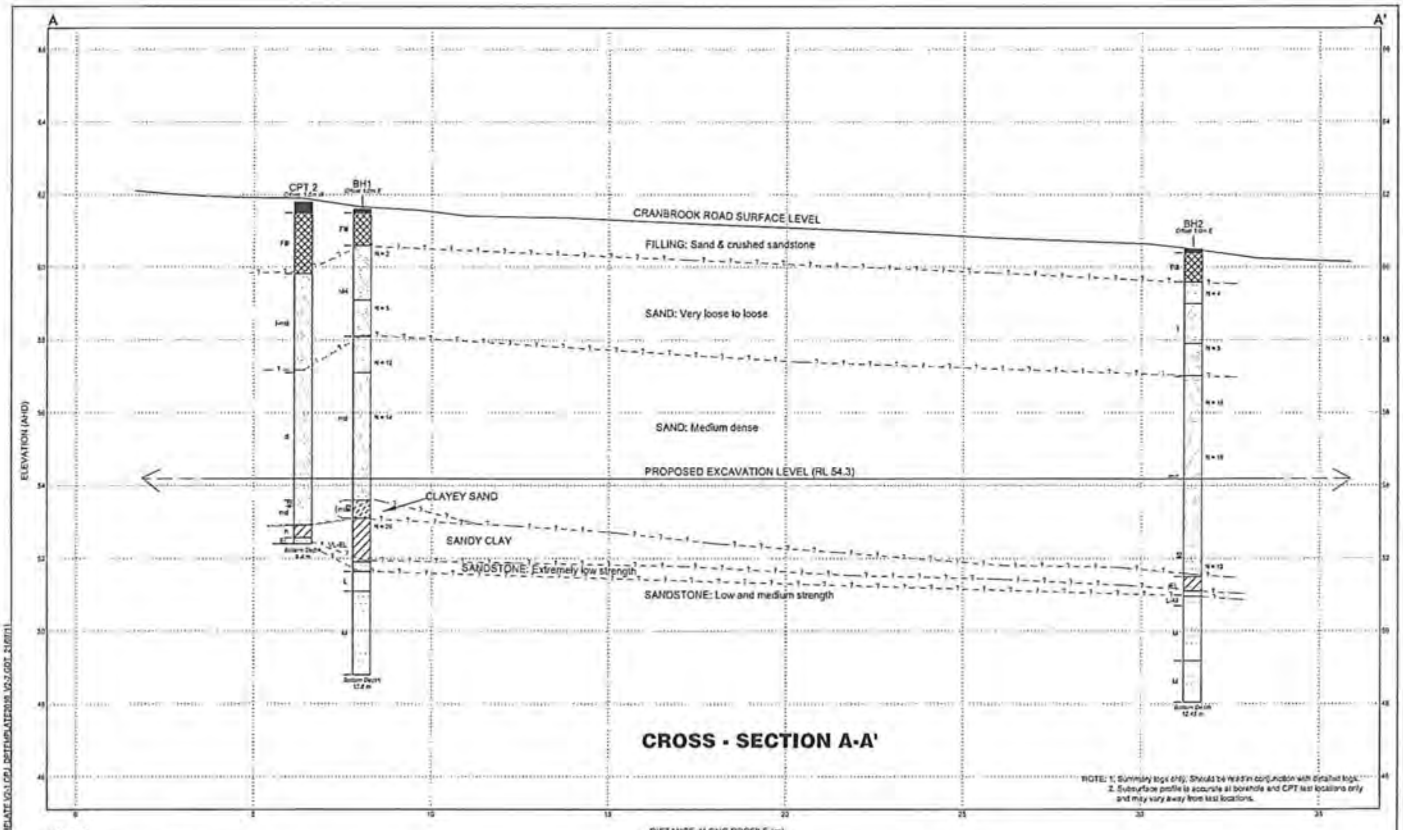
Proposed Educational Facility
The Scots College
Victoria Road, Bellevue Hill

Prepared for
The Scots College

Project 72517.00
August 2011



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: The Scots College		TITLE: Test Location Plan Proposed Educational Facility, The Scots College Victoria Road, BELLEVUE HILL	PROJECT No: 72517
	OFFICE: Sydney	DRAWN BY: PSCH		DRAWING No: 1
	SCALE: As shown	DATE: 23.7.2011		REVISION: A



CROSS - SECTION A-A'

