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Our Ref: PSM3759-002L

29 January 2019

Pepper Property Advisory Pty Ltd
28/2 Chifley Square
SYDNEY NSW 2000

Attention: Greg Carmichael

By email: gcarmichael@pepper.com.au

Dear Greg

RE: KAMBALA GIRLS SCHOOL, ROSE BAY, NSW
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION

1. Introduction

This letter presents the results of the geotechnical investigation undertaken by Pells Sullivan Meynink (PSM) at Kambala Girls School, Rose Bay, NSW. Figure 1 presents the locality plan of the site.

The work was undertaken in accordance with the PSM proposal dated 10 December 2018 (Ref. PSM3759-001L), as approved by email on 13 December 2018.

Prior to the work, PSM was supplied with the following documents:

- Allen Jack + Cottier Architects drawings and sketches “Kambala Sports Precinct Summary”.
- Allen Jack + Cottier Architects drawings SK_181130-1 and SK_181130-2 “Site Plan and Sections”.
- RPS Group survey plan sheets 1 – 7.
- Douglas Partners Geotechnical Report (Ref. 37034.04), dated June 2012 **(Douglas Partners Report)**.

Based on the email request and the documents provided above, we understand that:

- The existing sports oval adjacent to New South Head Road is to be excavated to a lower level, including a portion of the adjacent bank.
- The excavation will be up to 8 m below the existing ground level.
- A raised sports field will be constructed above the excavated oval.
- Two (2) retaining walls will be constructed to support the excavation, one of which comprises a contiguous pile wall.

2. Geotechnical Site Investigation

2.1 Outline

Prior to testing, on-site service location “scans” were undertaken by a service locator in the presence of a PSM geotechnical engineer to assess if the test locations were free from buried utilities.

A total of seven (7) boreholes were drilled on the 8th and 9th November 2018, with two of these being cored. The fieldwork was undertaken simultaneously with JBS&G’s environmental investigation. The boreholes were organised such that they meet both geotechnical and environmental requirements of the project.

All 7 boreholes were situated on the southern end of the existing sports field directly on the grass. A track-mounted rig was used for the auger drilling. The boreholes were drilled to target depth required for geotechnical assessments or until practical refusal by auger drilling using a Tungsten Carbide (TC) drill bit to a final depth of between 1.0 m and 5.2 m. Samples were taken directly from the auger and using hand augering techniques by JBS&G. Two cored boreholes, BH04 and BH06, were cored from TC bit refusal up to a final depth of 5.0 m and 7.2 m respectively.

The fieldwork was undertaken under the full time supervision of a PSM geotechnical engineer, who undertook the following tasks:

- Preparing field logs of material encountered in the boreholes
- Collecting samples for laboratory testing

The investigation locations were recorded with a hand-held GPS unit with a horizontal accuracy of ±5 m. Approximate PSM borehole locations are shown on Figure 1. The existing ground levels at borehole locations were based on the survey plan provided by Allen Jack + Cottier Architects.

Geotechnical engineering logs of the boreholes are presented in Attachment A.

2.2 Testing

Point load tests on the core were performed at approximately one metre intervals. Results are tabulated in Attachment B.

2.3 Environmental Testing and Method of Disposal

A contamination assessment was undertaken by environmental consultants JBS&G and the report prepared by JBS&G will be sent out when received.

As part of the contamination assessment, JBS&G completed a desktop study and sampling during the drilling works for contamination testing.

3. Site Conditions

3.1 Geological Setting

The 1:100,000 Sydney Geological map (1991) indicates the site is underlain by Hawkesbury Sandstone of the Wianamatta Group formation comprising medium to coarse-grained quartz sandstone, very minor shale and laminate lenses.

3.2 Surface Conditions

The site comprises an existing school with concrete pathways, sealed bitumen surfaces and some grassed and landscaped areas. A number of free-standing buildings occupy the school area. The site is bounded by New South Head Road to the east and south, Bayview Hill Road to the north, and Tivoli Avenue to the west and south. At the time of the fieldwork, the following observations were made:

- The area in which the boreholes are located was an existing sports field with grass on the surface.
- The site boundaries consisted of an existing retaining wall to the north and a permanent batter to the east both supporting New South Head Road. The southern boundary of the field contains a retaining wall supporting the sports field whilst the western boundary contains other sports courts.

Figure 2 presents selected photos taken during the fieldwork.

3.3 Subsurface Conditions Encountered

The subsurface conditions encountered in the boreholes are summarised in Table 1. The subsurface conditions were consistent with the information in published the geological map and the Douglas Partners Report.

Table 1 – Summary of Inferred Subsurface Conditions Encountered in PSM Boreholes

Inferred Unit	Encountered Depth to Top of Inferred Unit (m)	Typical Description
FILL	0.0 to 5.1	Silty SAND: grey to dark brown, fine to medium grained; trace of gravel and minor lenses of clay, low plasticity clay, sub-angular gravel up to 3mm, roots and rootlets observed down to approximately 0.2m, occasional crushed sandstone gravel encountered, generally loosely compacted and moist.
NATURAL SOIL	1.2 to 5.1	SAND: grey, brown and orange, fine to medium, with some silt and clay, low plasticity clay, generally loose to medium dense consistency and moist to wet.
WEATHERED ROCK	1.9 to 4.0	SANDSTONE: orange/red and light grey, medium to coarse grained, extremely weathered to moderately weathered and medium to high strength.
FRESH ROCK	3.3 to 7.0	SANDSTONE: light grey and black, medium to coarse grained, slightly weathered and high to very high strength.

The boreholes that were not cored were terminated at TC bit refusal which is inferred to be bedrock. There was a variability of ground conditions (e.g. thickness of geotechnical units) between investigation locations, which should be considered during the design process.

