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Our Ref: PSM1397.R1
Date: 27 October 2009

Taylor Thomson Whitting Pty Ltd
Level 3, 48 Chandos St
ST LEONARDS NSW 2065

ATTENTION: RICHARD GREEN (via. e-mail: richard.green@ttw.com.au)

Dear Sir,

RE: UNSW ENERGY TECHNOLOGIES BUILDING, KENSINGTON
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION

We are pleased to submit our report on the geotechnical investigation undertaken for the above project.

Please do not hesitate to contact the undersigned if you have any queries.

For and on behalf of
PELLS SULLIVAN MEYNINK

GARRY MOSTYN

Distribution: 1 electronic copy TTW
3 hard copies TTW
Original held by PSM

Taylor Thomson Whitting Pty Ltd

UNSW ENERGY TECHNOLOGIES BUILDING, KENSINGTON GEOTECHINCAL AND ENVIRONMENTAL INVESTIGATION

PSM1397.R1 OCTOBER 2009

CONTENTS

1. INTRODUCTION

This report presents the results of the geotechnical investigation undertaken by Pells Sullivan Meynink Pty Ltd (PSM) at the proposed site for the University of New South Wales (UNSW) Energy Technologies Building. In addition, it presents the results of the Stage 1 contamination assessment completed by Urban Environmental Consulting (UEC) on behalf of PSM.

The study was undertaken in accordance with our proposal A1103.L1 dated 20 August 2009 as varied in the e-mail from Bernard Shen of PSM dated 24 August 2009. The proposal was prepared in response to the Taylor Thomson Whitting (TTW) Geotechnical Investigation Brief (Ref. 091426) dated 11 August 2009.

Confirmation to proceed was provided in a letter dated 10 September 2009 (Ref. 091426).

The aim of the geotechnical investigation was to assess the subsurface conditions, assess the adequacy of the existing pavement and provide geotechnical advice for the proposed development. The aim of the Stage 1 contamination assessment was to identify past and present potentially contaminating activities. We have also included investigation results for previous projects undertaken within 300 m of the site.

2. PROPOSED DEVELOPMENT

We understand that the project comprises construction of a concrete frame building with four (4) storeys above ground, a roof and one (1) basement level. The basement level is approximately 4.0 m to 4.5 m below the existing ground level. The site is located at the existing tennis courts along Anzac Parade in UNSW, Kensington. A maximum working column load of 16,000 kN is proposed.

3. GEOTECHNICAL INVESTIGATION

3.1. Fieldwork

The fieldwork was undertaken on 23 September 2009 and 25 September 2009 and comprised:

- 5 x CPTs (CPT201 to CPT 205).
- 1 x borehole (BH101).
- 37 x Falling Weight Deflectometer (FWD) tests.

The CPTs were undertaken by Ground Test Pty Ltd, using a 15.5 tonne truck mounted testing rig. Four (4) CPTs were undertaken to 20 m depth and one (1) CPT to 25 m depth. The CPT locations are shown on Figure 1. CPT results and interpreted profiles are presented in Appendix A.

Borehole BH101 was drilled by Soil Check Pty Ltd using a truck mounted drill rig. The borehole was drilled to a depth of 27.25 m, using auger drilling and washboring techniques. The borehole location is shown in Figure 1. Drilling was undertaken in the full time presence of a PSM geotechnical engineer. Standard Penetration Tests (SPT) were undertaken and soil samples recovered. The engineering borehole log, together with the explanation sheets are presented in Appendix B.

A standpipe piezometer was installed in borehole BH101. Depth to the water table was measured immediately after the installation of piezometer and on three (3) occasions after installation. Groundwater levels are tabulated in Table 1. The measurement taken on 27 October 2009 was after significant rainfall.

TABLE 1
SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS

DATE / TIME	GROUNDWATER MEASUREMENTS	
	DEPTH (m)	REDUCED LEVEL (m AHD)
Immediately after piezometer installation 25/09/2009 (5:00 pm)	5.9	21.0
1/10/2009 (6:00 pm)	6.2	20.7
13/10/2009 (7:00 pm)	6.1	20.8
27/10/2009 (7:00 am)	5.9	21.0

The testing and sampling locations were measured by tape relative to existing site features. The surface levels of testing and sampling locations were measured with respect to levels of existing site features shown on a survey plan provided by UNSW.

The FWD testing was undertaken by Australian Surface Testing Pty Ltd. Testing was carried out at approximately 25 m intervals per lane of traffic and the test locations are shown on Figure 2. The results are summarised in Figure 3 and data shown in Appendix C.

3.2. Geotechnical laboratory Testing

Five (5) bulk samples (CBR1 to CBR5) were recovered for California Bearing Ratio (CBR) testing. The locations of the CBR sampling are shown in Figure 4.

The geotechnical laboratory test results are attached in Appendix D and summarised in Table 2.

TABLE 2
SUMMARY OF CBR TESTING RESULTS

SAMPLE	DEPTH (m)	DESCRIPTION	CBR[(1)] (%)	FIELD MOISTURE CONTENT (%)	DRY DENSITY RATIO (STANDARD) (%)
CBR1	0.05 – 0.40	Silty Clay: high plasticity, dark grey and black	2.0	30.2	98
CBR2	0.20 – 0.30	Silty Sand: grey, with medium to coarse gravel	7.0	19.1	98
CBR3	0.15 – 0.30	Silty Sand: light brown, with medium to coarse gravel, with foreign material (ceramic, glass, root fibres)	15.0	4.3	98
CBR4	0.15 – 0.40	Silty Sand: grey and black, with foreign material (ceramic, grass cuttings, glass, root fibres)	3.0	9.0	98
CBR5	0.10 – 0.30	Silty Sand: grey, black and brown, with medium to coarse gravel, with foreign material (ceramic, glass, root fibres)	8.0	4.7	98

Notes: [(1)] 4 day soaked CBR, 4.5 kg surcharge

4. STAGE 1 CONTAMINATION ASSESSMENT

The Stage 1 contamination assessment was performed by Urban Environmental Consultants (UEC). The Stage 1 contamination assessment report prepared by UEC (Ref. UES006.R01 dated 7 October 2009) is included in Appendix E.

As part of the contamination assessment, UEC completed preliminary waste classification testing of disturbed soil jar samples provided by PSM. PSM retrieved a total of four (4) samples from three (3) locations; BH101, CBR2 and CBR3. The samples were retrieved from between 0.2 to 2.0 m depth below the ground surface.

Laboratory analysis completed by UEC included testing for contaminants such as metals (CU, Pb, Zn, Cr, Cd, Ni, As, Hg), Petroleum Hydrocarbons (TPH / BTEX), Polyaromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs) and Pesticides (OCP/OPPs). Results are included in Appendix E.

5. SITE CONDITIONS

5.1. Geological Setting

The 1:100,000 Sydney Geological map indicates that the site is underlain by medium to fine-grained “marine” sand with podsols (a leached soil).

The published information was consistent with the encountered subsurface conditions in the field investigation.

5.2. Surface Conditions

The site is rectangular in shape with dimensions approximately 75.0 m (east to west) and 35.0 m (north to south). The site comprises tennis courts within the UNSW campus. It is bound by the University Mall to the north, Anzac Parade to the west, Grounds Depot (Building J6) to the south and Sam Cracknell Pavilion (Building H8) to the east.

The site survey plan show the existing tennis courts level at approximately RL 27 m AHD. The architectural drawings provided by TTW show the proposed basement at RL 23.7 m AHD.

5.3. Subsurface Conditions

The subsurface conditions encountered within the borehole and CPTs are summarised in Table 3 and Table 4. The subsurface conditions comprised a thin veneer of fill over aeolian and marine sand. The density index of the sand above approximately 10 m depth ranged from medium dense to dense, while below this depth the sand was typically dense to very dense.

TABLE 3
SUMMARY OF SUBSURFACE CONDITIONS ENCOUNTERED AT BOREHOLE AND CPT LOCATIONS

UNIT NAME	REDUCED LEVEL OF TOP OF UNIT (m AHD)	DESCRIPTION
FILL	26.8 to 27.1	GRAVEL and SAND: fine to medium gravel, up to 20 mm, angular, grey, medium grained sand.
SAND 1	26.7 to 27.0	SAND: fine to medium grained, dark brown and yellow brown, some thin clay bands. Density index range from medium dense to dense, typically within the medium dense range. Aeolian origin (wind blown deposit).
SAND 2	16.3 to 18.3	SAND: medium grained, yellow brown. Density index range from dense to very dense, typically within the dense range. Marine origin (marine deposit).

TABLE 4
LEVELS OF GEOTECHNICAL UNITS AT BOREHOLE AND CPT LOCATIONS

UNIT NAME	REDUCED LEVEL OF TOP OF UNIT (m AHD)					
	CPT201	CPT202	CPT203	CPT204	CPT205	BH101
FILL	26.9	27.1	27.2	27.2	27.0	26.9
SAND 1	26.7	26.9	27.0	27.0	26.8	26.7
SAND 2	16.3	16.9	18.3	18.1	17.9	20.0 - 18.0

5.4. Groundwater

Groundwater was encountered at levels of between RL 20.7 m AHD and RL 21.0 m AHD. It is noted however that groundwater levels do fluctuate with rainfall and other factors.

6. DISCUSSIONS AND RECOMMENDATIONS

6.1. Site Classification

The site has been classified in accordance with Australian Standard AS 2870 (1996), *Residential slabs and footings – Construction*. Table 2.1 of the standard provides classification by foundation material.

Based on the site observations, we recommend that structures relevant to this code be designed for a site classification of Class "A" (i.e. Most sand and rock sites with little or no ground movements from moisture changes).

6.2. Bulk Excavation Conditions

We understand that excavation to a depth between 4.0 m and 4.5 m is required for the proposed basement level. Based on the results of the investigation, excavation in FILL and SAND 1 units will be required. The SAND 2 unit is not expected to be exposed during excavation.

Excavation in FILL and SAND 1 units should be achievable using conventional earth moving equipment, including excavators, dozers and front end loaders.

The trafficability of excavated material will be dependant on preventing saturation of the near surface soils. Based on water levels measured from the piezometer, the water table is expected to occur about 1.5 m below the excavation level. Groundwater levels may increase especially during protracted periods of rain. Allowance for dewatering such as by pump and sump techniques may be required. Placement of a granular working platform may also be a suitable option.

6.3. Permanent and Temporary Batters

The following batter slope angles shown in Table 5, subject to the comments below, are recommended for the design of batters up to 5.0 m height.

TABLE 5
BATTER SLOPE ANGLES

UNIT NAME	TEMPORARY	PERMANENT
SAND 1	2.5H : 1V	3H : 1V

All batters should be protected from erosion. Permanent batters should be drained. Temporary batters should not be left unsupported for more than 3 months.

6.4. Excavation Support

It is understood that excavation would be approximately 4.0 m to 4.5 m deep. Structural support will be required to provide temporary and permanent support for the SAND 1 unit which will occur around the perimeter of the excavation.

The design of support structures should be based on the effective soil strength parameters, c' and ϕ' or the 'at rest' coefficient of lateral earth pressure K_o provided in Table 6.

We note that we have not provided active earth pressure coefficients (K_a) as these are dependent on the wall type and geometry, the batter angle, the backfill angle, the flexibility of the wall, the construction sequence, the acceptable deformation, surcharge etc. The retaining wall designer should consider all the above as part of the design.

Design of retention systems may be based on either K_a or K_o pressures. Design using active earth pressures provides the minimum lateral earth pressure that must be supported and requires a wall that can move 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).

If there is concern regarding movement due to basement excavation affecting adjacent structures or buried services, it is recommended that the design and construction be based on K_o pressures and construction be carefully controlled to ensure support is provided throughout all stages of construction. It should be noted that designing for K_o pressures does not, of itself, ensure that movement does not occur. Movements are controlled by construction method, especially sequence. The proximity of the

neighbouring buildings to the boundaries will need to be considered when designing the basement retaining structure.

Passive earth pressures should be used for calculation of resisting forces in embedded sections of retaining structures. Note these require large strains to mobilise the full geotechnical capacity. Where basement excavations extend below the water table, design of retention systems should take into account hydrostatic pressures.
Contiguous pile walls may be appropriate for the northern and southern boundary, though will require care to ensure that gaps between piles are filled to prevent loss of sand. This is based on the assumption that there are no movement sensitive structures along the boundaries.

Secant pile walls may be required adjacent to the Sam Cracknell Pavilion and western boundary, including a short return along the northern and southern walls. Use of soil anchors may be required, though installation of such anchors may result in ground loss, which could cause a problem at the Sam Cracknell Pavilion.

It is considered unlikely that a cantilevered wall will be economical for the proposed excavation depth.

6.5. Foundation Advice

6.5.1. General

The following sections provide advice and parameters that may be used when proportioning rafts, pad footings or bored piles for the proposed structure.

6.5.2. Pad and Raft Footings

Pad footings should be founded on or within the SAND 1 unit. The design parameters in Table 6 can be adopted.

6.5.3. Piles

Piles should be designed in accordance with the requirements in AS 2159 (1995), *Piling - Design and Installation*. The parameters provided in Table 6 and 7 may assist in the design of piles.

We envisage that piles will be founded within the SAND 2 unit, and with toe levels between RL 16 m AHD and RL 9 m AHD.

With regards to pile design we recommend that:

- A geotechnical strength reduction factor, Φ_g = 0.55 (AS2159 Cl. 4.2.2) be adopted.
- For bored concrete piles, a strength reduction factor of 0.75 (AS2159 Cl. 5.3.2) be adopted.
- For bored grout piles, a strength reduction factor of 0.65 (AS2159 Cl. 5.3.3) be adopted.

6.5.4. Differential Settlements

Where adjacent foundation details differ (e.g. pile and pad, differing loads or ground conditions) differential settlement will need to be assessed.

6.6. Earthquake Provisions

From AS 1170.4 (2007), *Structural design actions – Part 4: Earthquake actions in Australia,* Section 4.2, the site is classified as Class C_e, with depth of soil not exceeding 45 m for medium dense sand. The hazard factor (Z) for the site is 0.08 as per Table 3.2 of AS1170.4 - 2007.

6.7. Pavements

6.7.1. Existing Southern Drive

As shown in Figure 3, the FWD testing indicates the following:

- An overall deflection of between 0.2 mm and 1.2 mm, with a mean of 0.7 mm.
- A curvature deflection ratio of between 5% and 57%, with a mean of 26%.

The calculated Characteristic Deflection (CD) as defined by Austroads AP-G87/04 (Eqn. 6.2) is 1.0 mm.

Austroads AP-G87/04, *Pavement Rehabilitation: A guide to design of rehabilitation treatments for road pavements,* provides guidelines on the condition of a pavement based on deflection testing data. Its states that very high local deflections (more than 1.5 mm) may indicate weak subgrade conditions and a curvature deflection ratio of higher than about 35% may indicate low stiffness of the base course. The FWD results did not exceed either of these values.