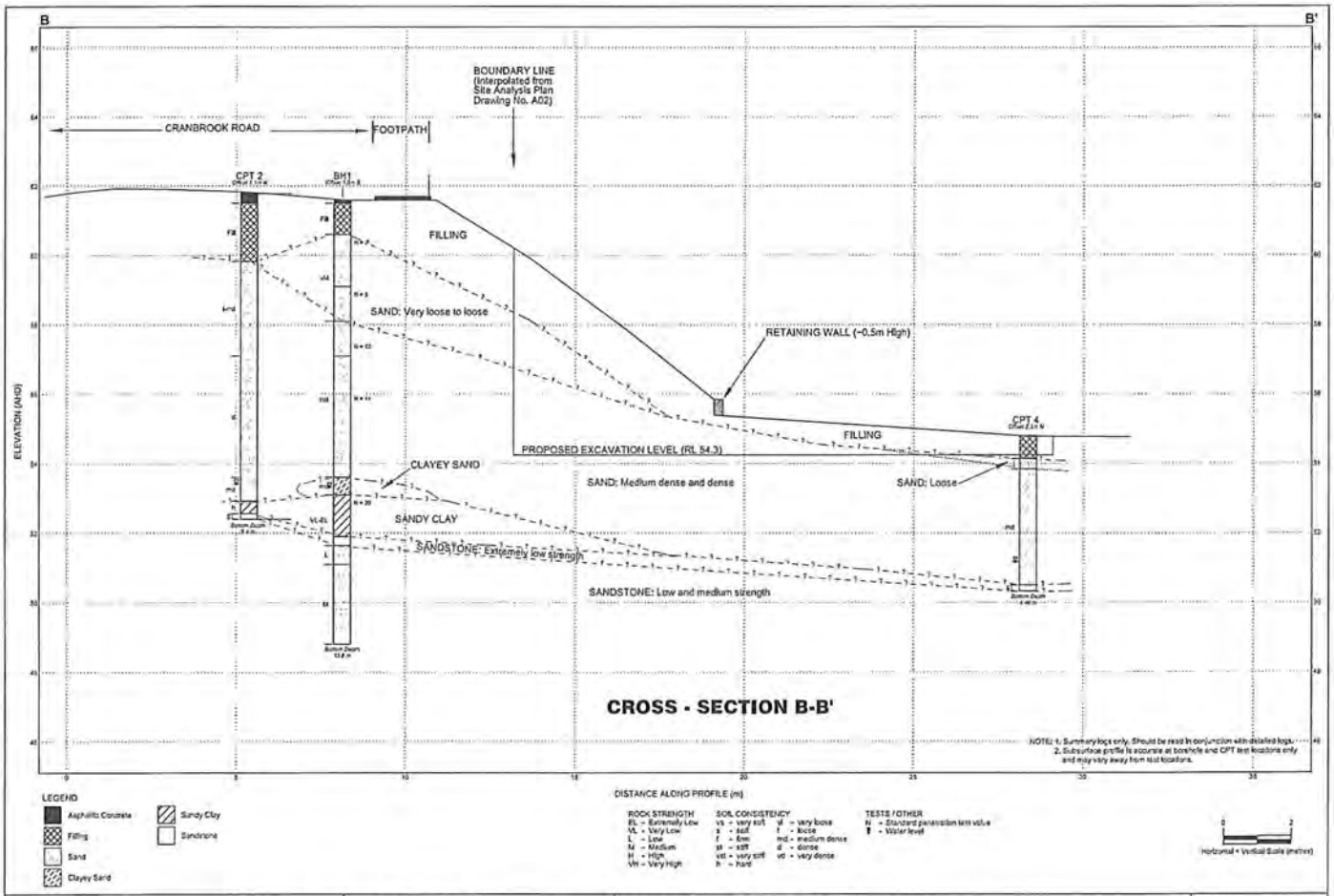
LEGEND

- Asphaltic Concrete
- Filling
- Sand
- Clayey Sand
- Sandy Clay
- Sandstone

ROCK STRENGTH	SOIL CONSISTENCY		TESTS / OTHER
EL – Extremely Low	vs – very soft	vl – very loose	N – Standard penetration test value
VL – Very Low	s – soft	l – loose	▼ – Water level
L – Low	f – firm	md – medium dense	
M – Medium	st – stiff	d – dense	
H – High	vst – very stiff	vd – very dense	
VH – Very High	h – hard		

Horizontal = Vertical Scale (metres)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: The Scots College	TITLE: **Interpreted Geological Model**	PROJECT No: 72517
	OFFICE: Sydney / DRAWN BY: PGH/LD	**Proposed Educational Facility, The Scots College**	DRAWING No: 2
	SCALE: 1:100 (H) 1:100 (V) @ A3 / DATE: 21.07.2011	**Victoria Road, Bellevue Hill**	REVISION:



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: The Scots College		TITLE: Interpreted Geological Model Proposed Educational Facility, The Scots College Victoria Road, Bellevue Hill	PROJECT No: 72517
	OFFICE: Sydney	DRAWN BY: PGH/LD		DRAWING No: 3
	SCALE: 1:100 (H) 1:100 (V) @ A3	DATE: 21.07.2011		REVISION:

BOREHOLE LOG

CLIENT: The Scots College
PROJECT: Proposed Educational Facility
LOCATION: The Scots College
Victoria Road, Bellevue Hill

SURFACE LEVEL: 61.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 72517
DATE: 14/7/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
61	0.1	ASPHALT										
		ROADBASE - roadbase gravel and sand filling										
	1.0	SAND - very loose, grey, fine to medium grained sand, damp							S			1,1,1 N = 2
60	2											
	2.5	SAND - loose, light grey, fine to medium grained sand, damp							S			2,2,3 N = 5
59	3											
	3.5	SAND - medium dense, brown, fine to medium grained sand. Cemented sand in parts, moist										
58	4								S			3,5,7 N = 12
		4.5m: becoming yellow										
57	5											
56	6								S			3,6,8 N = 14
55	7											
54	8											
	8.0	CLAYEY SAND - possibly medium dense, grey and orange, fine to medium grained clayey sand, moist to wet				19-07-11						
53	8.5	SANDY CLAY - very stiff, orange and grey, fine to medium grained sandy clay (possible extremely low strength sandstone), moist to wet							S			7,10,10 N = 20
52	9											
	9.75							9.75m: B0°, cln, pl, ro	C	100	92	PL(A) = 0.1

RIG: Bobcat **DRILLER:** SY **LOGGED:** LJH/SI **CASING:** HW to 5.0m

TYPE OF BORING: Solid flight auger to 6.0m; Rotary (mud) to 9.7m; NMLC-Coring to 12.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering. Groundwater level at 8.3m on 19/7/11 and 22/2/11

REMARKS: Standpipe piezometer installed to 12.8m (Screen 12.8m-6.8m; Gravel 12.8-6.5m; Bentonite 6.5-6.0m; Backfill 6.0-0.0m with gatic cover)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: The Scots College
PROJECT: Proposed Educational Facility
LOCATION: The Scots College
Victoria Road, Bellevue Hill

SURFACE LEVEL: 61.6 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/–

BORE No: BH1
PROJECT No: 72517
DATE: 14/7/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
51	10.5	SANDSTONE - very low then low strength, moderately weathered then fresh stained, fractured, orange grey, fine to medium grained sandstone *(continued)*						9.96m: B0°, cln, pl, ro				PL(A) = 0.2
		SANDSTONE - medium strength, fresh, unbroken, grey, medium grained sandstone										PL(A) = 0.4
50	11								C	100	92	
	12											PL(A) = 0.6
49	12.8											PL(A) = 0.5
		Bore discontinued at 12.8m - target depth achelved										
48	13											
	14											
47	15											
46	16											
45	17											
44	18											
43	19											
42												

RIG: Bobcat DRILLER: SY LOGGED: LJH/SI CASING: HW to 5.0m

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A	Auger sample	G	Gas sample	PID	Photo Ionisation detector (ppm)
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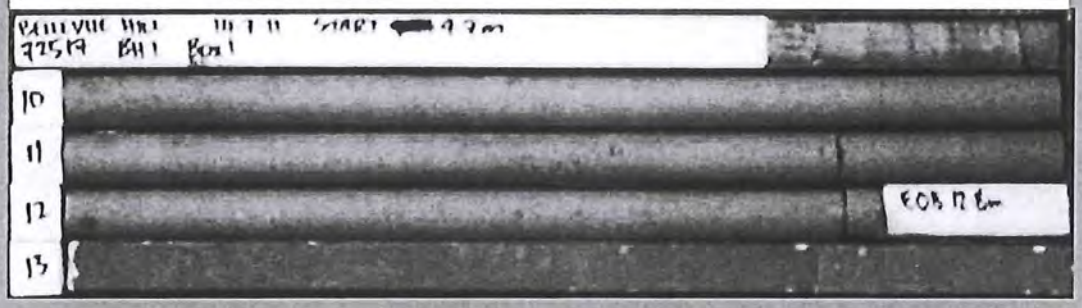
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD
PROPOSED EDUCATIONAL FACILITY
THE SCOTS COLLEGE, VICTORIA ROAD, BELLEVUE HILL

BORE 1 PROJECT 72517 JULY 2011



9.70 – 12.80 m

BOREHOLE LOG

CLIENT: The Scots College
PROJECT: Proposed Educational Facility
LOCATION: The Scots College
Victoria Road, Bellevue Hill