Figure 3 presents the core photographs of BH04 and BH06.

Table 2 presents the depths of the inferred geotechnical units encountered in the PSM boreholes.

Table 2 – Depth to Top of Inferred Geotechnical Units Encountered in PSM Boreholes

BH ID	Depth to Top of Inferred Geotechnical Units [m Depth]				
	Fill	Natural Soil	Weathered Rock	Fresh rock	EOH
BH03	0.0	1.2	N.E.	N.E.	2.7(1)
BH04	0.0	1.3	1.9	3.3	5.0
BH06	0.0	3.6	4.0	7.0	7.6
BH07	0.0	4.0	N.E.	N.E.	4.2(1)
BH08	0.0	5.1	N.E.	N.E.	5.2(1)
BH09	0.0	3.5	N.E.	N.E.	4.0(1)
BH10	0.0	N.E.	N.E.	N.E.	1.0(1)

Note: (1) Borehole was terminated at Bedrock
EOH = End of hole
N.E. = Not Encountered

3.4 Groundwater

We noted that the cuttings from boreholes BH06, BH07, BH08 and BH10 became wet towards the end of each hole. This suggests there is a possibility of a perched groundwater table exists in this area from 0.8m in BH10 down to 5.2m in BH08.

We also noted that based on the Douglas Partners Report, no groundwater was observed within the depth of augering. This suggests a variability of the groundwater condition on the site.

4. Discussion and Recommendations

4.1 Bulk Excavation Conditions

We understand that the excavation to depths of up to 8 m may be required for the proposed works. Based on the geotechnical investigation, excavation will include FILL, NATURAL SOIL, WEATHERED ROCK and FRESH ROCK units. Excavation in FILL and NATURAL SOIL should be achievable using conventional earth moving equipment. Excavation of ROCK units may require the use of hydraulic impact breakers, rock saws and/or rock grinders and must be undertaken by contractors with suitable experience in rock excavation close to existing structures. Auger TC bit refusal was encountered in all boreholes. BH04 and BH06 shows the sandstone cores expected on site.

Prospective contractors should make their own assessment of excavatability based on the borehole logs (this report and the Douglas Partners Report) and their site inspection and experience. It is our experience that excavatability is heavily dependent on both the operator and the plant used. Heavy rock breaking equipment will generate vibrations that may impact on neighbouring structures. Where controls on vibrations are required, the contractor should consider the use of smaller hammers, rock saws and grinders to undertake the excavation. The use of “pre-split” cuts along the boundaries using a rock saw can provide a “buffer” for vibrations.

It is noted that potential dewatering in the excavation may be required in some areas of the site due to possible seepage from perched water in the fill / natural soils and weathered sandstone layers; such inflows should be manageable by sump pumping. Settlements associated with such dewatering should be minor.

4.2 Site Classification

Based on the field observations and the inferred geotechnical units from the boreholes, we recommend that structures within scope of AS2870 be designed for a site classification of Class "P". This is due to the presence of very loose sand and fill layer deeper than 1.0 m over the majority of the site. Portions of the building founded in excavations in rock can be considered to be on a Class A site classification.

4.3 Temporary and Permanent Batters

The batter slope angles shown in Table 3 are recommended for the design of batters up to a nominal 8 m height; subject to the following recommendations:

1. All batters shall be protected from erosion. Permanent batters will need face support such as vegetation or shotcrete.
2. Permanent batters shall be drained for a distance behind the faces at least equal to the height.
3. Temporary batters shall not be left unsupported for more than 1 month without further advice, and inspection by a geotechnical engineer should be undertaken following significant rain events.
4. Where loads are imposed or structures/services are located within one batter height of the crest of the batter, further advice should be sought.

If the conditions above cannot be met, further advice should be sought.

Steeper batters may be possible subject to further advice, likely including inspection during construction.

Table 3 – Batter Slope Angles

Geotechnical Unit	Temporary		Permanent
	Personnel entry	No personnel entry**	
Fill / Natural Soil	1.75H : 1V*	1.5H : 1V***	3H : 1V
Weathered Rock/Fresh Rock****	Vertical	Vertical	1H : 1V or steeper

Note: *: Where the unit is less than 1.5 m thick, then a temporary batter slope of 1H:1V can be adopted
**: Shall not be left unsupported for more than 3 days without further advice
***: Material riling is more likely on the batter surface
****: Subject to support of localised adverse conditions, subject to design and inspection.

The batters (temporary with personnel entry and permanent) should be inspected by an experienced geotechnical engineer or engineering geologist during excavation to confirm the batter advice provided and assess the need for localised support, such as rock bolting to control adverse jointing and mesh and/or shotcreting for overall face support or soft seams etc.

4.4 Retention

4.4.1 General

Cuts in the Soil and Rock units steeper than the recommended permanent batter slopes in Table 3 will need to be supported by an appropriate retaining structure.

An appropriate shoring system for vertical faces could be contiguous piles or reinforced concrete soldier piles, or steel soldier piles with concrete encasement or a plug or sheet piles, with the piles supported laterally by anchors and/or props bonded in Fresh Rock. Given that Fresh Rock is anticipated 3 metres or so above the bulk excavation level (excavation to 8m deep), founding the piles on a ledge of Fresh Rock instead on founding them below the bulk excavation level is a valid option if desired but is accompanied by both design and inspection complexities. For non-vertical faces steeper than the recommended slopes in Table 3, other shoring system such as rock bolts could be appropriate.

The design of these structures should be based on the following geotechnical properties:

- Effective soil strength parameters in Table 4.
- Surcharge loads behind the retention.

- Water pressure (depending on the type of structure).