Austroads presents a method whereby the CD can be used to assess the required thickness of asphalt overlay for different design traffic. The criteria for this is pavement rutting. Based on Figure 6.5 of Austroads AP-G87/04, an overlay is not required for a CD of 1.0 mm and traffic loading of up to $3x10^6$ Equivalent Standard Axles (ESA). We note that the design charts presented in Austroads are for a standard FWD test pressure of 566 kPa and the FWD testing undertaken was at a pressure of 700 kPa. The measured deflections used in our assessment of traffic loading have not been corrected for this and therefore the assessment is conservative.

By adopting 4.5 ESAs for a construction vehicle (i.e. truck and trailer), this would be equivalent to more than 600,000 loaded movements, which we consider is unlikely to be exceeded for the proposed development.

A basic inspection of the Southern Drive was undertaken on 27 October 2009. The following was observed:

- Cracks and patch work between chainage 350 m to 450 m (i.e. outside Building L6, New College).
- Patch work between chainage 220 m to 280 m (i.e. outside Building N9, Shalom College).
- Other areas appeared to be in a relatively good condition.

Based on the above observations, some localised areas of the Southern Drive may experience further distress due to construction traffic and may require further patching.

6.7.2. New pavement

The CBR testing has indicated that the subgrade (at depth 0.05 m to 0.4 m below the ground surface) has a CBR between 2.0% to 15.0% when compacted to 98% of Standard Maximum Dry Density. The low CBR values for CBR1 and CBR4 is likely due to the subgrade being fill. We recommend that a design CBR of 8% be adopted for pavements founded on the SAND 1 unit.

TABLE 6
RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS FOR RETAINING STRUCTURES AND SHALLOW FOOTINGS

UNIT NAME	UNIT WEIGHT	EFFECTIVE STRENGTH PARAMETERS			YOUNG'S MODULUS		POISSON'S RATIO
		Cohesion	Friction angle	At rest coefficient of lateral earth pressure			
		c'	ϕ'	K_0			
	(kN/m^3)	(kPa)	(degrees)		(MPa)		
SAND 1	20	0	32	0.47	Above RL 23 m AHD	15	0.25
					Below RL 23 m AHD	30	
SAND 2	22	0	38	N.A.	60		0.3

TABLE 7
RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS PILES

UNIT NAME	CONTINUOUS FLIGHT AUGER PILES			DISPLACEMENT PILES[1]			DRIVEN PILES		
	Modulus (MPa)	Ultimate shaft adhesion (kPa)	Ultimate end bearing pressure (MPa)	Modulus (MPa)	Ultimate shaft adhesion (kPa)	Ultimate end bearing pressure (MPa)	Modulus (MPa)	Ultimate shaft adhesion (kPa)	Ultimate end bearing pressure (MPa)
SAND 1 (below RL 23 m AHD)	30	30	3.5	70	60	6	70	60	6
SAND 2 (between RL 17 m AHD and RL 2 m AHD)	40	50	10	90	80	12	90	80	12

Notes: [1]eg. Frankipile Australia Atlas piles or Vibropile Omega piles
[2]The parameters above are not to be used for piles founded below RL 2 m AHD, as the geotechnical investigation did not extend below RL 0 m AHD.

If subsurface conditions are found to vary from those described in this report, further advice should be sought.

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

For and on behalf of
PELLS SULLIVAN MEYNINK

GARRY MOSTYN

REFERENCES

Austroads AP-G87/04 (2004), *Pavement Rehabilitation: A guide to design of rehabilitation treatments for road pavements.*

A3

UNIVERSITY MALL

H3

H5

H8a

H8
SAM CRACKNELL PAVILION

J6
GROUNDS DEPOT

J6C

J6

DAY AVE

ANZAC PARADE

VILLAGE GREEN

CPT202
RL27.13m

CPT203
RL27.12m

CPT204
RL27.11m

CPT201
RL26.86m

BH101
RL26.94m

CPT205
RL26.94m

TBM1
RL27.21m

2.0
3.5
36.1
3.8
2.0

LEGEND

CPT201 RL27.13m — CONE PENETRATION TEST (CPT)

BH1 RL26.94m — BOREHOLE WITH STANDPIPE PIEZOMETER

TBM1 RL27.21m — TEMPORARY BENCHMARK (TBM)

N

0 10 20 30 m

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Taylor Thomson Whitting Pty Ltd
Proposed Energy Technologies Building
University of New South Wales, Kensington

GEOTECHNICAL INVESTIGATION
CPT and BH LOCATION PLAN

PSM1397.R1 | FIGURE 1

A3

FWD1E
FWD18W
FWD2E
FWD17W
FWD3E
FWD16W
FWD4E
FWD15W
FWD5E
FWD14W
FWD6E
FWD13W
FWD7E
FWD12W
FWD8E
FWD11W
FWD9E
FWD10W
FWD10E
FWD9W
FWD8W
FWD11E
FWD12E
FWD7W
FWD13E
FWD6W
FWD14E
FWD5W
FWD15E
FWD4W
FWD16E
FWD3W
FWD17E
FWD2W
FWD18E
FWD1W
FWD19E

VILLAGE GREEN
J6 GROUNDS DEPOT
L6
M7
N8
N9
N13
J12
J14
K14
K15
H13
M15
Barker Street
Southern Drive
Science Road
Physics road

CHAINAGE 0 m

LEGEND

FWD1W — FWD TEST LOCATIONS (W SERIES)

FWD1E — FWD TEST LOCATIONS (E SERIES)

N

0 20 40 60 m

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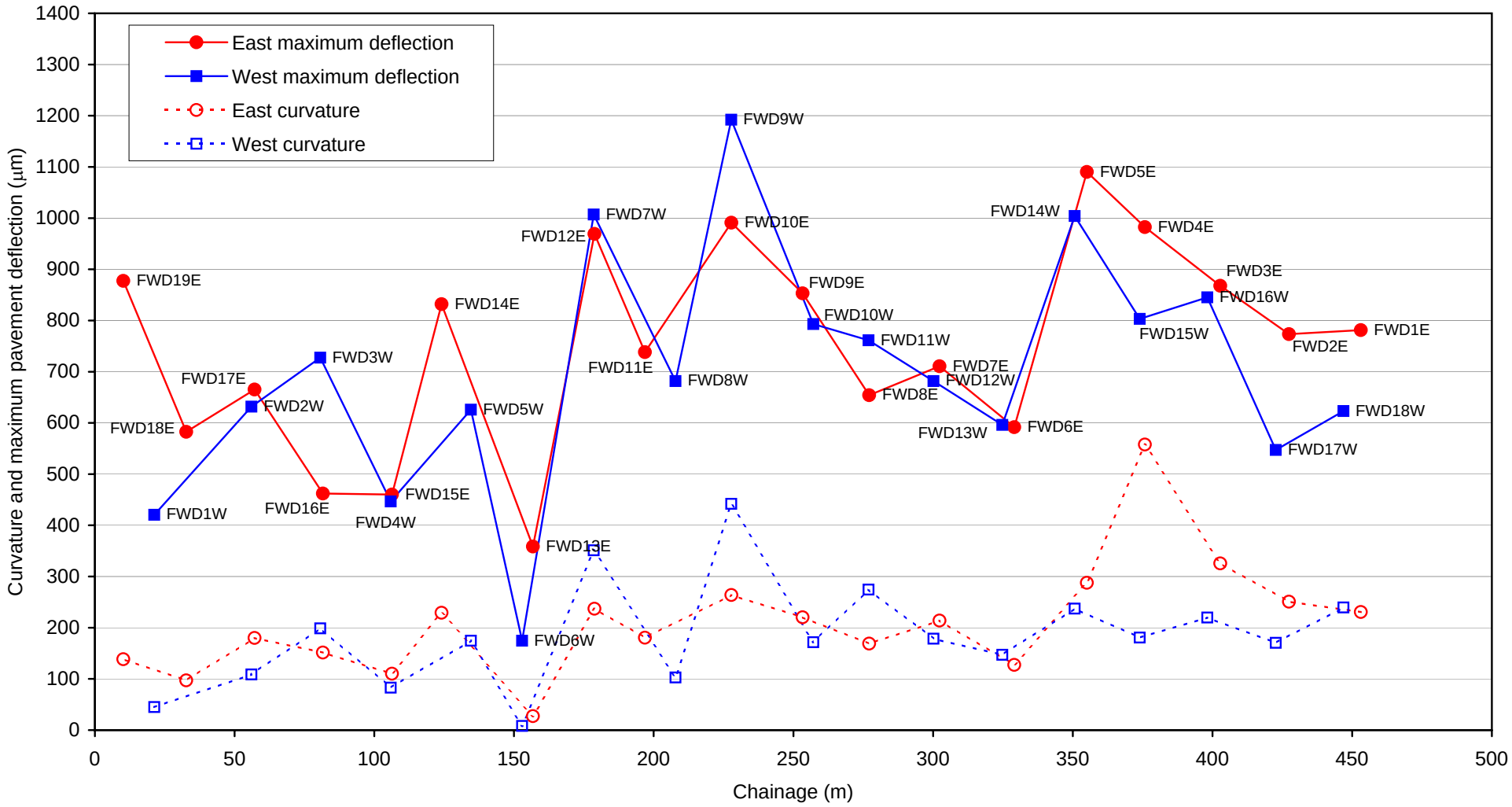
Proposed Energy Technologies Building
University of New South Wales, Kensington

GEOTECHNICAL INVESTIGATION
FWD TESTING LOCATION PLAN

PSM1397.R1 | FIGURE 2



Notes:

1. Chainage starts at Gate 14 along Barker Street.
2. Maximum pavement deflection measured at Sensor 1 (i.e. directly under falling weight).

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Taylor Thomson Whitting Pty Ltd
University of New South Wales
Energy Technologies Building, Kensington
GEOTECHNICAL INVESTIGATION
FWD TESTING SUMMARY

PSM1397.R1	FIGURE 3

U:\Jobs 1301 to 1400\PSM1381 to 1400\PSM1397\Engineering\FWD\[FWD data.xls]Summary

A3

TBM2
RL27.27m

CBR3
RL26.96m

CBR2
RL26.94m

TBM3
RL26.83m

CBR1
RL24.32m

TBM4
RL27.05m

CBR4
RL27.25m

CBR5
RL28.05m

UNIVERSITY MALL

University Mall

DAY AVE

ANZAC PARADE

H3

H5

H8
SAM CRACKNELL PAVILION

J6
GROUNDS DEPOT

J6C

L6

L5

M7

VILLAGE GREEN

F10

F12

J12

Science Road

Southern Drive

LEGEND

CBR1
RL24.32m
CBR SAMPLING LOCATION

TBM2
RL27.27m
TEMPORARY BENCHMARK (TBM)

N

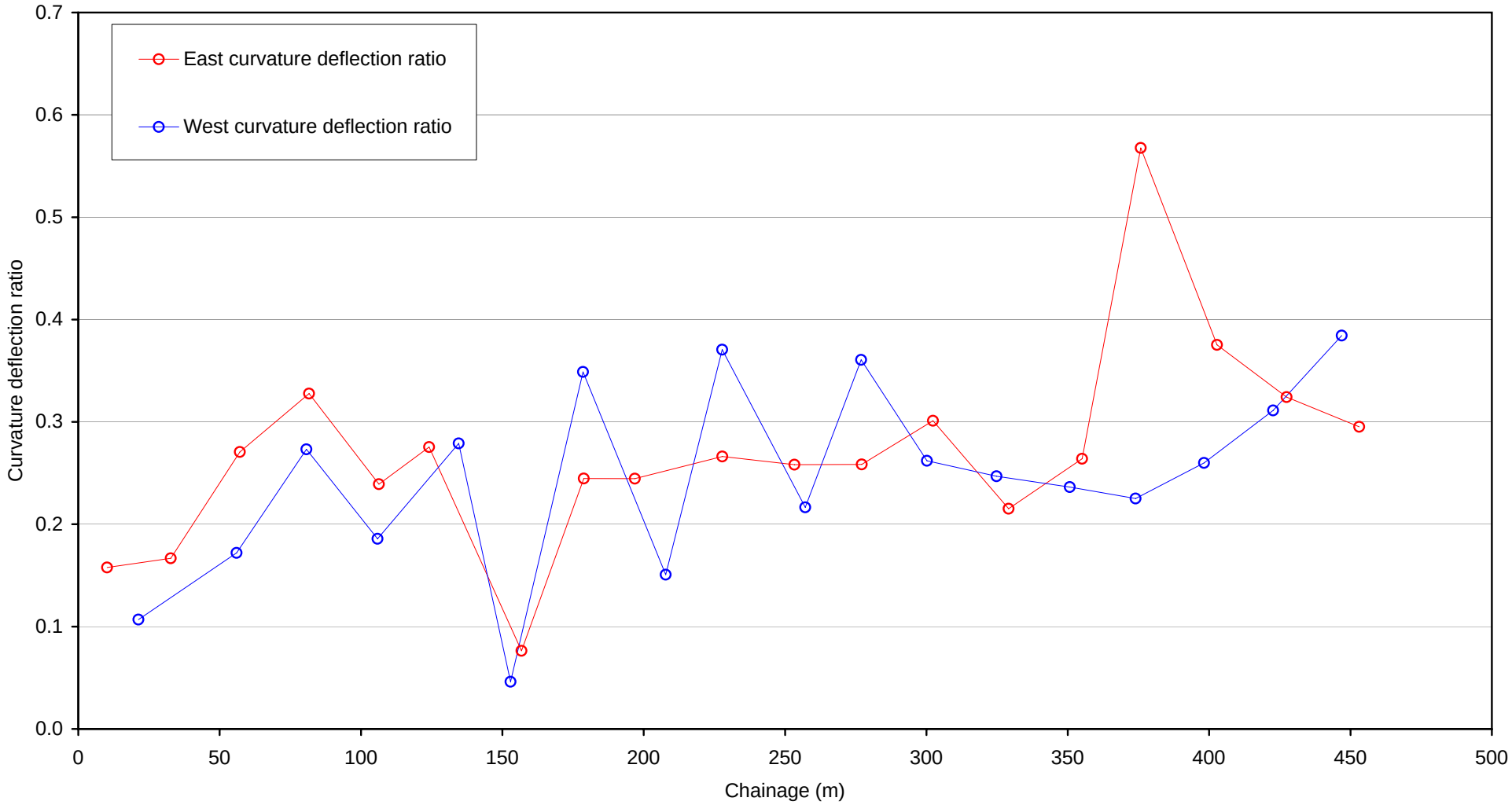
0 20 40 60 m

Pells Sullivan Meynink

Taylor Thomson Whitting Pty Ltd
Proposed Energy Technologies Building
University of New South Wales, Kensington