SURFACE LEVEL: 60.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 72517
DATE: 15/7/2011
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
60	0.1	ASPHALT										
		FILLING - crushed sandstone filling										
	0.9	SAND - loose, grey, medium grained sand (possible filling), damp							S			2,2,2 N = 4
59	1.5	SAND - loose, grey, fine to medium grained sand, damp										
58		- yellow below 2.6m							S			2,2,3 N = 5
57	3.5	SAND - medium dense, yellow, fine to medium grained sand, damp							S			3,7,8 N = 15
56												
55									S			2,6,13 N = 19
54												
53												
52						22-07-11			S			6,8,5 N = 13
51	9.0	SANDY CLAY - very stiff, orange and grey, sandy clay (possible extremely low strength sandstone)										
	9.4							9.43m: J45°, cln, cu, ro				
	9.54	SANDSTONE - very low strength, highly weathered, grey, fine to medium grained sandstone						9.55m: B0°, cln, pl, ro	C	100	62	PL(A) = 0.3

RIG: Bobcat **DRILLER:** SY **LOGGED:** LJH/SI **CASING:** HW to 5.5m

TYPE OF BORING: Solid flight auger to 6.0m; Rotary (mud) to 9.4m; NMLC-Coring to 12.45m

WATER OBSERVATIONS: No free groundwater observed whilst augering. Groundwater level measured at 8.5m on 22/7/11

REMARKS: Standpipe piezometer installed to 12.45m (Screen 12.45-6.4m; Gravel interval 12.4-6.0m; Bentonite 6.0-5.5m; Backfill 5.5-0.0m then gatic cover)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: The Scots College
PROJECT: Proposed Educational Facility
LOCATION: The Scots College
Victoria Road, Bellevue Hill

SURFACE LEVEL: 60.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 72517
DATE: 15/7/2011
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
50	11	SANDSTONE - medium strength, fresh stained to fresh, unbroken, grey, medium grained sandstone *(continued)*										PL(A) = 0.4 PL(A) = 0.5
49	11.31	SANDSTONE - low to medium then medium strength, slightly weathered and fresh stained, slightly fractured then fractured and highly fractured, grey, medium grained sandstone						11.34m: B0°, cly, pl, 10mm 11.65m: J45°, cln, pl, ro 11.86m: J45°, cln, pl, ro	C	100	62	PL(A) = 0.3 PL(A) = 0.4
48	12.45	Bore discontinued at 12.45m - target depth acheived										
47	13											
46	14											
45	15											
44	16											
43	17											
42	18											
41	19											

RIG: Bobcat **DRILLER:** SY **LOGGED:** LJH/SI **CASING:** HW to 5.5m

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B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD
PROPOSED EDUCATIONAL FACILITY
THE SCOTS COLLEGE, VICTORIA ROAD, BELLEVUE HILL