Note that design of retention systems may be based on either K_a or K_o earth pressures. Design using active earth pressures (K_a) provides the minimum lateral earth pressure that must be supported to avoid failure and requires a wall that can rotate or translate to allow the pressures to reduce to these values (vertical and lateral movements up to 2% of height may occur, typical movements will be much less).

Where the design is based on K_o pressures, construction should be carefully controlled to avoid unwanted effects. It should be noted that designing for K_o pressures does not, of itself, ensure that movement does not occur. Movements are also influenced by the construction method, especially sequence. Further, construction related ground movements can include sand flighting during pile excavation, surface settlement due to drilling of ground anchor holes, collapse settlements of very loose sands, movements due to sequencing of the excavation during retaining construction and movement due to loss of material between the shoring piles.

Very low SPT *"N"* values were recorded in some of the tests in the Fill and Natural Soil units, these indicate that collapse settlements are possible behind the retention structure. Face support between piles should be provided in soils, with particular consideration given to how to prevent cohesionless soils from flowing into the excavation.

Where excavations are proposed in the vicinity of existing structures, including the existing retaining walls mentioned in Section 3.2, designers should consider the effects of the excavation including horizontal and vertical deflections on the neighbouring structures and infrastructure (e.g. roads and services). Excavation near existing buildings should not undermine the existing footings and structures.

Both surface and sub-surface drainage needs to be designed and constructed properly to prevent pore water pressures from building up behind the retaining walls or appropriate water pressures must be included in the design. Water pressures in design should consider the possibility of broken water services behind the wall (if applicable)

4.4.2 Wallap analysis

PSM will undertake the global stability analyses for the proposed retaining walls once we receive the detailed information for the retaining walls. Table 4 presents the geotechnical parameters recommended for the design of retention systems, in a Wallap analysis or similar. These parameters are unfactored and relate to working stress design.

Table 4 – Geotechnical Parameters for Wallap analysis

Item	Parameter	Unit	Recommended design value	Note
Fill/Natural soil	Cohesion	kPa	0	1
	Friction Angle	o	25	
	Unit weight	kN/m^3	18	
	Young's modulus	kPa	5,000	
	Poisson's ratio	-	0.25	
	Skin friction (pile/soil interface)	kPa	0	2
Weathered Rock	Cohesion	kPa	20	1
	Friction Angle	o	30	
	Unit weight	kN/m^3	18	
	Young's modulus	kPa	50,000	
	Poisson's ratio	-	0.25	
	Skin friction (pile/soil interface)	kPa	0	2

Item	Parameter	Unit	Recommended design value	Note
Fresh Rock	Unit weight	kN/m^3	24	
	Allowable passive resistance (pile socket)	kPa	3,000	3
	Lateral earth pressure	kPa	10	4
	Young's modulus	kPa	600,000	5
	Ultimate Skin friction	kPa	800	6
Anchor	Minimum bond length	m	4	
	Maximum bond length	m	10	
	Minimum free length	m	3	7

Notes:

1. Can be used to calculate lateral earth pressure coefficients (K_o, K_a). Does not imply a maximum possible passive pressure, for scenarios where passive pressure is a load.
2. Value does not represent negative skin friction effects due to fill settlement.
3. Relates to rectangular projection in front of piles, and only applies during excavation, because following completion of excavation there will be no rock in front of the piles above final excavation level. Presence of defects or weak rock mass may significantly reduce lateral and vertical bearing capacity.

   Approximately equivalent to a Wallap cohesion parameter of 1,500 kPa x (pile diameter/pile spacing).
4. Considering potential localised rock wedges above pile toe level.
5. Young's modulus is highly dependent on scale and strain level, this value is only applicable for shoring design in a Wallap or similar analysis.
6. For anchor design and downwards vertical loading of piles. Ignore skin friction for pile uplift. If required to utilise skin friction between pile and rock for vertical capacity of piles (i.e. if end bearing provides insufficient vertical capacity), seek further geotechnical advice.
7. Free length at least extending beyond the theoretical 'active wedge'.
8. Designer to specify geotechnical construction verification requirements appropriate to its design.

4.5 Foundations

4.5.1 Shallow Footings and Allowable Bearing Pressure (ABP)

Pad footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads provided in Table 5.

We recommend that shallow footings should not be founded on or within the Fill unit. If required to be founded on or within Fill, seek a further geotechnical advice.

We note that an allowable bearing pressure (ABP) is not a soil property. It depends on many factors such as the size of the footings, the embedment depth, the load direction and eccentricity, the stiffness of the footing, the adopted factor of safety (FOS), the settlement limit, as well as the soil properties. As footings get bigger or deeper the capacity increases rapidly, as the load gains eccentricity or becomes inclined, the capacity reduces rapidly.

Settlements in the Natural Soil unit can be estimated using the elastic parameters provided in Table 5. Foundation conditions at shallow pad footing locations should be inspected by a suitably qualified geotechnical engineer prior to the pouring of concrete.

4.5.2 Piles

We envisage that piles would be founded within the Fresh Rock unit.

Piles should be designed in accordance with the requirements in AS 2159 (2009), Piling – Design and Installation. The parameters provided in Table 5 may be adopted in the design of piles founded in the Fresh Rock unit.

The designer should note the following with regards to the pile design:

- The ABP needs to be confirmed by a geotechnical engineer during a pile/footing inspection; this can be difficult if CFA piles are adopted and it may be appropriate to adopt a lower ABP of 6 MPa with a lesser inspection requirement.
- Under permanent load, the contribution of side adhesion for soils including Fill and Natural Soil should be ignored.
- Deflection needs to be checked using the recommended elastic parameters in Table 5.

The bearing capacities provided are contingent on piles or footings being vertically and centrally loaded. Further advice should be sought if the footings are not vertically centrically loaded. Should higher bearing capacities be required in Fresh Rock, this may be available subject to further advice.