GEOTECHNICAL INVESTIGATION
CBR SAMPLING LOCATION PLAN

PSM1397.R1 | FIGURE 4



Notes:

1. Chainage starts at Gate 14 along Barker Street.

Pells Sullivan Meynink

Taylor Thomson Whitting Pty Ltd	
University of New South Wales	
Energy Technologies Building, Kensington	
GEOTECHNICAL INVESTIGATION	
CURVATURE DEFLECTION RATIO	
PSM1397.R1	**FIGURE 5**

U:\Jobs 1301 to 1400\PSM1381 to 1400\PSM1397\Engineering\FWD\[FWD data.xls]Summary

APPENDIX A

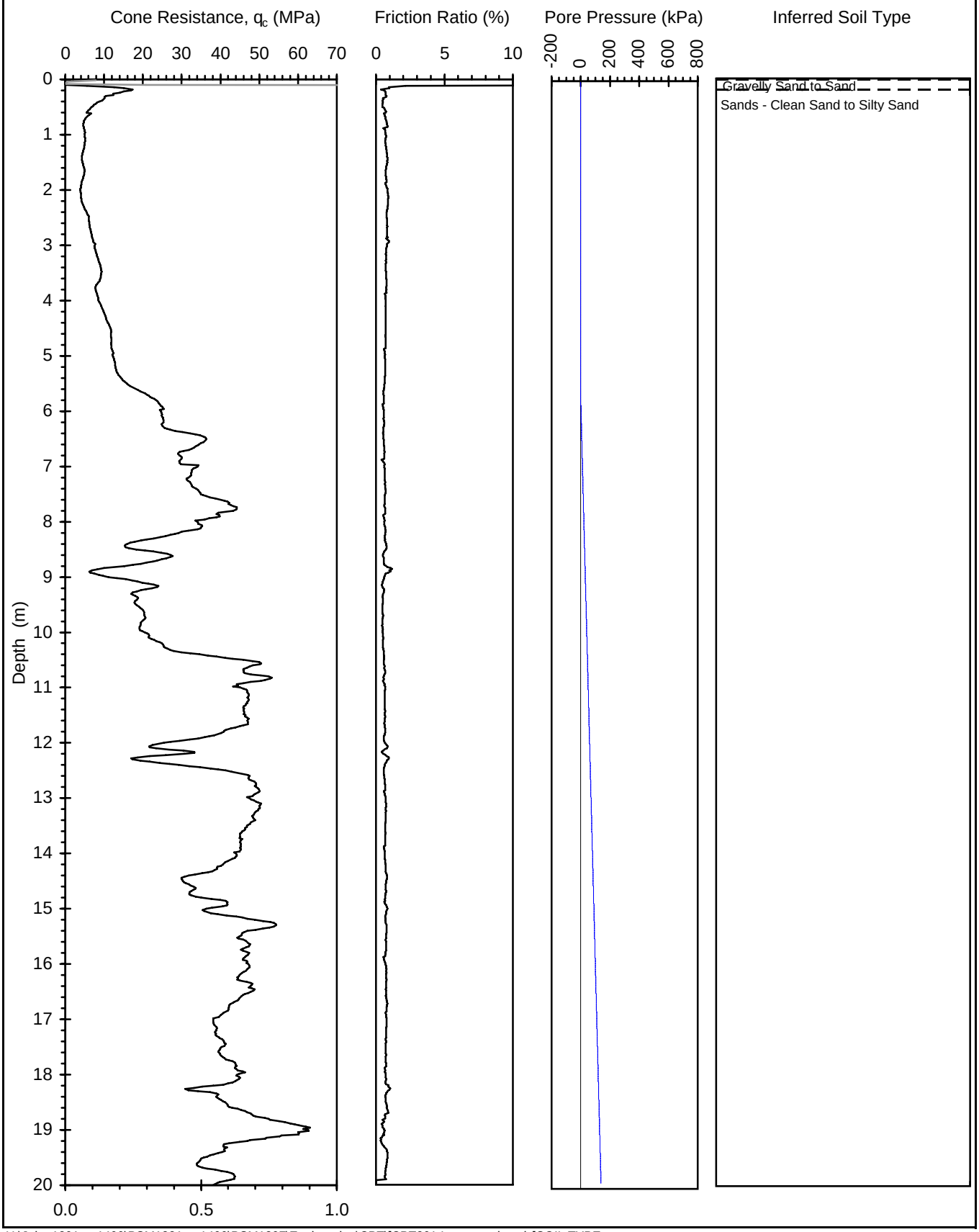
CONE PENETRATION TEST RESULT SHEETS

Pells Sullivan Meynink

CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT201***
Project	***UNSW Energy Technologies Building, Kensington, NSW***		

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*26.86 m (AHD)*	Field work	*Ground Test*



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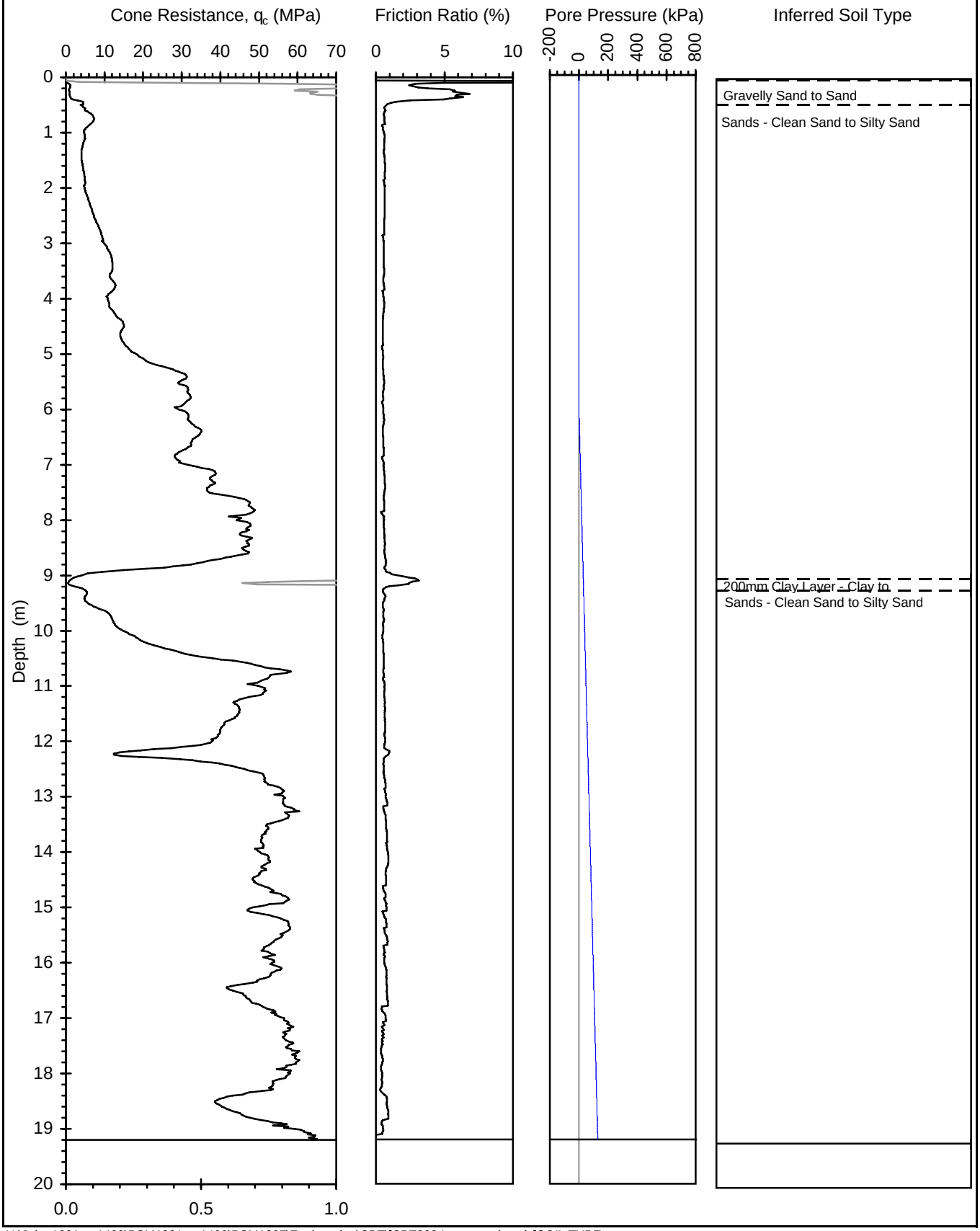
CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT202***
Project	***UNSW Energy Technologies Building, Kensington, NSW***		

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*27.13 m (AHD)*	Field work	*Ground Test*



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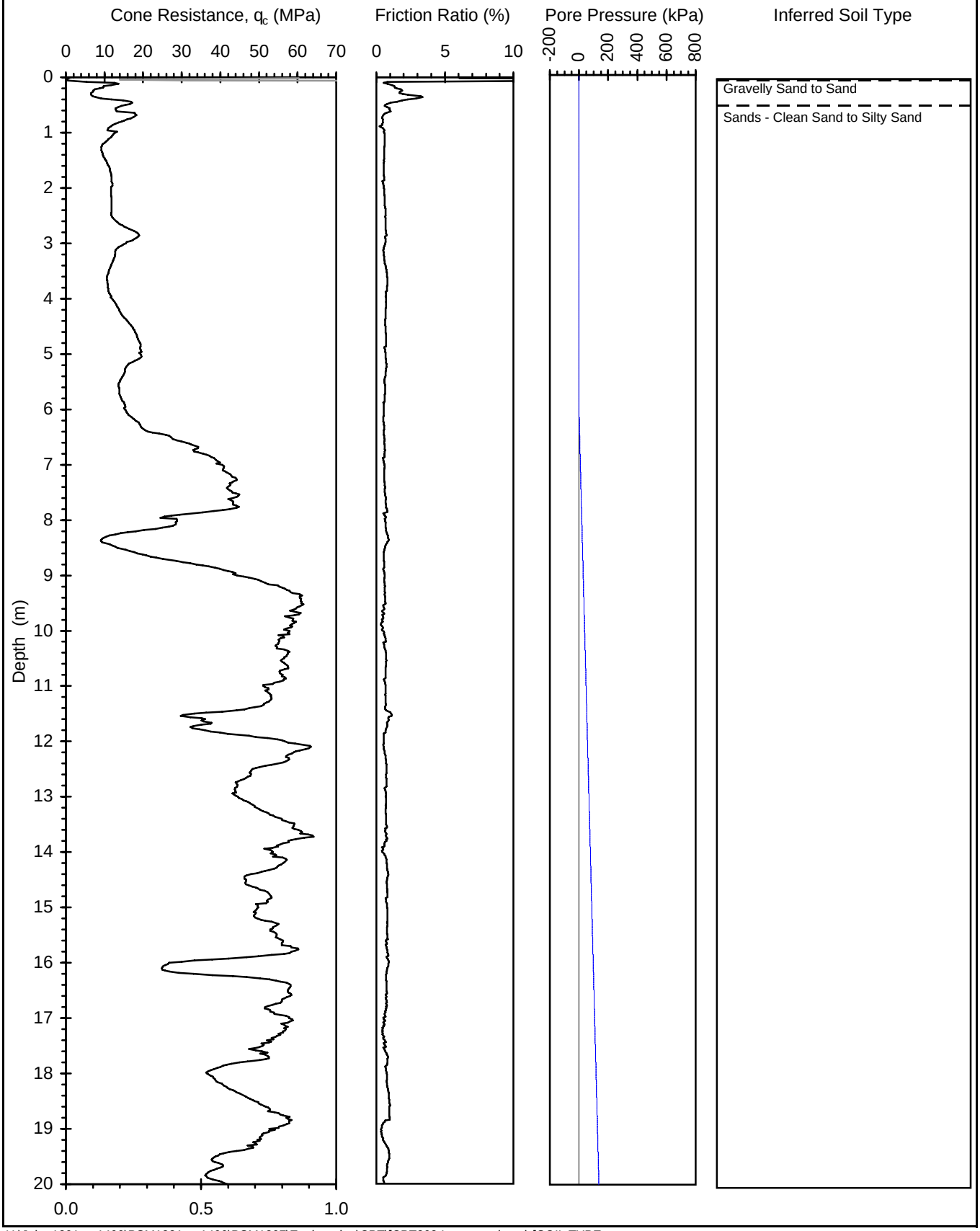
CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT203***
Project	***UNSW Energy Technologies Building, Kensington, NSW***	**Sheet**	***1 of 2***

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*27.12 m (AHD)*	Field work	*Ground Test*

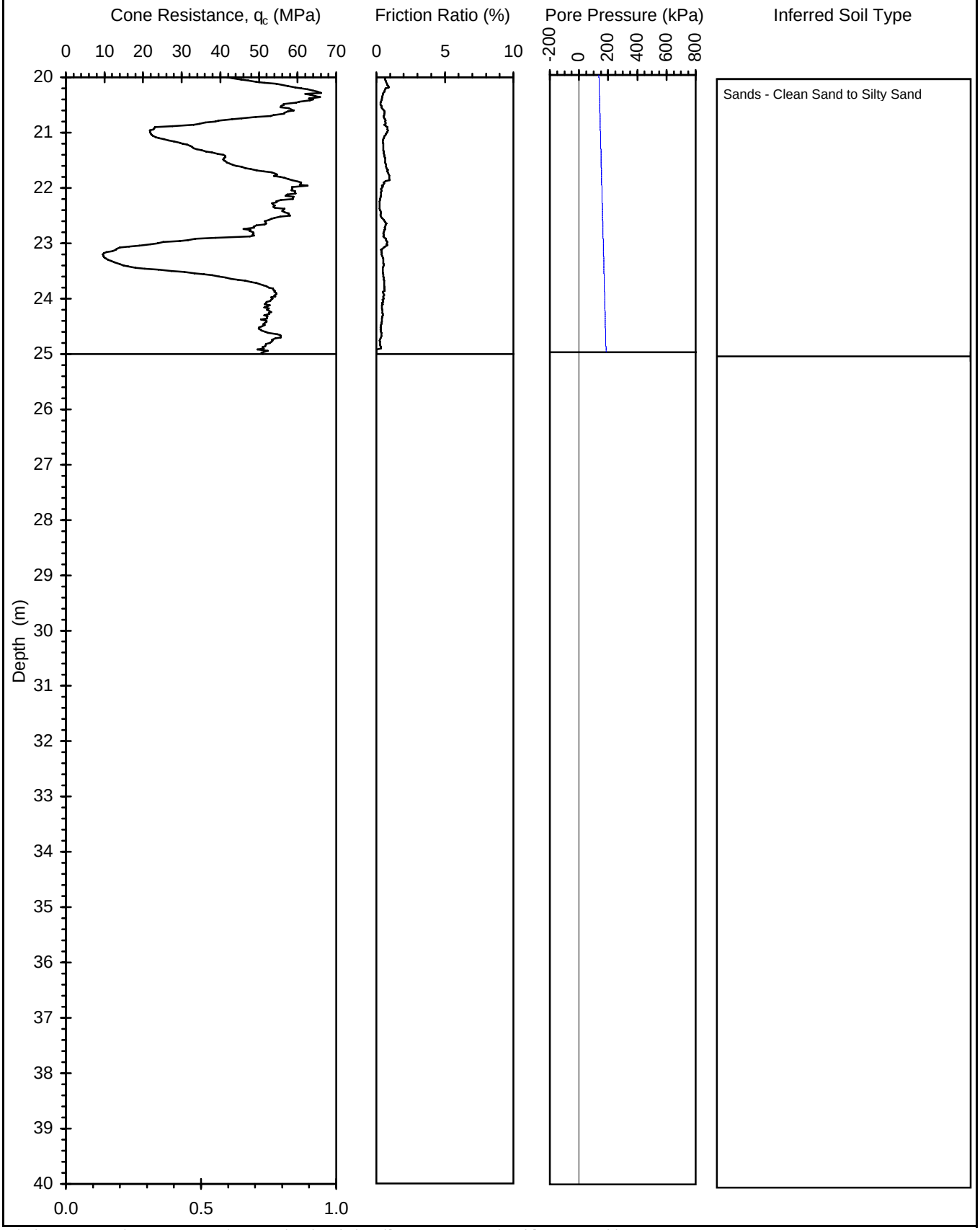


Pells Sullivan Meynink

CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT203***
Project	***UNSW Energy Technologies Building, Kensington, NSW***	**Sheet**	***2 of 2***