BORE 2 PROJECT 72517 JULY 2011

9.54 – 12.45 m

REPORT

TO
THE SCOTS COLLEGE

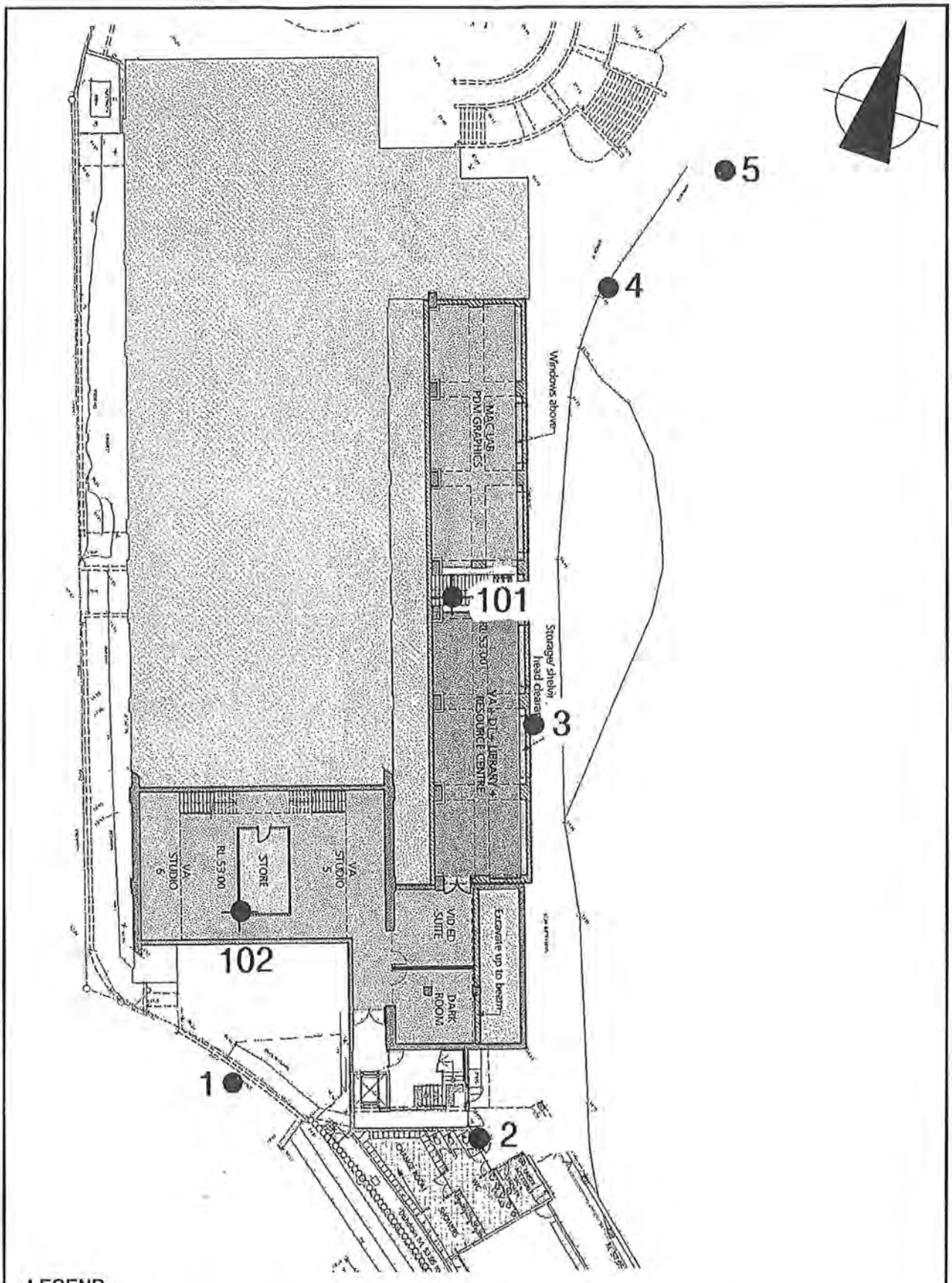
ON
GEOTECHNICAL INVESTIGATION

FOR
PROPOSED ALTERATIONS AND ADDITIONS

AT
MAIN SCHOOL BUILDING, THE SCOTS COLLEGE, VICTORIA ROAD, BELLEVUE HILL, NSW

22 November 2012
Ref: 26148Srpt

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS
PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 Fax: 02 9888 5001
www.jkgeotechnics.com.au
Jeffery & Katauskas Pty Ltd, trading as JK Geotechnics ABN 17 003 550 801



LEGEND

- 2005 INVESTIGATION
- 2012 INVESTIGATION – 100 SERIES

SCALE (m)