With regards to the pile design we recommend that:

- A geotechnical strength reduction factor, Φ_g = 0.60 (AS2159 CL. 4.3.2) be adopted for a high redundancy system for an assessed average risk rating (ARR) between 2.5 and 3.0. This should be reviewed to suit the specific design and appropriate pile testing proposed by the structural designers in accord with the requirements of AS2159.
- It may be possible to increase the strength reduction factors, if the details of the proposed pile installation procedures indicate a high level of quality control with regards to concrete placement, base cleanliness, etc.
- If a geotechnical strength reduction factor, Φ_g = 0.40 is adopted then no pile testing will be required (AS2159 Clause 8.2.4 (b)).

Table 5 – Foundation Parameters of Inferred Geotechnical Units

Inferred Unit	Bulk Unit Weight (kN/m^3)	Soil Effective Strength Parameters		Ultimate Bearing Pressure under Vertical Centric Loading[3] (kPa)	Allowable Bearing Pressure (ABP) under Vertical Centric Loading (kPa)	Ultimate Shaft Adhesion (kPa)	Elastic Parameters	
		c' (kPa)	*φ'* *(deg)*				Long Term Vertical Young Modulus (MPa)	Poisson's Ratio
Natural Soil	18	0	25	200	70[1]	N/A	5	0.25
				300	95[2]			
Weathered Rock	18	20	30	10,000	5,000	N/A	350	0.25
Fresh Rock (not on ledge)	24	N/A	N/A	60,000	10,000[4,5]	250	1100	0.25
Fresh Rock (on ledge)	24	N/A	N/A	10,000[6]	3,000[4,5]	N/A	900	0.25

Note: 1. Pad footings (for ABP of 70 kPa) should have a minimum horizontal dimension of 1.0 m and a minimum embedment depth of 0.5 m. Corresponds to FOS = 3 on ultimate capacities. Designer to also assess the settlements as this may instead govern the design.
2. Pad footings (for ABP of 95 kPa) should have a minimum horizontal dimension of 1.5 m and a minimum embedment depth of 0.7 m. Corresponds to FOS = 3 on ultimate capacities. Designer to also assess the settlements as this may instead govern the design.
3. Ultimate values occur at large settlement (>5% of minimum footing / pile dimensions)
4. Assuming a sufficiently clean pile base.
5. End bearing pressure associated with settlement of <1% of minimum footing / pile dimension.
6. Assuming a cleanly cut ledge with no overbreak, adversely oriented discontinuities or rock mass disturbance, and a sufficiently clean pile base. It is possible substantial dental support may be required following inspection.

5. General

If at any time, the conditions are found to vary from those described in this report, further advice should be sought.

Should there be any queries, please do not hesitate to contact the undersigned.

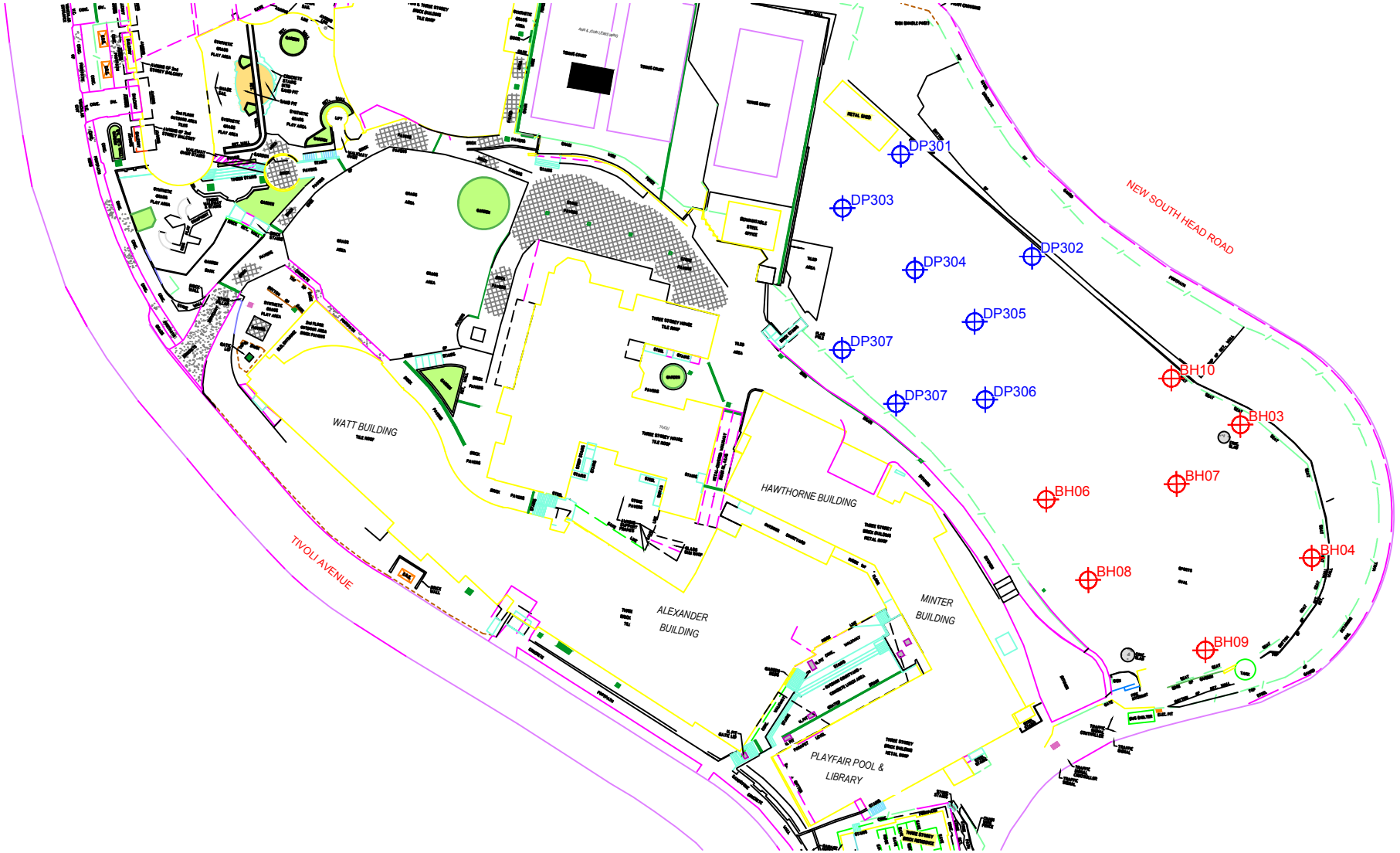
For and on behalf of
PELLS SULLIVAN MEYNINK