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*27.12 m (AHD)*	Field work	*Ground Test*

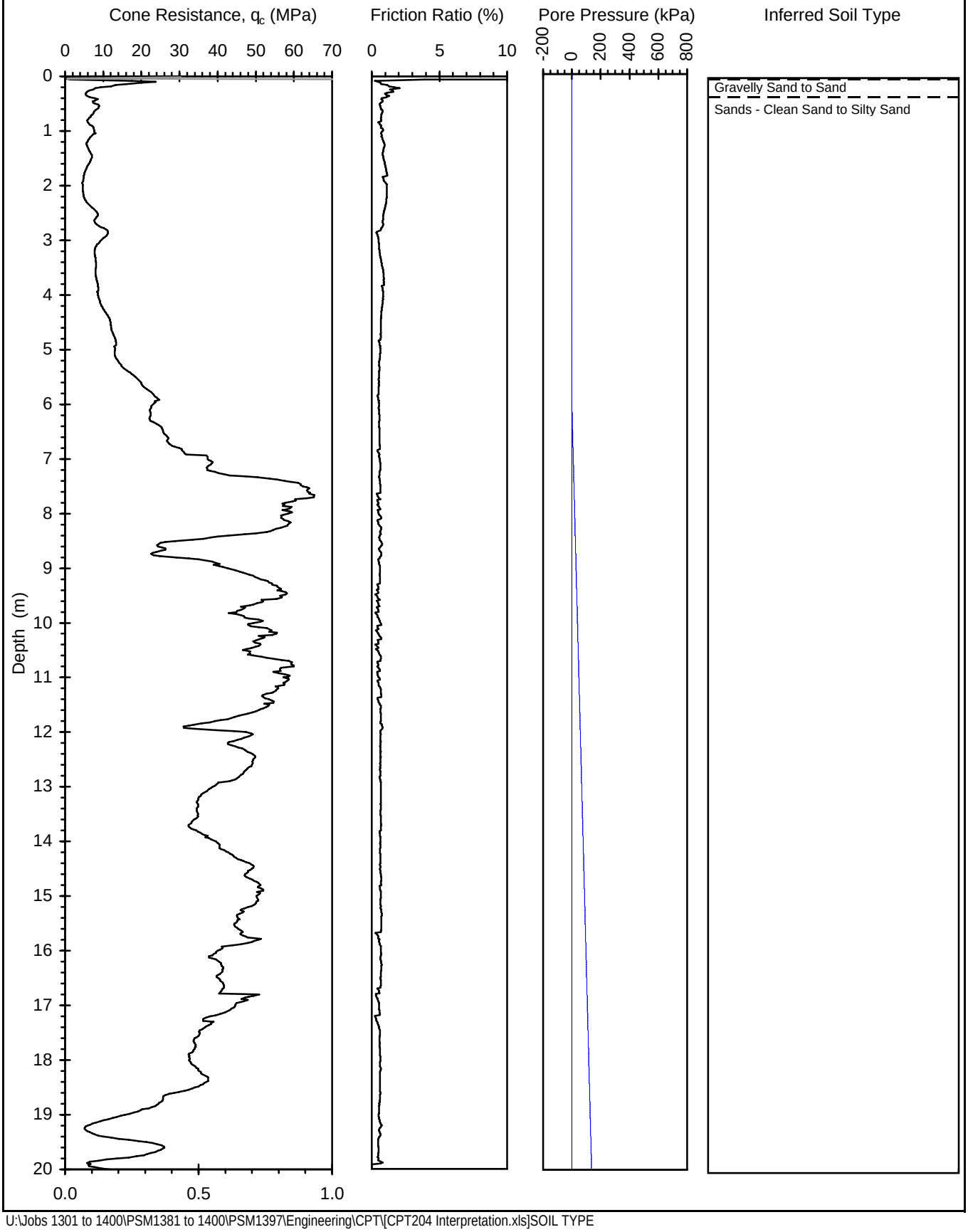


Pells Sullivan Meynink

CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT204***
Project	***UNSW Energy Technologies Building, Kensington, NSW***		

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*27.11 m (AHD)*	Field work	*Ground Test*

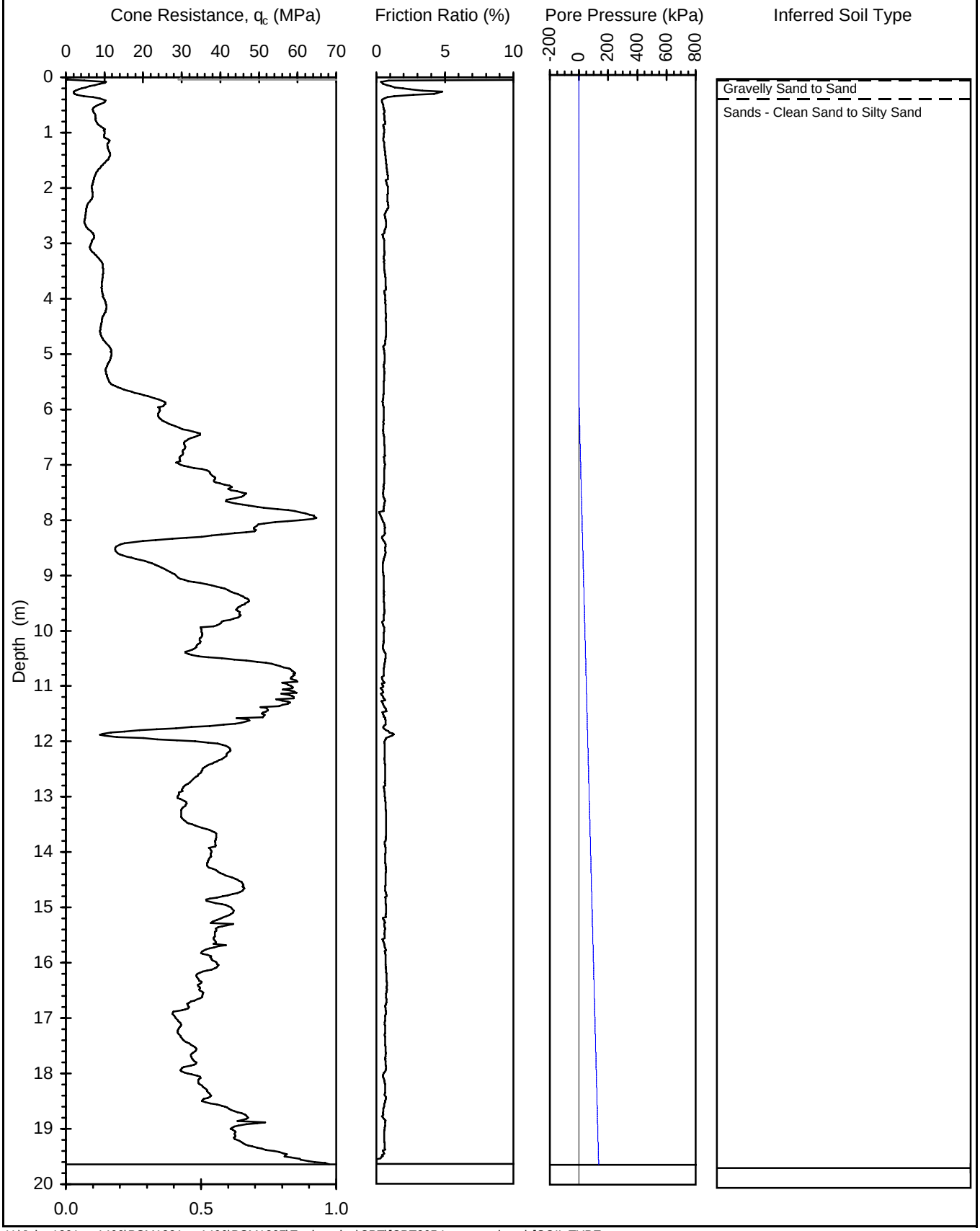


Pells Sullivan Meynink

CONE PENETRATION TEST - INFERRED SOIL TYPE

Job No.	***PSM1397***	**Test No.**	***CPT205***
Project	***UNSW Energy Technologies Building, Kensington, NSW***		

Pushing rig	*Douglas Partners truck*	Test date	*23/09/2009*
Location	*See PSM1397.R1 Figure 1*	Probe I.D.	*CONE-HH4*
R.L. Surface	*26.94 m (AHD)*	Field work	*Ground Test*



APPENDIX B

ENGINEERING BOREHOLE LOGS AND EXPLANATION SHEETS

Pells Sullivan Meynink

Engineering Consultants
Rock-Soil-Water

Borehole Log

Borehole No: **BH1**
Sheet: 1 of 3
Job No: PSM1397

Client:	Taylor Thomson Whitting Pty Ltd	**Date commenced:**	25/09/2009
Principal:		**Date completed:**	25/09/2009
Project:	UNSW Energy Technologies Building	**Logged by:**	BS/HCH
Site location:	Kensington, NSW	**Checked by:**	

Drilling contractor:	Soil Check Pty Ltd	**R.L. surface:**	26.94	**Vertical datum:**	AHD
Equipment type:	JK500 Truck Mounted Rig	**Easting:**		**Horizontal datum:**	
		Northing:		**Inclination / azimuth:**	-90 / -

Method	Samples	Water	R.L. (m)	Depth (m)	Graphic Log	USCS Symbol	Material (SOIL TYPE; plasticity or particle characteristics, colour, secondary and minor components / ROCK TYPE; weathering, particle characteristics, colour, secondary and minor components)	Moisture Condition	Estimated Strength	Structure and Additional Observations
Concrete saw	E		26.0	1.0			BITUMEN, 45 mm thick, black			Tennis court surface
							GRAVEL: fine, up to 20 mm, angular, grey, with some sand			Fill
							SAND: fine to medium grained, brown	D		
	E		25.0	2.0			Becoming fine grained, yellow brown			
			24.0	3.0			Becoming dark brown and yellow brown			
Auger			23.0	4.0				M		
	SPT 6,9,14 N=23	Measured on 25/09/09 (5.00pm)	22.0	5.0		SP				
			21.0	6.0						Water level measured immediately after installation of piezometer
			20.0	7.0			Becoming medium grained, brown			
			19.0	8.0			Becoming yellow brown	W		
Washboring	SPT 14,35(100mm) N>50		18.0	9.0						
			17.0							

File Name: PSM1397 SOIL LOG.GPJ Print Date: 27/10/09

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink

Engineering Consultants
Rock-Soil-Water

Borehole No: **BH1**

Sheet: 2 of 3

Borehole Log

Job No: PSM1397

Client:	Taylor Thomson Whitting Pty Ltd	**Date commenced:**	25/09/2009
Principal:		**Date completed:**	25/09/2009
Project:	UNSW Energy Technologies Building	**Logged by:**	BS/HCH
Site location:	Kensington, NSW	**Checked by:**	

Drilling contractor:	Soil Check Pty Ltd	**R.L. surface:**	26.94	**Vertical datum:**	AHD
Equipment type:	JK500 Truck Mounted Rig	**Easting:**		**Horizontal datum:**	
		Northing:		**Inclination / azimuth:**	-90 / -

Method	Samples	Water	R.L. (m)	Depth (m)	Graphic Log	USCS Symbol	Material (SOIL TYPE; plasticity or particle characteristics, colour, secondary and minor components / ROCK TYPE; weathering, particle characteristics, colour, secondary and minor components)	Moisture Condition	Estimated Strength	Structure and Additional Observations
Washboring	SPT 30(130mm) N>50		16.0 15.0 14.0 13.0 12.0 11.0 10.0 9.0 8.0 7.0	11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0		SP		W		

File Name: PSM1397 SOIL LOG.GPJ Print Date: 27/10/09

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink

Engineering Consultants
Rock-Soil-Water

Borehole No: **BH1**

Sheet: 3 of 3

Job No: PSM1397

Borehole Log

Client:	Taylor Thomson Whitting Pty Ltd	**Date commenced:**	25/09/2009
Principal:		**Date completed:**	25/09/2009
Project:	UNSW Energy Technologies Building	**Logged by:**	BS/HCH
Site location:	Kensington, NSW	**Checked by:**	

Drilling contractor:	Soil Check Pty Ltd	**R.L. surface:**	26.94	**Vertical datum:**	AHD
Equipment type:	JK500 Truck Mounted Rig	**Easting:**		**Horizontal datum:**	
		Northing:		**Inclination / azimuth:**	-90 / -

Method	Samples	Water	R.L. (m)	Depth (m)	Graphic Log	USCS Symbol	Material (SOIL TYPE; plasticity or particle characteristics, colour, secondary and minor components / ROCK TYPE; weathering, particle characteristics, colour, secondary and minor components)	Moisture Condition	Estimated Strength	Structure and Additional Observations
Washboring	SPT 19,22,32(120mm) N>50		6.0	21.0		SP		W		
			5.0	22.0						
			4.0	23.0						
			3.0	24.0						
			2.0	25.0						
			1.0	26.0						
			0.0	27.0						
			-1.0	28.0			End of the hole at 27.25 m			
			-2.0	29.0						
			-3.0							

File Name: PSM1397 SOIL LOG.GPJ Print Date: 27/10/09

Refer to Explanation Sheets Attached for Classification Systems

EXPLANATION SHEET
BOREHOLE LOG

GENERAL

Method

Non-Cored Borehole
Auger
Hand Auger
Diamond Rotary
Percussion
Washboring

Coring Size

Cored Borehole	Nominal Core Diameter (mm)
NMLC	51.9
BQ	36.5
BQ3	33.5
NQ	47.6
NQ3	45.1
HQ	63.5
HQ3	61.1
PQ	85
PQ3	83.1
Diatube	Variable
Other	-

Testing

Symbol	Description
UCS	Uniaxial Compressive Strength
TXL	Triaxial Test
BT	Brazilian Test
DT	Direct Tensile
SD	Slake Durability
Packer	Rock Mass Permeability

Samples

Symbol	Description
E	Environmental sample
D	Disturbed sample
Bs	Bulk sample

Water

Symbol	Description
	Water level
	Water inflow
	Complete water loss
	Partial water loss

SOIL DESCRIPTIONS

Unified Soil Classification System (USCS)

Major Divisions			Symbol	Typical Names
Coarse-Grained Soils More than 50% coarser than 0.075mm	Gravels (more than 50% coarser than 2mm)	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
		Gravels With Fines	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels. gravel-sand-clay mixtures.
	Sands (more than 50% of coarse fraction finer than 2mm)	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands, little or no fines.
		Sand With Fines	SM	Silty sands, sand-silt mixture.
			SC	Clayey sands, sand-clay mixtures.
Fine-Grained Soils 50% or more finer than 0.075mm	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour silty or clayey fine sands.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and silty clays of low plasticity.
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
Highly Organic Soils			PT	Peat etc.