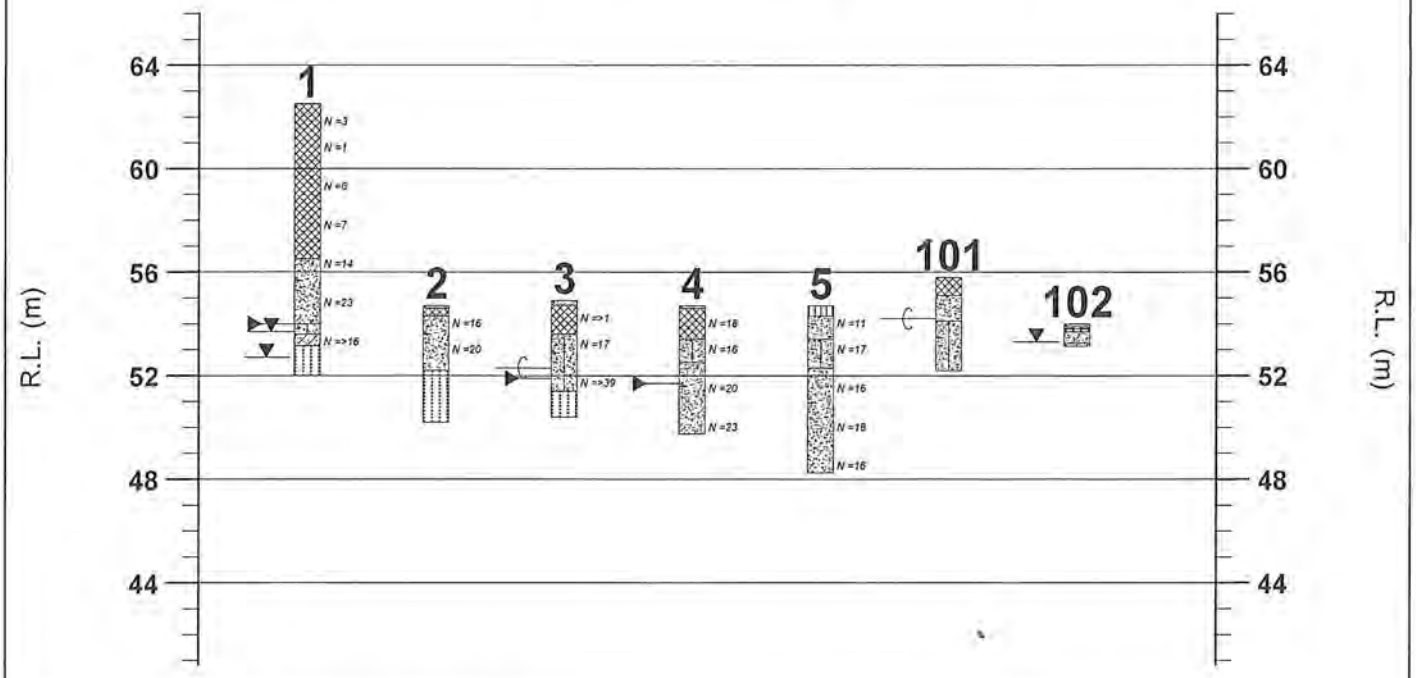
0 20

BOREHOLE LOCATION PLAN

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Report No. 26148S Figure No. 1

GRAPHICAL BOREHOLE SUMMARY



Fill | Sandy Clay | Topsoil | Observed water level | N SPT "N" VALUE
Sand | Sandstone/ Graywacke | Brick | Groundwater seepage level | No SOLID CONE BLOW COUNTS PER 150mm
Silty Sand | Concrete | Clayey Sand | Borehole Collapse Depth

NOTE: REFER TO BOREHOLE LOGS

Scale: 1 : 200 (vert) ; NTS (horiz)

JK Geotechnics

Job No.: 26148S

Figure No.: 2

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 1 1/2

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./WT
R.L. Surface: ≈ 62.5m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			FILL: Silty sand, fine to medium grained, grey brown, with a trace of fine grained sub rounded sandstone and brick gravel.	M			GRASS COVER APPEARS POORLY COMPACTED
					N = 3 2,1,2	1							
					N = 1 1,0,1	2			as above, but yellow light brown.				50mm PVC STANDPIPE INSTALLED TO 9m, SLOTTED FROM 1.5m TO 9m.
					N = 6 1,1,5	3			as above, but grey brown.				
					N = 7 4,3,4	4							
						5							
					N = 14 8,7,7	6		SP	SAND: fine to medium grained, yellow.	M	MD		
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 1 2/2

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./WT
R.L. Surface: ≈ 62.5m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
					N = 23 14,10,13	8		SP	SAND: fine to medium grained, yellow.	M	MD		
								SM	SILTY SAND: fine to medium grained, light grey with a trace of clay.	W			
▼ AFTER 3 HRS					N > 16 3,6, 10/100mm REFUSAL	9		CL	SANDY CLAY: low to medium plasticity, light grey.	MC>PL	VSt	- 350 350 300	
▼ ON COMPLET-ION						10		-	SANDSTONE: fine to medium grained, light grey.	DW	VL		VERY LOW RESISTANCE
									SANDSTONE: medium grained, yellow orange with light grey seams and coarse grained seams.		L		MODERATE RESISTANCE
									END OF BOREHOLE AT 10.5m				
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 2 1/1

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./
R.L. Surface: ≈ 54.7m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION & AFTER 2 HRS						0			CONCRETE: 100mm.t				6mm DIAMETER REINFORCEMENT AT 70mm TOP COVER
								-	FILL: Silty sand, fine to medium grained, grey brown.	M	-	-	
					N = 16 3,8,8	1		SP	SAND: fine to medium grained, orange brown, with silt.	M	MD	-	APPEARS MODERATELY COMPACTED
					N = 20 6,9,11	2			SAND: medium grained, orange brown.				
						3		-	SANDSTONE: medium grained, light yellow orange with light grey seams and coarse grained seams.	DW	L	-	MODERATE 'TC' BIT RESISTANCE
						4			SANDSTONE: medium grained, grey with light orange yellow seams.		L-M		MODERATE TO HIGH RESISTANCE
						5			END OF BOREHOLE AT 4.5m				
						6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 3 1/1

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./
R.L. Surface: ≈ 54.9m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			CONCRETE: 170mm.t				8mm DIAMETER REINFORCEMENT AT 70mm TOP COVER
					N > 1 2,1,0	1		-	FILL: Gravelly sand, fine to medium grained, grey, with fine to medium grained sub angular igneous gravel.	M	-	-	
									FILL: Silty sand, fine to medium grained, grey brown, with fine to medium grained sub angular to sub rounded igneous, brick and sandstone gravel.				APPEARS POORLY COMPACTED
ON COMPLET-ION					N = 17 2,6,11	2		SM	SILTY SAND: fine to medium grained, orange brown, with some dark grey brown cemented seams.	M	MD	-	
					N > 39 10,17, 22/130mm	3			SILTY SAND: fine to medium grained, brown.	W			
					REFUSAL			-	SANDSTONE: fine to medium grained, orange brown.	XW	EL	-	
						4			SANDSTONE: medium grained, orange brown, with coarse grained seams.	DW	L-M		MODERATE TO HIGH RESISTANCE
						5			END OF BOREHOLE AT 4.5m				
						6							
						7							