STEPHANIE SALIM
GEOTECHNICAL ENGINEER

GARRY MOSTYN
PRINCIPAL

Encl.

Figure 1	Locality Plan
Figure 2	Selected site photographs
Figure 3	Core photographs of BH04 and BH06
Attachment A	Engineering Borehole Logs
Attachment B	Geotechnical & Analytical Laboratory Testing Results



LEGEND:

- PSM BOREHOLE LOCATION (BH)
- DOUGLAS PARTNERS BOREHOLE LOCATION (DP)
  (REFERENCE : DOUGLAS PARTNERS REPORT 37034.04)

REFERENCE DRAWING : CAD FILE G219SW A02a

0 10 20 30 40 50

Scale(m)
1:1000 @ A4

Pells Sullivan Meynink

Pepper Property Pty Ltd
Kambala Girls School
794 New South Head Rd, Rose Bay

LOCALITY PLAN &
BOREHOLE LOCATIONS

PSM3759-002L	Figure 1

PHOTO 1 - GENERAL SITE PHOTO (FACING NORTH WEST)

PHOTO 2 - TC BIT DRILLING (BH03)

Pepper Property Pty Ltd

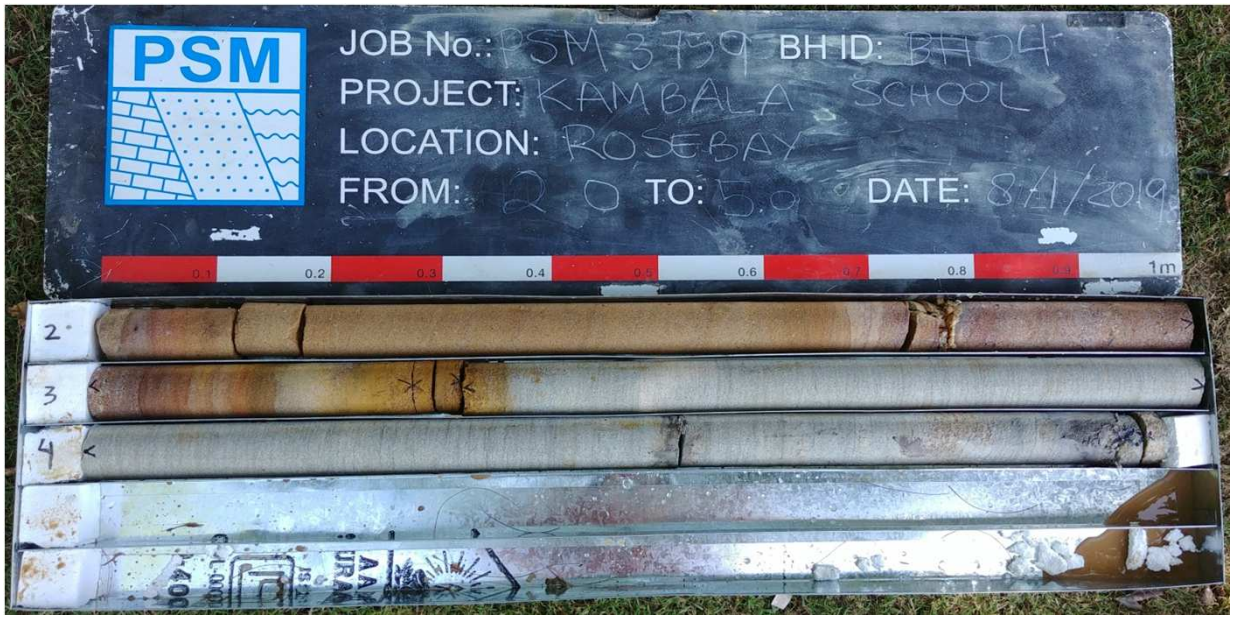
Kambala Girls School

794 New South Head Rd, Rose Bay

SELECTED SITE PHOTOGRAPHS (SHEET 1 OF 1)

Pells Sullivan Meynink

PSM3759-002L	**Figure 2**



BH04 - 2.1m to 5.0m

BH06 - 4.1m to 7.6m

Pepper Property Pty Ltd

Kambala Girls School

794 New South Head Rd, Rose Bay

CORE PHOTOS BH04 & BH06
(SHEET 1 OF 1)