Moisture Condition

Term	Symbol
Dry	D
Moist	M
Wet	W
Wet at Plastic Limit	WP
Wet at Liquid Limit	WL

Strength

COHESIVE SOILS are described in terms of undrained shear strength, colour and structure with comments on minor constituents or apparent special features. Undrained shear strength is measured by hand penetrometer or determined by laboratory testing or estimated from experience. Classification in terms of undrained shear strength is as follows:

Term	Symbol	Description for Field Estimation	Shear Strength (kPa)	UCS (kPa)
Very Soft	VS	Easily penetrated several centimetres by fist.	<12	<25
Soft	S	Easily penetrated several centimetres by thumb. Can be moulded by light finger pressure.	12-25	25-50
Firm	F	Can be penetrated by thumb with moderate effort. Can be moulded by strong finger pressure.	25-50	50-100
Stiff	ST	Readily indented by thumb.	50-100	100-200
Very Stiff	VST	Readily indented by thumbnail.	100-200	200-400
Hard	H	Indented with difficulty by thumbnail	>200	>400

NON-COHESIVE SOILS are described in terms of density, colour, with comments on minor constituents or special features. Density (density index) is generally based on standard penetration testing (AS1289 Method 6.3.1), or other forms of penetration testing. Terms used in describing density are set out below:

Term	Symbol	Density Index	SPT N Values
Very Loose	VL	<15%	<5
Loose	L	15-35 %	5-10
Medium Dense	MD	35-65 %	10-30
Dense	D	65-85 %	30-50
Very Dense	VD	>85 %	>50

ROCK DESCRIPTIONS

Weathering

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

Strength

Term	Symbol	Description for Field Estimation	UCS (MPa)
Extremely Low	R0	Thumbnail easily scratches; gentle blow with geological pick leaves deep impression.	0.7-1.5
Very Low	R1	Can be peeled by a pocket knife. Crumbles under firm blows with geological pick.	1.5-3.0
Low	R2	Can be peeled by a pocket knife with difficulty; shallow indentation made by firm blow of geological pick.	3.0-10
Medium	R3	Cannot be scraped or peeled with a pocket knife; specimen can be fractured with single firm blow of hammer end of geological pick.	10-25
High	R4	Specimen requires more than one blow with hammer end of geological pick to fracture.	25-80
Very High	R5	Specimen requires many blows of hammer end of geological pick to fracture.	>80

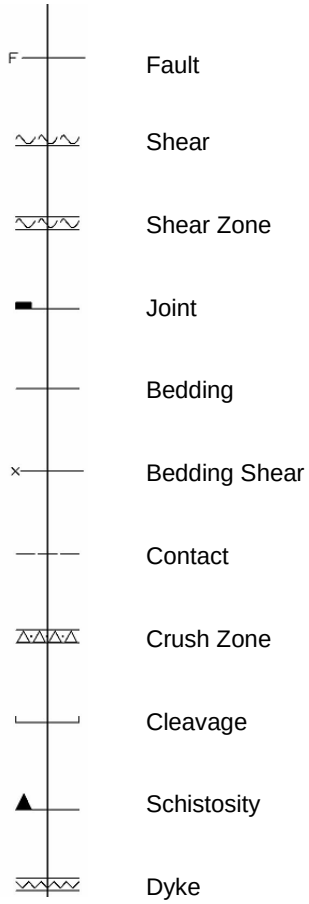
Defect Description

Order of description: type, inclination, shape, roughness, infill type, infill thickness, number

Defect Type

Symbol	Description
CL	Clay Seam
FL	Fault - fracture along which displacement is recognisable.
SR	Shear - a fracture along which movement has taken place but no displacement is recognisable. Evidence for movement may be slickensides, polishing and/or clay gouge.
SH	Sheared Zone - zone of multiple closely spaced fracture planes with roughly parallel planar boundaries usually forming blocks of lenticular or wedge shaped intact material. Fractures are typically smooth, polished or slickensided; and curved.
BG	Bedding parting - arrangement in layers of mineral grains or crystals parallel to surface of deposition along which a continuous observable parting occurs.
BSH	Bedding plane shear - a shear formed along a bedding plane
JN	Joint - a single fracture across which rock has little or no tensile strength and is not obviously related to rock fabric.
CN	Contact - surface between two lithologies.
SC	Schistosity - plane formed by the preferred orientation of the constituent minerals in a parallel arrangement in a coarse grained rock which has undergone regional metamorphism (schist).
CV	Cleavage - plane of mechanical fracture in a rock normally sufficiently closely spaced to form parallel-sided slices.
FO	Foliation
CZ	Crushed Zone - zone with roughly parallel, planar boundaries (commonly slickensided) containing disoriented usually angular rock fragments of variable size often in a soil matrix.
VN	Vein - fracture in which a tabular or sheet-like body of minerals have been intruded.
DK	Dyke - Igneous intrusion - often weathered and altered to a clay like substance.
DZ	Decomposed Zone - zone of any shape but commonly with parallel planar boundaries containing moderately to gradational boundaries into fresher rock.
FZ	Fractured Zone - a zone of closely spaced defects (mainly joints, bedding, cleavage and/or schistosity) comprised of core lengths in the order of 50 mm or less.

Standard Defect Symbols



Shape

Term	Symbol	Description
Planar	PL	Forms a continuous plane without variation in orientation.
Curved	CU	Has a gradual change in orientation.
Undulating	UN	Has a wavy surface shape.
Stepped	ST	Has one or more well defined steps
Irregular	IR	Many changes of orientation.

Roughness

Term	Symbol	Description
Slickensided or polished	Ro1	Very smooth, reflects light.
Smooth	Ro2	Roughness not detected with finger.
Defined ridges	Ro3	Sandpaper feel (fine to medium sandpaper).
Small steps	Ro4	Sandpaper feel (medium to coarse sandpaper).
Very rough	Ro5	Very well defined ridges and/or steps.

Infill Type

Symbol	Description
KL	Clean
CA	Calcite
CB	Carbonaceous
CHL	Chlorite
FE	Iron oxide
QZ	Quartz
MG	Manganese
SU	Sulphides
SE	Sericite
RF	Rock fragments
G	Gravel
S	Sand
Z	Silt
CL	Clay

Infill Thickness

Where infilling is present, the thickness of infill is recorded using the following convention:

ST Iron oxide staining of less than 1 mm
VN Veneer coating of less than 1 mm

If the infilling is greater than 1 mm, the actual thickness of infill is recorded in millimeters.

If infill is not present, a dash (-) is recorded

Number

Number of defects with similar characteristics.

APPENDIX C

FALLING WEIGHT DEFLECTOMETER TEST DATA

client: Taylor Thomson Whitting Pty Ltd
principal:
project: University of New South Wales
location: Energy Technologies Building, Kensington

job no: PSM1397.R1
date: 6/10/2009
by: BS

Falling Weight Deflectometer Test Result Summary

						Deflections										Normalised deflections										Temperature														
Road ID	Test#	Lane#	Chainage (km)	Visual Code	Force (50kN=700kPa)	Sensor 1 (0mm)	Sensor 2 (200mm)	Sensor 3 (300mm)	Sensor 4 (450mm)	Sensor 5 (600mm)	Sensor 6 (750mm)	Sensor 7 (900mm)	Sensor 8 (1200mm)	Sensor 9 (1500mm)	Normalised Force	Sensor 1 (0mm) Normalised	Sensor 2 (200mm) Normalised	Sensor 3 (300mm) Normalised	Sensor 4 (450mm) Normalised	Sensor 5 (600mm) Normalised	Sensor 6 (750mm) Normalised	Sensor 7 (900mm) Normalised	Sensor 8 (1200mm) Normalised	Sensor 9 (1500mm) Normalised	Curvature	Pavement Temp	Air Temp	Drop Sequence Completed Time	GPS Quality	Latitude		Longitude		PDOP	Start Date-Time	Sensors	Weight/spring	Location	Operator	Comments
East	1	1	0	0	48.82	762.90	532.22	393.65	254.30	176.83	125.11	100.43	69.33	58.22	50	781.340	545.084	403.165	260.447	181.104	128.134	102.857	71.006	59.627	230.68	40.2	26.83	10:12	DGPS Fix	3355.072368	S	15113.615395	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	2	1	25	0	48.93	756.82	506.05	377.24	226.99	181.70	141.00	118.86	80.90	65.29	50	773.370	517.116	385.489	231.954	185.673	144.083	121.459	82.669	66.718	250.77	40.6	26.83	10:13	DGPS Fix	3355.085882	S	15113.614547	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	3	1	50	0	49.26	855.04	529.33	376.00	264.89	229.55	202.22	176.25	140.58	122.10	50	867.885	537.282	381.648	268.869	232.998	205.258	178.898	142.692	123.934	325.71	24.5	26.83	10:14	DGPS Fix	3355.099114	S	15113.616422	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	4	1	77	0	49.15	965.72	407.96	398.47	251.45	200.66	162.15	172.49	111.66	111.61	50	982.421	415.015	405.361	255.799	204.130	164.954	175.473	113.591	113.540	557.76	23.3	26.83	10:17	DGPS Fix	3355.113617	S	15113.618404	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	5	1	98	0	47.82	1042.58	754.79	562.74	389.90	306.10	257.61	222.15	174.31	139.45	50	1090.109	789.199	588.394	407.675	320.054	269.354	232.277	182.256	145.807	287.79	36.1	26.83	10:20	DGPS Fix	3355.124681	S	15113.620685	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	6	1	125	0	51.15	605.31	477.97	408.80	315.12	245.94	187.98	147.59	97.20	75.82	50	591.701	467.224	399.609	308.035	240.411	183.754	144.272	95.015	74.115	127.34	41.6	26.83	10:21	DGPS Fix	3355.138537	S	15113.623848	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	7	1	150	0	50.48	717.45	503.45	372.83	234.68	157.82	108.43	