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 4 1/1

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./WT
R.L. Surface: ≈ 54.7m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			CONCRETE: 100mm.t				8mm DIAMETER REINFORCEMENT AT 42mm TOP COVER
								-	FILL: Silty sand, fine to medium grained, grey brown, with a trace of fine to medium grained sandstone gravel and clayey seams.	M	-	-	
					N = 18 8,6,12	1			FILL: Silty sand, fine to medium grained, grey brown, with fine to medium grained sub angular to sub rounded igneous, brick and sandstone gravel.				APPEARS MODERATELY COMPACTED
								SM	SILTY SAND: fine to medium grained, brown, with a trace of cemented seams.	M	MD	-	
					N = 16 3,9,7	2							
								SP	SAND: fine to medium grained, light yellow brown, with a trace of silt.				
						3			SAND: fine to medium grained, yellow.				
					N = 20 8,9,11								
						4							
					N = 23 9,10,13								
						5			END OF BOREHOLE AT 4.95m				
						6							
						7							

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Borehole No. **5** 1/1

BOREHOLE LOG

Client: THE SCOTS COLLEGE
Project: PROPOSED ADDITIONS
Location: THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 19326S
Date: 17-3-05
Method: SPIRAL AUGER JK250
Logged/Checked by: N.S./ WT
R.L. Surface: ≈ 54.7m
Datum: ASSUMED

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION						0			TOPSOIL: Silty sand, fine grained, brown.	M			GRASS COVER
					N = 11 3,5,6	1		SP	SAND: fine to medium grained, light grey, with a trace of silt.	M	MD	-	APPEARS MODERATELY COMPACTED
					N = 17 5,5,12	2		SM	SILTY SAND: fine to medium grained, orange brown, with brown cemented seams.				50mm PVC STANDPIPE INSTALLED TO 4.7m, SLOTTED FROM 1.0m TO 4.7m
					N = 16 6,6,10	3		SP	SAND: fine to medium grained, yellow.				
					N = 18 8,8,10	4							
					N = 16 8,7,9	5							
						6			END OF BOREHOLE AT 6.45m				
						7							