Pells Sullivan Meynink

PSM3759-002L	Figure 3

Attachment A
Engineering Borehole Logs

Borehole ID

BH03

Page 1 of 1

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	09/01/2019
Project Name:	Kambala Girls School	Completed:	09/01/2019
Hole Location:	Rose Bay	Logged By:	SS
Hole Position:	340237.0 m E 6251473.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.70 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T										SILTY SAND: dark brown, medium grained sand, roots and rootlets observed down to 0.2 m.	M	C		0.00: FILL
										SAND: light brown, medium grained sand	M	D		
						38.7	1		SC	SAND: dark brown, medium grained sand, trace clay low plasticity.				1.20: Inferred residual.
				1.50: SPT - 15, 23, 21, N = 44		37.7	2			Becomes light grey and orange brown, coarse grained at 2.0 m.	M	D		
				2.70: SPT Refusal		36.7	3			Hole Terminated at 2.70 m				2.70: TC bit refusal on inferred bedrock.
						35.7	4							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Borehole ID

BH04

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340249.0 m E 6251450.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.70 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T						38.7	1			SILTY SAND: dark brown, fine grained sand, roots and rootlets observed down to 0.2 m.	M	C		0.00: FILL
										Becomes light grey at 0.40 m.				
				1.50: SPT - 2, 7, 8, N = 15.					SC	CLAYEY SAND: orange brown, fine grained sand, clay low plasticity	M	MD		1.30: Inferred residual.
						37.7	2			Continued on cored borehole sheet				1.90: TC bit refusal on bedrock.
						36.7	3							
						35.7	4							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Engineering Log - Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340249.0 m E 6251450.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting: CRP 155 Track Mounted | Inclination: -90° | RL Surface: 39.70 m
Barrel Type and Length: | Bearing: | Datum: AHD | Operator: BG Drilling

Drilling Information							Rock Substance																	Rock Mass Defects	
Method	Water	TCR (%)	RQD (%)	SAMPLES & FIELD TESTS	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable)	Weathering EW	HW	MW	SW	F	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	60	200	600	1000	Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other
					38.7	1		Continued from non-cored borehole sheet																	
NMLC		97	96	2.67m Is(50) d=1.5 a=2.1 MPa	37.7	2		No core; 100mm loss.																	
								SANDSTONE: Orange-red, fine to medium grained, poorly developed bedding.																	BP 0° CN CU RF =0 mm DB
					36.7	3																			BP 6° SN PR RF =0 mm SM 3° S PR RF =6 mm
				3.68m Is(50) d=1.4 a=1.5 MPa				SANDSTONE: Light grey, fine grained, developed bedding.																	BP 10° SN UN RF =0 mm
					35.7	4																			BP 8° CL PR S =2 mm
				4.51m Is(50) d=1.8 a=1.5 MPa																					DB DB
								Hole Terminated at 5.00 m																	

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
HQ3- Wireline core (63.5 mm)
PQ3- Wireline core (85.0 mm)
SPT- Standard penetration test
PT - Push tube

Water
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
No core recovery

Weathering
EW - Extremely Weathered
HW - Highly Weathered
MW - Moderately Weathered
SW - Slightly Weathered
F - Fresh

Strength
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Defect Type
FT - Fault
SS - Shear Surface
SZ - Shear Zone
BP - Bedding parting
SM - Seam
IS - Infilled Seam
JT - Joint
CO - Contact
CZ - Crushed Zone
VN - Vein
FZ - Fracture Zone
BSH - Bedding Shear
DB - Drilling Break

Infilling/Coating
CN - Clean
SN - Stain
VN - Veneer
CO - Coating
RF - Rock fragments
G - Gravel
S - Sand
Z - Silt
CA - Calcite
CL - Clay
FE - Iron
QZ - Quartz
X - Carbonaceous

Roughness
SL - Slickensided
POL - Polished
S - Smooth
RF - Rough
VR - Very Rough

Shape
PR - Planar
CU - Curved
UN - Undulating
ST - Stepped
IR - Irregular

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

Borehole ID

BH06

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340204.0 m E 6251459.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.50 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information							Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T							0			SILTY SAND: brown, fine grained sand, roots and rootlets observed down to 0.2 m, minor lenses of clay.	M	L		0.00: FILL
										SILTY SAND: grey, fine grained sand				
						38.5	1							
				1.50 m SPT - 0, 0, 0, N = 0.							M			
						37.5	2			Becomes dark brown at 2.0 m.		VL		
				3.00 m SPT - 0, 2, 2, N = 4		36.5	3				M to W			3.00: Water observed.
									SM	SILTY SAND: grey and yellow-brown, fine to medium grained sand, with clay low plasticity	M to W	C		3.60: Inferred residual.
						35.5	4							4.00: TC bit refusal on bedrock.
										Continued on cored borehole sheet				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Engineering Log - Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340204.0 m E 6251459.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting: CRP 155 Track Mounted | Inclination: -90° | RL Surface: 39.50 m
Barrel Type and Length: | Bearing: | Datum: AHD | Operator: BG Drilling

Drilling Information							Rock Substance															Rock Mass Defects		
Method	Water	TCR (%)	RQD (%)	SAMPLES & FIELD TESTS	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable)	Weathering EW	HW	MW	SW	F	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	60	200	600	1000	Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other
					38.5	1																				
					37.5	2																				
					36.5	3																				
					35.5	4		Continued from non-cored borehole sheet																		
NMLC								100 mm core loss.																		
		83	100					SANDSTONE: Orange and red, fine to medium grained, poorly-developed to developed bedding.																		SM 6° CL CU RF 2 mm
		100	93	4.83m Is(50) d=0.7 a=0.8				SANDSTONE: Grey, medium grained, developed bedding.																		