86.22	61.40	54.15	50	710.628	498.663	369.285	232.448	156.319	107.399	85.400	60.816	53.635	214.00	44.1	26.83	10:24	DGPS Fix	3355.144608	S	15113.636316	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	8	1	175	0	50.37	658.93	489.88	383.54	261.56	175.76	118.78	89.09	57.69	48.54	50	654.090	486.282	380.723	259.639	174.469	117.907	88.436	57.266	48.183	169.05	41.2	26.83	10:25	DGPS Fix	3355.146603	S	15113.652462	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	9	1	200	0	48.93	834.77	614.50	464.54	324.83	265.47	215.11	188.83	147.72	118.76	50	853.025	627.938	474.699	331.933	271.275	219.814	192.959	150.950	121.357	220.27	41.0	26.83	10:26	DGPS Fix	3355.148052	S	15113.667823	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	10	1	225	0	48.93	969.83	705.96	545.95	385.58	280.53	216.89	181.42	138.66	119.92	50	991.038	721.398	557.889	394.012	286.665	221.633	185.387	141.692	122.542	263.87	40.0	26.83	10:27	DGPS Fix	3355.149068	S	15113.683873	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	11	1	257	0	49.60	732.38	551.83	445.52	323.79	254.73	202.67	170.33	129.42	108.82	50	738.286	556.280	449.113	326.401	256.784	204.304	171.704	130.464	109.698	180.55	35.5	26.83	10:28	DGPS Fix	3355.147048	S	15113.703879	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	12	1	275	0	49.15	952.68	715.54	556.28	384.21	285.87	227.92	192.27	133.93	105.91	50	969.156	727.915	565.900	390.855	290.814	231.862	195.595	136.246	107.742	237.14	37.8	26.83	10:29	DGPS Fix	3355.147517	S	15113.715699	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	13	1	300	0	50.37	361.31	333.93	314.67	277.88	246.82	220.54	198.06	162.52	138.36	50	358.656	331.477	312.359	275.839	245.007	218.920	196.605	161.326	137.344	27.38	23.1	26.83	10:30	DGPS Fix	3355.150724	S	15113.729569	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	Concrete
East	14	1	332	0	47.48	790.08	560.89	392.44	260.31	185.04	146.20	120.57	88.88	79.50	50	832.013	590.659	413.269	274.126	194.861	153.960	126.969	93.597	83.719	229.19	21.9	26.83	10:31	DGPS Fix	3355.156115	S	15113.749334	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	15	1	350	0	51.04	469.66	359.60	291.64	216.49	166.74	130.57	108.25	76.14	59.05	50	460.090	352.273	285.697	212.079	163.342	127.909	106.044	74.589	57.847	110.06	31.5	26.83	10:32	DGPS Fix	3355.157215	S	15113.760782	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	16	1	375	0	49.93	461.31	309.94	242.35	174.82	140.40	115.21	97.69	72.49	58.65	50	461.957	310.375	242.690	175.065	140.597	115.372	97.827	72.592	58.732	151.37	22.5	26.83	10:33	DGPS Fix	3355.159653	S	15113.776562	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	17	1	400	0	48.71	648.14	468.09	381.62	282.40	224.65	185.45	158.13	122.10	98.07	50	665.305	480.487	391.727	289.879	230.599	190.361	162.318	125.334	100.667	180.05	42.2	26.83	10:34	DGPS Fix	3355.161948	S	15113.792185	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	18	1	427	0	49.71	579.27	482.12	413.16	335.66	284.31	245.29	212.50	162.62	126.47	50	582.649	484.933	415.570	337.618	285.969	246.721	213.740	163.569	127.208	97.15	40.4	26.83	10:34	DGPS Fix	3355.171058	S	15113.799609	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
East	19	1	450	0	46.82	821.62	683.17	576.67	440.57	349.15	279.96	227.79	150.03	102.19	50	877.424	729.571	615.837	470.493	372.864	298.975	243.261	160.220	109.131	138.45	37.6	26.83	10:35	DGPS Fix	3355.183132	S	15113.797548	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
West	1	1	25	0	49.71	418.15	373.22	345.16	310.85	277.90	248.08	222.41	179.34	149.00	50	420.589	375.397	347.174	312.663	279.521	249.527	223.708	180.386	149.869	44.93	40.2	29.98	10:38	DGPS Fix	3355.176404	S	15113.792737	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	2	1	50	0	48.71	615.50	506.81	449.80	381.09	324.15	270.62	230.55	168.09	125.87	50	631.800	520.232	461.712	391.183	332.735	277.787	236.656	172.542	129.203	108.69	43.1	29.98	10:39	DGPS Fix	3355.164018	S	15113.792531	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	3	1	75	0	47.59	692.44	493.65	393.44	285.75	218.04	169.57	137.43	95.93	76.91	50	727.506	518.649	413.364	300.221	229.082	178.157	144.390	100.788	80.805	198.79	22.9	29.98	10:40	DGPS Fix	3355.161146	S	15113.776880	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	4	1	101	0	48.59	433.91	350.96	297.16	226.38	176.74	138.42	114.58	78.63	59.44	50	446.501	361.144	305.783	232.949	181.869	142.437	117.905	80.912	61.165	82.95	38.4	29.98	10:41	DGPS Fix	3355.158615	S	15113.760795	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	5	1	131	0	46.26	579.14	404.54	303.97	229.01	186.21	160.18	140.73	111.40	90.03	50	625.962	437.246	328.545	247.525	201.265	173.130	152.108	120.406	97.309	174.60	24.1	29.98	10:42	DGPS Fix	3355.156625	S	15113.742343	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	6	1	150	0	50.71	177.04	168.99	161.48	153.60	143.43	135.17	126.35	110.83	93.78	50	174.561	166.624	159.219	151.449	141.422	133.277	124.581	109.278	92.467	8.05	24.3	29.98	10:43	DGPS Fix	3355.153520	S	15113.730703	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	Concrete
West	7	1	175	0	46.26	931.60	580.32	444.79	316.39	234.19	184.60	159.00	124.81	101.72	50	1006.917	627.237	480.750	341.969	253.124	199.524	171.855	134.901	109.944	351.28	43.7	29.98	10:44	DGPS Fix	3355.149051	S	15113.715653	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	8	1	205	0	48.15	656.43	553.69	479.33	383.40	305.89	239.92	193.04	133.88	100.22	50	681.651	574.964	497.747	398.131	317.643	249.138	200.457	139.024	104.071	102.74	24.5	29.98	10:45	DGPS Fix	3355.148894	S	15113.696905	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	9	1	225	0	50.93	1214.46	772.62	580.62	403.88	290.85	227.18	193.33	143.40	128.14	50	1192.284	758.512	570.018	396.505	285.539	223.032	189.800	140.781	125.800	441.84	42.0	29.98	10:48	DGPS Fix	3355.150644	S	15113.684240	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	10	1	255	0	51.26	813.08	641.39	511.07	356.57	276.18	216.90	179.60	127.02	101.92	50	793.094	625.624	498.508	347.805	269.391	211.568	175.185	123.898	99.415	171.69	43.1	29.98	10:49	DGPS Fix	3355.149284	S	15113.665108	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	11	1	276	0	51.49	784.08	509.54	370.40	246.07	167.21	113.09	209.15	64.47	59.63	50	761.391	494.795	359.681	238.949	162.371	109.817	203.098	62.604	57.904	274.54	45.7	29.98	10:50	DGPS Fix	3355.147733	S	15113.652428	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	12	1	300	0	51.04	695.83	517.19	404.05	277.24	208.13	156.97	128.36	80.84	62.47	50	681.652	506.652	395.817	271.591	203.889	153.772	125.745	79.193	61.197	178.64	48.5	29.98	10:51	DGPS Fix	3355.146529	S	15113.637231	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	13	1	325	0	51.49	613.88	466.71	373.43	255.61	186.31	135.73	110.62	77.54	60.98	50	596.116	453.205	362.624	248.213	180.919	131.802	107.419	75.296	59.215	147.17	45.5	29.98	10:52	DGPS Fix	3355.140846	S	15113.623738	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	14	1	351	0	49.60	995.98	758.72	619.32	452.23	356.87	293.88	252.93	199.49	171.16	50	1004.012	764.839	624.315	455.877	359.748	296.250	254.970	201.099	172.540	237.26	45.7	29.98	10:52	DGPS Fix	3355.127135	S	15113.620073	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	15	1	375	0	50.60	812.79	631.98	422.82	271.03	207.41	164.16	149.30	108.08	97.27	50	803.152	624.486	417.806	267.816	204.951	162.213	147.530	106.798	96.117	180.81	30.6	29.98	10:54	DGPS Fix	3355.114682	S	15113.617801	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	16	1	400	0	50.60	855.41	635.65	488.03	347.76	282.39	233.10	207.99	157.12	129.00	50	845.267	628.113	482.243	343.636	279.042	230.336	205.524	155.257	127.470	219.76	29.6	29.98	10:54	DGPS Fix	3355.101748	S	15113.615381	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	17	1	425	0	51.71	565.88	395.57	300.09	211.40	159.11	125.35	104.91	73.38	56.19	50	547.167	382.489	290.166	204.409	153.848	121.205	101.441	70.953	54.332	170.31	46.9	29.98	10:55	DGPS Fix	3355.088575	S	15113.613744	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
West	18	1	449	0	50.93	634.79	395.27	279.12	180.39	132.86	99.13	82.37	59.26	49.63	50	623.199	388.052	274.023	177.096	130.434	97.320	80.866	58.178	48.724	239.52	44.7	29.98	10:56	DGPS Fix	3355.075569	S	15113.613957	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	