REPORT

TO
FUGEN

ON
GEOTECHNICAL INVESTIGATION

FOR
PROPOSED NEW EDUCATIONAL FACILITY
ANNEX BUILDING

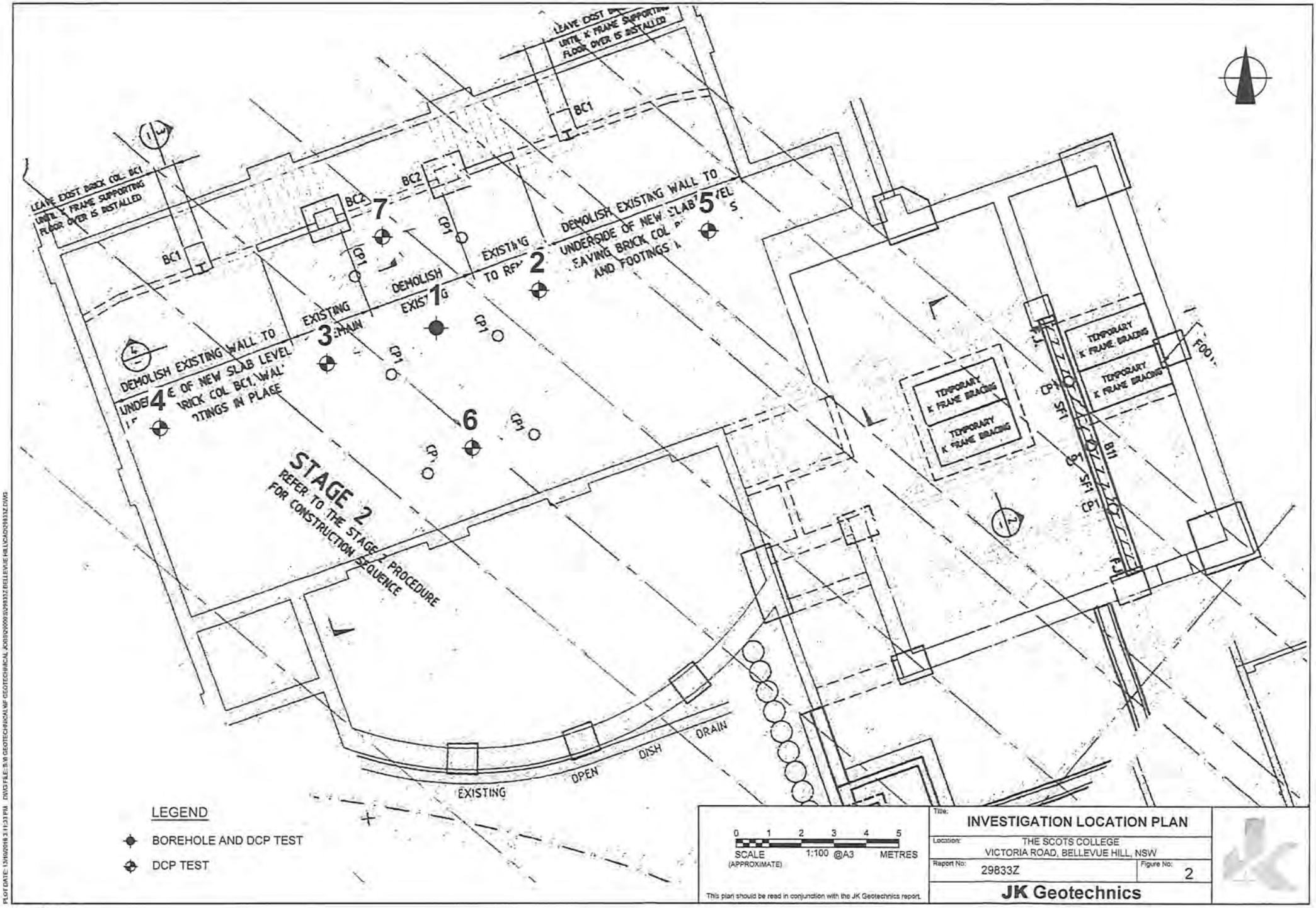
AT
SCOTS COLLEGE
VICTORIA ROAD, BELLEVUE HILL, NSW

13 October 2016
Ref: 29833Zrpt

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 Fax: 02 9888 5003
www.jkgeotechnics.com.au

Jeffery & Katauskas Pty Ltd, trading as JK Geotechnics ABN 17 003 550 801



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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 1
1/1

Client: FUGEN
Project: GEOTECHNICAL INVESTIGATION
Location: ANNEX BUILDING, THE SCOTS COLLEGE, BELLEVUE HILL, NSW

Job No. 29833Z **Method:** HAND AUGER **R.L. Surface:** N/A
Date: 5-10-16 **Datum:**
Logged/Checked by: A.F./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
▼ ON COMPLETION						0			CONCRETE: 100mm.t BRICK SLAB: 100mm.t				
						0.5		-	FILL: Sand, fine to medium grained, yellow brown, trace of fine to coarse grained sandstone and concrete gravel.	M W			APPEARS POORLY TO MODERATELY COMPACTED
						1			END OF BOREHOLE AT 1.0m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
						1.5							
						2							
						2.5							
						3							
						3.5							

JK Geotechnics

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

DYNAMIC CONE PENETRATION TEST RESULTS

Client:	FUGEN		
Project:	GEOTECHNICAL INVESTIGATION		
Location:	ANNEX BUILDING. THE SCOTS COLLEGE, BELLEVUE HILL, NSW		
Job No.	29833Z	Hammer Weight & Drop:	9kg/510mm
Date:	5-10-16	Rod Diameter:	16mm
Tested By:	A.F./	Point Diameter:	20mm

Number of Blows per 100mm Penetration

Test Location							
Depth (mm)	1	2	3	4	5	6	7
0 - 100	EXCAVATED	EXCAVATED	EXCAVATED	EXCAVATED	EXCAVATED	EXCAVATED	EXCAVATED
100 - 200	↓	↓	↓	↓	↓	↓	↓
200 - 300	↓	8	20/10mm	13/20mm	1	2	2
300 - 400	↓	5	REFUSAL	REFUSAL	4	2	3
400 - 500	↓	5			5	3	2
500 - 600	↓	5			6	5	6
600 - 700	↓	5			8	4	5
700 - 800	↓	6			5	5	4
800 - 900	3	7			5	5	5
900 - 1000	8	8			5	4	6
1000 - 1100	10/20mm	6			7	6	9/20mm
1100 - 1200	REFUSAL	7			4	12	REFUSAL
1200 - 1300		13			4	REFUSAL	
1300 - 1400		20/50mm			4		
1400 - 1500		REFUSAL			18/10mm		
1500 - 1600					REFUSAL		
1600 - 1700							
1700 - 1800							
1800 - 1900							
1900 - 2000							
2000 - 2100							
2100 - 2200							
2200 - 2300							
2300 - 2400							
2400 - 2500							
2500 - 2600							
2600 - 2700							
2700 - 2800							
2800 - 2900							
2900 - 3000							

Remarks:
1. The procedure used for this test is similar to that described in AS1289.6.3.2-1997, Method 6.3.2.
2. Usually 8 blows per 20mm is taken as refusal