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
HQ3- Wireline core (63.5 mm)
PQ3- Wireline core (85.0 mm)
SPT- Standard penetration test
PT - Push tube

Water
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
No core recovery

Weathering
EW - Extremely Weathered
HW - Highly Weathered
MW - Moderately Weathered
SW - Slightly Weathered
F - Fresh

Strength
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Defect Type
FT - Fault
SS - Shear Surface
SZ - Shear Zone
BP - Bedding parting
SM - Seam
IS - Infilled Seam
JT - Joint
CO - Contact
CZ - Crushed Zone
VN - Vein
FZ - Fracture Zone
BSH - Bedding Shear
DB - Drilling Break

Infilling/Coating
CN - Clean
SN - Stain
VN - Veneer
CO - Coating
RF - Rock fragments
G - Gravel
S - Sand
Z - Silt
CA - Calcite
CL - Clay
FE - Iron
QZ - Quartz
X - Carbonaceous

Roughness
SL - Slickensided
POL - Polished
S - Smooth
RF - Rough
VR - Very Rough

Shape
PR - Planar
CU - Curved
UN - Undulating
ST - Stepped
IR - Irregular

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

Engineering Log - Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340204.0 m E 6251459.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting: CRP 155 Track Mounted | Inclination: -90° | RL Surface: 39.50 m
Barrel Type and Length: | Bearing: | Datum: AHD | Operator: BG Drilling

Drilling Information							Rock Substance																Rock Mass Defects		
Method	Water	TCR (%)	RQD (%)	SAMPLES & FIELD TESTS	RL (m)	Depth (m)	Graphic Log	Material Description ROCK TYPE: Colour, grain size, structure (texture, fabric, mineral composition, hardness, alteration, cementation, etc as applicable)	Weathering EW	HW	MW	SW	F	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	60	200	600	1000	Defect Descriptions / Comments Description, alpha/beta, infilling or coating, shape, roughness, thickness, other
NMLC		100	93	MPa	33.5	6		SANDSTONE: Grey, medium grained, developed bedding.*(continued)*																		BP 10° CL PR RF 2 mm
																										SM 7° CL CU RF 10 mm
				5.84m Is(50) d=1.1 a=1.6 MPa				Becomes light red and medium to coarse grained at 5.6 m.																		BP 18° CN PR RF 0 mm
																										BP 0° X CU RF 5 mm
																										BP 10° CL UN RF 0 mm
																										BP 5° CL PR RF 1 mm
																										SM 10° CL PR S 5 mm
					32.5	7		Becomes black and coarse grained at 7.0 m.																		BP 0° CL PR S 1 mm
				6.94m Is(50) d=0.6 a=0.9 MPa																						BP 0° CL PR S 1 mm
				7.53m Is(50) d=3.4 a=3.5 MPa																						
					31.5	8		Hole Terminated at 7.60 m																		
					30.5	9																				

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
HQ3- Wireline core (63.5 mm)
PQ3- Wireline core (85.0 mm)
SPT- Standard penetration test
PT - Push tube

Water
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
No core recovery

Weathering
EW - Extremely Weathered
HW - Highly Weathered
MW - Moderately Weathered
SW - Slightly Weathered
F - Fresh

Strength
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Defect Type
FT - Fault
SS - Shear Surface
SZ - Shear Zone
BP - Bedding parting
SM - Seam
IS - Infilled Seam
JT - Joint
CO - Contact
CZ - Crushed Zone
VN - Vein
FZ - Fracture Zone
BSH - Bedding Shear
DB - Drilling Break

Infilling/Coating
CN - Clean
SN - Stain
VN - Veneer
CO - Coating
RF - Rock fragments
G - Gravel
S - Sand
Z - Silt
CA - Calcite
CL - Clay
FE - Iron
QZ - Quartz
X - Carbonaceous

Roughness
SL - Slickensided
POL - Polished
S - Smooth
RF - Rough
VR - Very Rough

Shape
PR - Planar
CU - Curved
UN - Undulating
ST - Stepped
IR - Irregular

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

Borehole ID

BH07

Page 1 of 1

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	09/01/2019
Project Name:	Kambala Girls School	Completed:	09/01/2019
Hole Location:	Rose Bay	Logged By:	SS
Hole Position:	340227.0 m E 6251463.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.60 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T				1.50 m SPT - 0, 2, 2, N = 2.		38.6	1			SILTY SAND: dark brown, fine grained sand, roots and rootlets observed down to 0.2 m.	M	VL		0.00: FILL
						37.6	2			SILTY SAND: dark brown, fine grained sand, trace gravel sub-angular up to 3mm.	M	VL		
				3.00 m SPT - 1, 0, 0, N = 0.		36.6	3			SILTY SAND: dark brown, fine grained sand, trace clay low plasticity.	M to W	VL		2.50: Water observed.
						35.6	4		SM	SILTY SAND: light grey and brown, fine grained sand, minor lenses of clay.	M to W	VL		4.00: Inferred residual.
				4.20 m SPT - Refusal						Hole Terminated at 4.20 m				4.20: TC bit refusal on inferred bedrock.

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Borehole ID

BH08

Page 1 of 2

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340212.0 m E 6251447.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.40 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T						39.40	0							0.00: FILL
						38.4	1			SILTY SAND: dark brown, fine grained sand, roots and rootlets observed down to 0.15 m, minor lenses of clay.				
										Becomes light brown at 1.3 m.	M	L		1.30: Crushed sandstone gravel observed up to 2.5m.
				1.50 m SPT - 2, 3, 4, N = 7.		37.4	2							
										SILTY SAND: orange-brown, fine grained sand, trace gravel sub-angular up to 3mm.				
				3.00 m SPT - 2, 0, 0, N = 0.		36.4	3				M	VL		
										Becomes dark brown at 3.5 m.				3.50: Water observed at 3.5 m, cuttings partly washed off.
						35.4	4				W	MD		
				4.50 m SPT - 7, 11, 15, N = 26.										