client: Taylor Thomson Whitting Pty Ltd
principal:
project: University of New South Wales
location: Energy Technologies Building, Kensington

job no: PSM1397.R1
date: 6/10/2009
by: BS

Falling Weight Deflectometer Test Results (East)

					Deflections										Normalised deflections											Temperature											
Test#	Lane#	Chainage (km)	Visual Code	Force (50kN=700kPa)	Sensor 1 (0mm)	Sensor 2 (200mm)	Sensor 3 (300mm)	Sensor 4 (450mm)	Sensor 5 (600mm)	Sensor 6 (750mm)	Sensor 7 (900mm)	Sensor 8 (1200mm)	Sensor 9 (1500mm)	Normalised Force	Sensor 1 (0mm) Normalised	Sensor 2 (200mm) Normalised	Sensor 3 (300mm) Normalised	Sensor 4 (450mm) Normalised	Sensor 5 (600mm) Normalised	Sensor 6 (750mm) Normalised	Sensor 7 (900mm) Normalised	Sensor 8 (1200mm) Normalised	Sensor 9 (1500mm) Normalised	Curvature	Pavement Temp	Air Temp	Drop Sequence Completed Time	GPS Quality	Latitude		Longitude		PDOP	Start Date-Time	Sensors	Weight/spring	Location	Operator	Comments
1	1	0	0	48.37	813.04	548.90	396.38	255.00	174.39	122.71	97.91	67.75	55.38	50	840.438	567.397	409.737	263.593	180.267	126.845	101.209	70.033	57.246	264.14	40.2	26.83	10:12	DGPS Fix	3355.072368	S	15113.615395	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
1	1	0	0	49.04	785.19	542.66	398.39	256.55	178.02	126.65	100.26	68.98	56.09	50	800.561	553.283	406.189	261.572	181.505	129.129	102.223	70.330	57.188	242.53	40.2	26.83	10:12	DGPS Fix	3355.072368	S	15113.615395	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
1	1	0	0	48.82	762.90	532.22	393.65	254.30	176.83	125.11	100.43	69.33	58.22	50	781.340	545.084	403.165	260.447	181.104	128.134	102.857	71.006	59.627	230.68	40.2	26.83	10:12	DGPS Fix	3355.072368	S	15113.615395	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
2	1	25	0	48.48	786.62	513.55	388.73	225.39	179.64	138.53	115.48	78.82	64.06	50	811.283	529.651	400.918	232.457	185.272	142.873	119.101	81.291	66.068	273.07	40.6	26.83	10:13	DGPS Fix	3355.085882	S	15113.614547	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
2	1	25	0	48.48	764.37	506.95	379.73	226.20	181.05	139.56	117.47	80.10	64.43	50	788.335	522.844	391.636	233.292	186.726	143.936	121.153	82.611	66.450	257.42	40.6	26.83	10:13	DGPS Fix	3355.085882	S	15113.614547	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
2	1	25	0	48.93	756.82	506.05	377.24	226.99	181.70	141.00	118.86	80.90	65.29	50	773.370	517.116	385.489	231.954	185.673	144.083	121.459	82.669	66.718	250.77	40.6	26.83	10:13	DGPS Fix	3355.085882	S	15113.614547	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
3	1	50	0	47.93	861.47	516.31	370.26	263.68	226.40	199.20	174.64	139.12	125.20	50	898.675	538.608	386.251	275.068	236.178	207.803	182.182	145.128	130.607	345.16	24.5	26.83	10:14	DGPS Fix	3355.099114	S	15113.616422	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
3	1	50	0	48.48	845.38	517.63	368.12	262.68	224.86	198.61	173.57	138.34	122.19	50	871.885	533.859	379.662	270.916	231.910	204.837	179.012	142.677	126.021	327.75	24.5	26.83	10:14	DGPS Fix	3355.099114	S	15113.616422	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
3	1	50	0	49.26	855.04	529.33	376.00	264.89	229.55	202.22	176.25	140.58	122.10	50	867.885	537.282	381.648	268.869	232.998	205.258	178.898	142.692	123.934	325.71	24.5	26.83	10:14	DGPS Fix	3355.099114	S	15113.616422	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
4	1	77	0	48.93	1141.17	519.11	401.24	248.94	198.17	154.67	165.11	111.08	109.07	50	1166.125	530.462	410.014	254.384	202.504	158.052	168.721	113.509	111.455	622.06	23.3	26.83	10:17	DGPS Fix	3355.113617	S	15113.618404	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
4	1	77	0	49.04	936.44	514.99	401.89	252.02	199.85	158.30	171.79	111.73	110.39	50	954.772	525.071	409.757	256.954	203.762	161.399	175.153	113.917	112.551	421.45	23.3	26.83	10:17	DGPS Fix	3355.113617	S	15113.618404	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
4	1	77	0	49.15	965.72	407.96	398.47	251.45	200.66	162.15	172.49	111.66	111.61	50	982.421	415.015	405.361	255.799	204.130	164.954	175.473	113.591	113.540	557.76	23.3	26.83	10:17	DGPS Fix	3355.113617	S	15113.618404	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
5	1	98	0	47.04	1078.10	751.90	546.97	382.98	299.56	253.56	217.36	164.08	132.97	50	1145.940	799.213	581.388	407.079	318.410	269.515	231.037	174.405	141.337	326.20	36.1	26.83	10:20	DGPS Fix	3355.124681	S	15113.620685	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
5	1	98	0	47.04	1056.68	758.65	552.84	388.75	301.38	252.31	219.92	166.78	139.07	50	1123.172	806.388	587.628	413.212	320.344	268.187	233.759	177.275	147.821	298.03	36.1	26.83	10:20	DGPS Fix	3355.124681	S	15113.620685	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
5	1	98	0	47.82	1042.58	754.79	562.74	389.90	306.10	257.61	222.15	174.31	139.45	50	1090.109	789.199	588.394	407.675	320.054	269.354	232.277	182.256	145.807	287.79	36.1	26.83	10:20	DGPS Fix	3355.124681	S	15113.620685	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
6	1	125	0	50.71	619.50	484.57	412.27	317.82	247.19	190.05	147.83	98.76	75.59	50	610.826	477.785	406.498	313.370	243.729	187.389	145.760	97.377	74.532	134.93	41.6	26.83	10:21	DGPS Fix	3355.138537	S	15113.623848	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
6	1	125	0	50.93	609.06	481.51	410.84	316.84	249.20	189.73	147.40	98.70	75.56	50	597.938	472.717	403.338	311.054	244.650	186.265	144.708	96.898	74.180	127.55	41.6	26.83	10:21	DGPS Fix	3355.138537	S	15113.623848	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
6	1	125	0	51.15	605.31	477.97	408.80	315.12	245.94	187.98	147.59	97.20	75.82	50	591.701	467.224	399.609	308.035	240.411	183.754	144.272	95.015	74.115	127.34	41.6	26.83	10:21	DGPS Fix	3355.138537	S	15113.623848	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
7	1	150	0	49.93	738.80	507.19	369.40	234.48	153.45	106.84	83.21	62.17	52.19	50	739.836	507.901	369.918	234.809	153.665	106.990	83.327	62.257	52.263	231.61	44.1	26.83	10:24	DGPS Fix	3355.144608	S	15113.636316	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
7	1	150	0	50.60	726.24	500.70	374.78	235.71	156.14	108.48	85.22	63.83	54.11	50	717.628	494.763	370.336	232.915	154.289	107.194	84.209	63.073	53.468	225.54	44.1	26.83	10:24	DGPS Fix	3355.144608	S	15113.636316	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
7	1	150	0	50.48	717.45	503.45	372.83	234.68	157.82	108.43	86.22	61.40	54.15	50	710.628	498.663	369.285	232.448	156.319	107.399	85.400	60.816	53.635	214.00	44.1	26.83	10:24	DGPS Fix	3355.144608	S	15113.636316	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
8	1	175	0	50.26	679.21	498.19	388.38	263.96	177.58	118.32	88.43	56.67	49.51	50	675.696	495.613	386.371	262.595	176.661	117.708	87.973	56.377	49.254	181.02	41.2	26.83	10:25	DGPS Fix	3355.146603	S	15113.652462	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
8	1	175	0	50.15	663.74	488.40	382.63	260.90	175.48	118.14	88.04	56.58	48.59	50	661.755	486.939	381.486	260.120	174.955	117.787	87.777	56.411	48.445	175.34	41.2	26.83	10:25	DGPS Fix	3355.146603	S	15113.652462	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
8	1	175	0	50.37	658.93	489.88	383.54	261.56	175.76	118.78	89.09	57.69	48.54	50	654.090	486.282	380.723	259.639	174.469	117.907	88.436	57.266	48.183	169.05	41.2	26.83	10:25	DGPS Fix	3355.146603	S	15113.652462	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
9	1	200	0	48.71	858.16	615.26	474.64	322.46	265.31	216.36	189.05	148.64	122.13	50	880.887	631.554	487.210	331.000	272.336	222.090	194.057	152.576	125.364	242.90	41.0	26.83	10:26	DGPS Fix	3355.148052	S	15113.667823	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
9	1	200	0	49.37	841.38	616.72	481.40	321.95	264.46	217.11	187.69	146.34	118.61	50	852.117	624.590	487.543	326.058	267.835	219.880	190.085	148.207	120.124	224.66	41.0	26.83	10:26	DGPS Fix	3355.148052	S	15113.667823	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
9	1	200	0	48.93	834.77	614.50	464.54	324.83	265.47	215.11	188.83	147.72	118.76	50	853.025	627.938	474.699	331.933	271.275	219.814	192.959	150.950	121.357	220.27	41.0	26.83	10:26	DGPS Fix	3355.148052	S	15113.667823	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
10	1	225	0	49.04	989.47	712.72	545.80	382.30	277.20	210.88	178.61	135.59	117.05	50	1008.840	726.672	556.485	389.784	282.626	215.008	182.106	138.244	119.341	276.75	40.0	26.83	10:27	DGPS Fix	3355.149068	S	15113.683873	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
10	1	225	0	48.82	976.19	712.86	546.66	386.44	280.73	217.25	180.02	139.78	120.00	50	999.785	730.111	559.873	395.780	287.515	222.501	184.371	143.159	122.900	263.31	40.0	26.83	10:27	DGPS Fix	3355.149068	S	15113.683873	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
10	1	225	0	48.93	969.83	705.96	545.95	385.58	280.53	216.89	181.42	138.66	119.92	50	991.038	721.398	557.889	394.012	286.665	221.633	185.387	141.692	122.542	263.87	40.0	26.83	10:27	DGPS Fix	3355.149068	S	15113.683873	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
11	1	257	0	49.15	749.46	561.60	452.73	324.86	252.58	200.37	166.21	125.50	106.42	50	762.421	571.312	460.560	330.478	256.948	203.835	169.084	127.670	108.260	187.86	35.5	26.83	10:28	DGPS Fix	3355.147048	S	15113.703879	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
11	1	257	0	49.26	734.44	555.83	446.99	323.06	253.32	200.17	168.00	127.18	107.31	50	745.473	564.180	453.705	327.913	257.125	203.177	170.524	129.091	108.922	178.61	35.5	26.83	10:28	DGPS Fix	3355.147048	S	15113.703879	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
11	1	257	0	49.60	732.38	551.83	445.52	323.79	254.73	202.67	170.33	129.42	108.82	50	738.286	556.280	449.113	326.401	256.784	204.304	171.704	130.464	109.698	180.55	35.5	26.83	10:28	DGPS Fix	3355.147048	S	15113.703879	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
12	1	275	0	48.59	985.29	738.83	561.26	381.47	280.72	222.84	187.28	131.52	104.43	50	1013.881	760.270	577.547	392.540	288.866	229.306	192.715	135.336	107.460	246.46	37.8	26.83	10:29	DGPS Fix	3355.147517	S	15113.715699	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
12	1	275	0	48.82	960.16	714.55	558.04	383.13	285.10	226.51	191.19	132.90	104.94	50	983.367	731.821	571.528	392.390	291.991	231.985	195.811	136.112	107.476	245.61	37.8	26.83	10:29	DGPS Fix	3355.147517	S	15113.715699	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
12	1	275	0	49.15	952.68	715.54	556.28	384.21	285.87	227.92	192.27	133.93	105.91	50	969.156	727.915	565.900	390.855	290.814	231.862	195.595	136.246	107.742	237.14	37.8	26.83	10:29	DGPS Fix	3355.147517	S	15113.715699	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
13	1	300	0	50.26	358.45	332.09	312.31	277.76	245.89	220.49	195.11	161.17	137.21	50	356.596	330.372	310.694	276.323	244.618	219.349	194.101	160.336	136.500	26.36	23.1	26.83	10:30	DGPS Fix	3355.150724	S	15113.729569	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
13	1	300	0	50.48	363.41	335.88	315.61	279.56	248.76	222.45	198.88	163.80	141.17	50	359.954	332.686	312.609	276.902	246.395	220.335	196.989	162.242	139.828	27.53	23.1	26.83	10:30	DGPS Fix	3355.150724	S	15113.729569	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
13	1	300	0	50.37	361.31	333.93	314.67	277.88	246.82	220.54	198.06	162.52	138.36	50	358.656	331.477	312.359	275.839	245.007	218.920	196.605	161.326	137.344	27.38	23.1	26.83	10:30	DGPS Fix	3355.150724	S	15113.729569	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
14	1	332	0	46.93	815.95	569.59	404.99	260.25	182.45	145.18	117.85	89.29	76.10	50	869.327	606.851	431.483	277.275	194.385	154.677	125.559	95.131	81.078	246.36	21.9	26.83	10:31	DGPS Fix	3355.156115	S	15113.749334	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
14	1	332	0	47.04	794.12	557.79	398.73	260.70	181.55	144.44	117.71	88.36	80.58	50	844.090	592.889	423.820	277.105	192.974	153.529	125.117	93.920	85.651	236.33	21.9	26.83	10:31	DGPS Fix	3355.156115	S	15113.749334	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
14	1	332	0	47.48	790.08	560.89	392.44	260.31	185.04	146.20	120.57	88.88	79.50	50	832.013	590.659	413.269	274.126	194.861	153.960	126.969	93.597	83.719	229.19	21.9	26.83	10:31	DGPS Fix	3355.156115	S	15113.749334	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
15	1	350	0	50.93	481.60	368.20	297.30	221.49	168.96	131.21	108.57	76.69	59.35	50	472.806	361.477	291.871	217.446	165.875	128.814	106.587	75.290	58.266	113.40	31.5	26.83	10:32	DGPS Fix	3355.157215	S	15113.760782	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
15	1	350	0	51.37	476.88	363.15	294.22	219.15	168.30	131.61	108.11	76.34	59.78	50	464.162	353.465	286.373	213.305	163.812	128.100	105.227	74.304	58.186	113.73	31.5	26.83	10:32	DGPS Fix	3355.157215	S	15113.760782	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
15	1	350	0	51.04	469.66	359.60	291.64	216.49	166.74	130.57	108.25	76.14	59.05	50	460.090	352.273	285.697	212.079	163.342	127.909	106.044	74.589	57.847	110.06	31.5	26.83	10:32	DGPS Fix	3355.157215	S	15113.760782	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
16	1	375	0	49.82	474.69	313.32	243.69	176.04	139.16	113.35	95.80	72.63	58.02	50	476.405	314.452	244.570	176.676	139.663	113.760	96.146	72.892	58.230	161.37	22.5	26.83	10:33	DGPS Fix	3355.159653	S	15113.776562	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
16	1	375	0	50.15	468.49	311.72	243.15	175.99	140.88	115.04	97.81	73.70	58.36	50	467.089	310.788	242.423	175.464	140.459	114.696	97.517	73.480	58.185	156.77	22.5	26.83	10:33	DGPS Fix	3355.159653	S	15113.776562	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
16	1	375	0	49.93	461.31	309.94	242.35	174.82	140.40	115.21	97.69	72.49	58.65	50	461.957	310.375	242.690	175.065	140.597	115.372	97.827	72.592	58.732	151.37	22.5	26.83	10:33	DGPS Fix	3355.159653	S	15113.776562	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
17	1	400	0	48.04	659.36	475.11	381.95	281.02	221.10	181.38	155.46	118.99	96.13	50	686.261	494.494	397.533	292.485	230.121	188.780	161.803	123.845	100.052	184.25	42.2	26.83	10:34	DGPS Fix	3355.161948	S	15113.792185	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
17	1	400	0	48.59	652.72	470.17	382.57	282.33	223.08	183.88	157.35	120.12	98.00	50	671.661	483.814	393.672	290.523	229.553	189.216	161.916	123.606	100.844	182.55	42.2	26.83	10:34	DGPS Fix	3355.161948	S	15113.792185	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
17	1	400	0	48.71	648.14	468.09	381.62	282.40	224.65	185.45	158.13	122.10	98.07	50	665.305	480.487	391.727	289.879	230.599	190.361	162.318	125.334	100.667	180.05	42.2	26.83	10:34	DGPS Fix	3355.161948	S	15113.792185	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
18	1	427	0	49.26	594.80	485.28	415.89	338.34	285.11	245.68	210.67	161.22	123.67	50	603.735	492.570	422.138	343.423	289.393	249.371	213.835	163.642	125.528	109.52	40.4	26.83	10:34	DGPS Fix	3355.171058	S	15113.799609	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
18	1	427	0	49.93	585.96	485.82	416.69	339.47	286.90	246.48	212.91	162.68	126.44	50	586.781	486.501	417.274	339.946	287.302	246.826	213.208	162.908	126.617	100.14	40.4	26.83	10:34	DGPS Fix	3355.171058	S	15113.799609	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
18	1	427	0	49.71	579.27	482.12	413.16	335.66	284.31	245.29	212.50	162.62	126.47	50	582.649	484.933	415.570	337.618	285.969	246.721	213.740	163.569	127.208	97.15	40.4	26.83	10:34	DGPS Fix	3355.171058	S	15113.799609	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
19	1	450	0	47.59	859.24	705.13	594.63	454.24	359.07	286.77	228.38	151.35	100.67	50	902.753	740.838	624.743	477.243	377.254	301.292	239.945	159.014	105.768	154.11	37.6	26.83	10:35	DGPS Fix	3355.183132	S	15113.797548	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
19	1	450	0	46.59	824.23	682.21	579.55	441.87	349.68	280.00	224.98	149.10	100.47	50	884.557	732.142	621.968	474.211	375.274	300.494	241.447	160.013	107.824	142.02	37.6	26.83	10:35	DGPS Fix	3355.183132	S	15113.797548	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	
19	1	450	0	46.82	821.62	683.17	576.67	440.57	349.15	279.96	227.79	150.03	102.19	50	877.424	729.571	615.837	470.493	372.864	298.975	243.261	160.220	109.131	138.45	37.6	26.83	10:35	DGPS Fix	3355.183132	S	15113.797548	E	0.00	09/25/2009 10:11:48	Chop118-05A	3	UNSW	Brendan	

client: Taylor Thomson Whitting Pty Ltd
principal:
project: University of New South Wales
location: Energy Technologies Building, Kensington

job no: PSM1397.R1
date: 6/10/2009
by: BS

Falling Weight Deflectometer Test Results (West)