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340212.0 m E 6251447.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.40 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T										SILTY SAND: orange-brown, fine grained sand, trace gravel sub-angular up to 3mm. *(continued)*	W	MD		5.10: Inferred residual at 5.1 m.
										Hole Terminated at 5.20 m				5.20: TC bit refusal on inferred bedrock.
						33.4	6							
						32.4	7							
						31.4	8							
						30.4	9							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Borehole ID

BH09

Page 1 of 1

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	08/01/2019
Project Name:	Kambala Girls School	Completed:	08/01/2019
Hole Location:	Rose Bay	Logged By:	MB/SS
Hole Position:	340232.0 m E 6251434.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.50 m		
Hole Diameter:	130 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information							Soil Description					Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T										SILTY SAND: dark brown, fine grained sand, roots and rootlets observed down to 0.2 m.	M	L		0.00: FILL
						38.5	1			SILTY SAND: orange-brown, fine grained sand, trace gravel sub-angular up to 3mm.	M	L		
				1.50 m SPT - 4, 4, 3, N = 7.		37.5	2			Becomes pale brown at 2.0 m.				
										SAND: light grey, fine grained sand	D	L		
				3.00 m SPT - 2, 4, 3, N = 7.		36.5	3		SM	SILTY SAND: orange-brown, fine grained sand	M	C		3.50: Inferred residual.
				3.90 m SPT refusal		35.5	4			Hole Terminated at 4.00 m				4.00: TC bit refusal on inferred bedrock.

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Borehole ID

BH10

Page 1 of 1

Engineering Log - Non Cored Borehole

Project No.: PSM3759

Client:	Pepper Property Advisory Pty Ltd	Commenced:	09/01/2019
Project Name:	Kambala Girls School	Completed:	09/01/2019
Hole Location:	Rose Bay	Logged By:	SS
Hole Position:	340226.0 m E 6251481.0 m N MGA94 Zone 56	Checked By:	GM

Drill Model and Mounting:	CRP 155 Track Mounted	Inclination:	-90°	RL Surface:	39.80 m		
Hole Diameter:		Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information								Soil Description						Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description SOIL NAME: Colour, structure, plasticity, additional	Moisture Condition	Consistency / Relative Density	Hand Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T						39.8	0			SAND: orange-red, medium grained sand, roots and rootlets observed down to 0.2 m.	M	L		0.00: FILL
										Trace of gravel observed from 0.8 m.	M to W			
						38.8	1			Hole Terminated at 1.00 m				1.00: TC bit refusal.
						37.8	2							
						36.8	3							
						35.8	4							

Method
AD/T - Auger drilling TC bit
AD/V - Auger drilling V bit
WB - Washbore
SPT - Standard penetration test
PT - Push tube
AS - Auger Screwing

Penetration
No resistance through to refusal

Water
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
ES - Environmental Sample
TW - Thin Walled
LB - Large Disturbed Sample

Classification symbols and soil descriptions based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very soft
S - Soft
F - Firm
St - Stiff
VSt - Very stiff
H - Hard
VL - Very loose
L - Loose
MD - Medium dense
D - Dense
VD - Very dense
Ce - Cemented
C - Compact

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

Attachment B
Geotechnical & Analytical Laboratory Testing Results

Pells Sullivan Meynink

POINT LOAD STRENGTH INDEX TEST RESULTS

Job No. ***PSM3759*** **Sheet 1 of 1**

Project ***Kambala Girls School***

Test Method	*AS 4133.4.1 - 1993 Methods of Testing Rocks for Engineering Purposes, Determination of Point Load Strength Index*	Sampling Technique	*NLMC*	Sampling Date	*8/01/2019*
		Storage History	*North Ryde office indoor core storage area*	Testing Date	*8/01/2019*
Test Machine	*GSA 6500*	Moisture Condition	*Natural*	Tested By	*MB/SS*
Calibration Date	*3/12/2012*	Loading Rate	*< 30 seconds*		

Rock Type	Location	Depth	Diametral Tests					Axial, Block, and Irregular Lump Tests							AS 1726 Strength Class
			D	L	P	$I_{s(50)}$	Failure Mode	W	D	L	P	I_s	$I_{s(50)}$	Failure Mode	
		(m)	(mm)	(mm)	(kN)	(MPa)		(mm)	(mm)	(mm)	(kN)	(MPa)	(MPa)		
Sandstone	***Bh04***	***2.67***	*50*	*31*	*2.7*	***1.1***	*Parallel to bedding*	*50*	*33*		*2.3*	*1.1*	***1***	*Through substance*	***H***
Sandstone	***Bh04***	***3.68***	*50*	*58*	*3.1*	***1.2***	*Parallel to bedding*	*50*	*35*		*2.2*	*1*	***1***	*Through substance*	***H***
Sandstone	***Bh04***	***4.51***	*50*	*26*	*2.5*	***1***	*Parallel to bedding*	*50*	*31*		*2.7*	*1.4*	***1.3***	*Through substance*	***H***
Sandstone	***Bh06***	***4.83***	*50*	*35*	*1.7*	***0.7***	*Parallel to bedding*	*50*	*45*		*2.4*	*0.8*	***0.8***	*Through substance*	***M***
Sandstone	***Bh06***	***5.84***	*50*	*38*	*2.8*	***1.1***	*Parallel to bedding*	*50*	*38*		*4*	*1.7*	***1.6***	*Through substance*	***H***
Sandstone	***Bh06***	***6.94***	*50*	*30*	*1.5*	***0.6***	*Parallel to bedding*	*50*	*38*		*2.2*	*0.9*	***0.9***	*Through substance*	***M***
Sandstone	***Bh06***	***7.53***	*50*	*38*	*8.6*	***3.4***	*Parallel to bedding*	*50*	*39*		*8.6*	*3.5*	***3.5***	*Through substance*	***VH***

By: ***MB*** **Checked:** ***SS*** **Date:** ***14/01/2019***