					Deflections										Normalised deflections											Temperature												
Test#	Lane#	Chainage (km)	Visual Code	Force (50kN=700kPa)	Sensor 1 (0mm)	Sensor 2 (200mm)	Sensor 3 (300mm)	Sensor 4 (450mm)	Sensor 5 (600mm)	Sensor 6 (750mm)	Sensor 7 (900mm)	Sensor 8 (1200mm)	Sensor 9 (1500mm)	Normalised Force	Sensor 1 (0mm) Normalised	Sensor 2 (200mm) Normalised	Sensor 3 (300mm) Normalised	Sensor 4 (450mm) Normalised	Sensor 5 (600mm) Normalised	Sensor 6 (750mm) Normalised	Sensor 7 (900mm) Normalised	Sensor 8 (1200mm) Normalised	Sensor 9 (1500mm) Normalised	Curvature	Pavement Temp	Air Temp	Drop Sequence Completed Time	GPS Quality	Latitude		Longitude		PDOP	Start Date-Time	Sensors	Weight/spring	Location	Operator	Comments
1	1	25	0	48.59	414.57	368.28	341.16	307.49	275.65	244.83	220.68	177.27	145.35	50	426.600	378.967	351.060	316.413	283.649	251.935	227.084	182.414	149.568	46.29	40.2	29.98	10:38	DGPS Fix	3355.176404	S	15113.792737	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
1	1	25	0	49.93	420.13	375.25	347.48	312.82	280.42	250.05	223.50	180.93	148.63	50	420.719	375.776	347.967	313.259	280.813	250.401	223.813	181.184	148.838	44.88	40.2	29.98	10:38	DGPS Fix	3355.176404	S	15113.792737	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
1	1	25	0	49.71	418.15	373.22	345.16	310.85	277.90	248.08	222.41	179.34	149.00	50	420.589	375.397	347.174	312.663	279.521	249.527	223.708	180.386	149.869	44.93	40.2	29.98	10:38	DGPS Fix	3355.176404	S	15113.792737	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
2	1	50	0	47.59	611.96	503.99	447.72	378.99	319.98	269.28	226.53	164.26	124.16	50	642.950	529.513	470.393	398.182	336.184	282.917	238.002	172.578	130.448	107.97	43.1	29.98	10:39	DGPS Fix	3355.164018	S	15113.792531	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
2	1	50	0	48.48	610.09	503.79	447.09	380.13	321.03	269.46	228.59	166.43	123.92	50	629.218	519.585	461.108	392.048	331.095	277.908	235.757	171.648	127.805	106.30	43.1	29.98	10:39	DGPS Fix	3355.164018	S	15113.792531	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
2	1	50	0	48.71	615.50	506.81	449.80	381.09	324.15	270.62	230.55	168.09	125.87	50	631.800	520.232	461.712	391.183	332.735	277.787	236.656	172.542	129.203	108.69	43.1	29.98	10:39	DGPS Fix	3355.164018	S	15113.792531	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
3	1	75	0	46.82	723.47	504.99	398.02	288.53	220.20	170.31	138.26	95.73	77.16	50	772.608	539.289	425.053	308.127	235.156	181.877	147.651	102.232	82.401	218.48	22.9	29.98	10:40	DGPS Fix	3355.161146	S	15113.776880	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
3	1	75	0	46.70	693.12	489.57	387.04	281.46	214.92	166.11	135.13	94.58	74.81	50	742.099	524.165	414.390	301.349	230.107	177.848	144.679	101.263	80.096	203.55	22.9	29.98	10:40	DGPS Fix	3355.161146	S	15113.776880	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
3	1	75	0	47.59	692.44	493.65	393.44	285.75	218.04	169.57	137.43	95.93	76.91	50	727.506	518.649	413.364	300.221	229.082	178.157	144.390	100.788	80.805	198.79	22.9	29.98	10:40	DGPS Fix	3355.161146	S	15113.776880	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
4	1	101	0	48.59	445.93	357.33	299.49	229.73	177.11	140.47	113.44	78.57	58.50	50	458.870	367.699	308.181	236.396	182.249	144.546	116.732	80.850	60.198	88.60	38.4	29.98	10:41	DGPS Fix	3355.158615	S	15113.760795	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
4	1	101	0	48.71	433.37	352.01	294.24	226.35	175.58	138.73	114.28	77.64	58.04	50	444.847	361.332	302.032	232.344	180.230	142.404	117.307	79.696	59.577	81.36	38.4	29.98	10:41	DGPS Fix	3355.158615	S	15113.760795	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
4	1	101	0	48.59	433.91	350.96	297.16	226.38	176.74	138.42	114.58	78.63	59.44	50	446.501	361.144	305.783	232.949	181.869	142.437	117.905	80.912	61.165	82.95	38.4	29.98	10:41	DGPS Fix	3355.158615	S	15113.760795	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
5	1	131	0	45.26	569.03	405.25	306.61	228.23	184.56	158.35	137.17	108.85	90.85	50	628.624	447.691	338.721	252.132	203.889	174.934	151.536	120.250	100.365	163.78	24.1	29.98	10:42	DGPS Fix	3355.156625	S	15113.742343	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
5	1	131	0	46.26	587.79	407.53	307.48	230.59	187.31	160.72	140.00	111.77	16.98	50	635.311	440.478	332.339	249.233	202.454	173.714	151.319	120.806	18.353	180.26	24.1	29.98	10:42	DGPS Fix	3355.156625	S	15113.742343	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
5	1	131	0	46.26	579.14	404.54	303.97	229.01	186.21	160.18	140.73	111.40	90.03	50	625.962	437.246	328.545	247.525	201.265	173.130	152.108	120.406	97.309	174.60	24.1	29.98	10:42	DGPS Fix	3355.156625	S	15113.742343	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
6	1	150	0	50.48	178.49	169.61	161.75	153.53	143.98	134.89	125.99	109.38	93.60	50	176.793	167.997	160.212	152.070	142.611	133.607	124.792	108.340	92.710	8.88	24.3	29.98	10:43	DGPS Fix	3355.153520	S	15113.730703	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
6	1	150	0	50.37	175.95	167.97	160.16	150.53	141.01	132.07	122.96	107.02	91.17	50	174.658	166.736	158.984	149.424	139.974	131.100	122.057	106.234	90.500	7.98	24.3	29.98	10:43	DGPS Fix	3355.153520	S	15113.730703	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
6	1	150	0	50.71	177.04	168.99	161.48	153.60	143.43	135.17	126.35	110.83	93.78	50	174.561	166.624	159.219	151.449	141.422	133.277	124.581	109.278	92.467	8.05	24.3	29.98	10:43	DGPS Fix	3355.153520	S	15113.730703	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
7	1	175	0	46.04	977.70	580.93	444.93	314.82	232.73	183.98	156.61	121.86	100.12	50	1061.794	630.897	483.199	341.898	252.748	199.805	170.080	132.341	108.732	396.77	43.7	29.98	10:44	DGPS Fix	3355.149051	S	15113.715653	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
7	1	175	0	46.48	957.28	581.72	443.86	323.58	236.53	187.88	159.64	125.37	102.79	50	1029.776	625.775	477.474	348.085	254.443	202.108	171.730	134.864	110.574	375.56	43.7	29.98	10:44	DGPS Fix	3355.149051	S	15113.715653	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
7	1	175	0	46.26	931.60	580.32	444.79	316.39	234.19	184.60	159.00	124.81	101.72	50	1006.917	627.237	480.750	341.969	253.124	199.524	171.855	134.901	109.944	351.28	43.7	29.98	10:44	DGPS Fix	3355.149051	S	15113.715653	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
8	1	205	0	47.48	670.33	560.34	490.04	387.32	308.78	240.46	192.51	130.32	97.95	50	705.908	590.080	516.049	407.877	325.168	253.222	202.727	137.237	103.149	109.99	24.5	29.98	10:45	DGPS Fix	3355.148894	S	15113.696905	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
8	1	205	0	47.70	661.01	556.01	483.28	385.50	306.31	239.91	192.36	132.70	98.88	50	692.883	582.820	506.583	404.088	321.080	251.478	201.635	139.099	103.648	105.00	24.5	29.98	10:45	DGPS Fix	3355.148894	S	15113.696905	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
8	1	205	0	48.15	656.43	553.69	479.33	383.40	305.89	239.92	193.04	133.88	100.22	50	681.651	574.964	497.747	398.131	317.643	249.138	200.457	139.024	104.071	102.74	24.5	29.98	10:45	DGPS Fix	3355.148894	S	15113.696905	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
9	1	225	0	48.93	1212.83	764.61	575.93	397.60	286.98	222.35	189.73	141.11	125.13	50	1239.352	781.330	588.524	406.295	293.256	227.212	193.879	144.196	127.866	448.22	42.0	29.98	10:48	DGPS Fix	3355.150644	S	15113.684240	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
9	1	225	0	50.04	1233.41	774.10	586.93	407.03	295.40	228.27	196.35	145.40	128.76	50	1232.424	773.481	586.461	406.705	295.164	228.088	196.193	145.284	128.657	459.31	42.0	29.98	10:48	DGPS Fix	3355.150644	S	15113.684240	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
9	1	225	0	50.93	1214.46	772.62	580.62	403.88	290.85	227.18	193.33	143.40	128.14	50	1192.284	758.512	570.018	396.505	285.539	223.032	189.800	140.781	125.800	441.84	42.0	29.98	10:48	DGPS Fix	3355.150644	S	15113.684240	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
10	1	255	0	50.93	839.94	650.36	518.62	356.55	273.90	211.64	175.52	121.77	98.97	50	824.602	638.484	509.150	350.039	268.898	207.775	172.315	119.546	97.163	189.58	43.1	29.98	10:49	DGPS Fix	3355.149284	S	15113.665108	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
10	1	255	0	51.60	850.65	639.73	517.14	358.78	276.00	216.55	178.87	126.26	101.85	50	824.273	619.893	501.105	347.655	267.442	209.835	173.324	122.345	98.692	210.92	43.1	29.98	10:49	DGPS Fix	3355.149284	S	15113.665108	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
10	1	255	0	51.26	813.08	641.39	511.07	356.57	276.18	216.90	179.60	127.02	101.92	50	793.094	625.624	498.508	347.805	269.391	211.568	175.185	123.898	99.415	171.69	43.1	29.98	10:49	DGPS Fix	3355.149284	S	15113.665108	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
11	1	276	0	51.04	811.71	527.21	376.11	242.69	162.24	110.09	505.45	61.77	58.33	50	795.170	516.467	368.446	237.745	158.934	107.847	495.151	60.511	57.141	284.50	45.7	29.98	10:50	DGPS Fix	3355.147733	S	15113.652428	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
11	1	276	0	51.60	801.18	525.24	372.09	245.14	165.38	111.66	419.83	63.25	60.62	50	776.337	508.953	360.552	237.539	160.252	108.198	406.812	61.289	58.740	275.94	45.7	29.98	10:50	DGPS Fix	3355.147733	S	15113.652428	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
11	1	276	0	51.49	784.08	509.54	370.40	246.07	167.21	113.09	209.15	64.47	59.63	50	761.391	494.795	359.681	238.949	162.371	109.817	203.098	62.604	57.904	274.54	45.7	29.98	10:50	DGPS Fix	3355.147733	S	15113.652428	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
12	1	300	0	50.04	718.73	521.54	406.55	276.05	204.44	153.26	123.79	78.15	62.07	50	718.155	521.123	406.225	275.829	204.277	153.137	123.691	78.088	62.020	197.19	48.5	29.98	10:51	DGPS Fix	3355.146529	S	15113.637231	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
12	1	300	0	51.49	708.25	520.99	409.68	280.36	209.24	157.09	128.33	79.85	61.90	50	687.755	505.914	397.825	272.247	203.185	152.544	124.616	77.539	60.109	187.26	48.5	29.98	10:51	DGPS Fix	3355.146529	S	15113.637231	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
12	1	300	0	51.04	695.83	517.19	404.05	277.24	208.13	156.97	128.36	80.84	62.47	50	681.652	506.652	395.817	271.591	203.889	153.772	125.745	79.193	61.197	178.64	48.5	29.98	10:51	DGPS Fix	3355.146529	S	15113.637231	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
13	1	325	0	50.37	647.37	468.32	374.01	251.90	179.68	131.37	104.87	73.90	59.37	50	642.615	464.880	371.263	250.050	178.360	130.405	104.100	73.357	58.934	179.05	45.5	29.98	10:52	DGPS Fix	3355.140846	S	15113.623738	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
13	1	325	0	51.93	624.84	471.47	379.57	257.52	185.73	135.89	111.09	77.53	63.32	50	601.618	453.948	365.463	247.949	178.827	130.840	106.961	74.649	60.967	153.37	45.5	29.98	10:52	DGPS Fix	3355.140846	S	15113.623738	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
13	1	325	0	51.49	613.88	466.71	373.43	255.61	186.31	135.73	110.62	77.54	60.98	50	596.116	453.205	362.624	248.213	180.919	131.802	107.419	75.296	59.215	147.17	45.5	29.98	10:52	DGPS Fix	3355.140846	S	15113.623738	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
14	1	351	0	47.26	990.26	738.13	603.34	436.83	342.32	277.66	237.23	185.33	156.54	50	1047.672	780.925	638.320	462.156	362.167	293.758	250.984	196.075	165.616	252.13	45.7	29.98	10:52	DGPS Fix	3355.127135	S	15113.620073	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
14	1	351	0	48.48	986.20	745.33	609.93	444.54	349.67	287.14	246.28	196.04	164.51	50	1017.120	768.698	629.053	458.478	360.633	296.143	254.002	202.186	169.668	240.87	45.7	29.98	10:52	DGPS Fix	3355.127135	S	15113.620073	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
14	1	351	0	49.60	995.98	758.72	619.32	452.23	356.87	293.88	252.93	199.49	171.16	50	1004.012	764.839	624.315	455.877	359.748	296.250	254.970	201.099	172.540	237.26	45.7	29.98	10:52	DGPS Fix	3355.127135	S	15113.620073	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
15	1	375	0	48.59	816.07	626.11	458.41	265.54	201.69	161.22	143.82	104.55	97.18	50	839.751	644.279	471.712	273.246	207.543	165.898	147.993	107.584	100.000	189.96	30.6	29.98	10:54	DGPS Fix	3355.114682	S	15113.617801	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
15	1	375	0	50.04	813.49	634.20	478.30	268.46	205.25	163.59	147.73	107.80	98.52	50	812.840	633.693	477.918	268.245	205.086	163.459	147.612	107.714	98.441	179.29	30.6	29.98	10:54	DGPS Fix	3355.114682	S	15113.617801	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
15	1	375	0	50.60	812.79	631.98	422.82	271.03	207.41	164.16	149.30	108.08	97.27	50	803.152	624.486	417.806	267.816	204.951	162.213	147.530	106.798	96.117	180.81	30.6	29.98	10:54	DGPS Fix	3355.114682	S	15113.617801	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
16	1	400	0	49.71	864.93	643.78	482.70	341.94	274.23	224.34	198.40	149.41	124.30	50	869.976	647.536	485.516	343.935	275.830	225.649	199.557	150.282	125.025	221.15	29.6	29.98	10:54	DGPS Fix	3355.101748	S	15113.615381	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
16	1	400	0	50.26	849.07	632.00	484.98	343.97	277.53	227.75	201.75	154.01	129.02	50	844.678	628.731	482.471	342.191	276.094	226.572	200.706	153.213	128.353	217.07	29.6	29.98	10:54	DGPS Fix	3355.101748	S	15113.615381	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
16	1	400	0	50.60	855.41	635.65	488.03	347.76	282.39	233.10	207.99	157.12	129.00	50	845.267	628.113	482.243	343.636	279.042	230.336	205.524	155.257	127.470	219.76	29.6	29.98	10:54	DGPS Fix	3355.101748	S	15113.615381	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
17	1	425	0	50.48	583.99	400.63	302.69	211.24	157.56	124.43	103.46	73.11	55.82	50	578.437	396.821	299.812	209.231	156.062	123.247	102.476	72.415	55.289	183.36	46.9	29.98	10:55	DGPS Fix	3355.088575	S	15113.613744	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
17	1	425	0	51.15	569.31	397.59	300.94	211.55	159.39	125.00	104.47	75.01	55.88	50	556.510	388.651	294.174	206.794	155.806	122.190	102.121	73.324	54.624	171.72	46.9	29.98	10:55	DGPS Fix	3355.088575	S	15113.613744	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
17	1	425	0	51.71	565.88	395.57	300.09	211.40	159.11	125.35	104.91	73.38	56.19	50	547.167	382.489	290.166	204.409	153.848	121.205	101.441	70.953	54.332	170.31	46.9	29.98	10:55	DGPS Fix	3355.088575	S	15113.613744	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
18	1	449	0	50.15	677.13	399.13	281.58	177.84	129.18	95.76	78.02	57.00	48.99	50	675.105	397.936	280.738	177.308	128.794	95.474	77.787	56.830	48.843	278.00	44.7	29.98	10:56	DGPS Fix	3355.075569	S	15113.613957	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
18	1	449	0	50.93	656.26	397.15	283.12	181.79	132.82	99.24	80.35	58.59	49.95	50	644.276	389.898	277.950	178.470	130.395	97.428	78.883	57.520	49.038	259.11	44.7	29.98	10:56	DGPS Fix	3355.075569	S	15113.613957	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	
18	1	449	0	50.93	634.79	395.27	279.12	180.39	132.86	99.13	82.37	59.26	49.63	50	623.199	388.052	274.023	177.096	130.434	97.320	80.866	58.178	48.724	239.52	44.7	29.98	10:56	DGPS Fix	3355.075569	S	15113.613957	E	0.00	09/25/2009 10:38:26	Chop118-05A	3	UNSW	Brendan	

APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULT SHEETS

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Macquarie Park, NSW 2113
PO Box 976
North Ryde, Bc 1670
Telephone: 02 9888 5000
Facsimile: 02 9888 5001
Email: dtreweek@jkgroup.net.au

SOIL TEST SERVICES
ABN 43 002 145 173

STS Job No:L3058
Table A: Page 1 of 1
Lab Report No:1

TABLE A
SUMMARY OF FOUR DAY SOAKED C.B.R.TEST RESULTS

Client: Pells Sullivan Meynink

Project: Lab Testing

Location: Proposed UNSW Energy Technologies Building

Your Ref No:PSM1397.L1

SAMPLE NUMBER	1	2	3	4	5
Surcharge (kg)	4.5	4.5	4.5	4.5	4.5
Soil Description	SILTY CLAY: high plasticity, dark grey/black	SILTY SAND: grey, with medium to coarse gravel	SILTY SAND:light brown,with medium to coarse gravel,with foreign material(ceramic, glass,root fibers)	SILTY SAND:grey/black with foreign material (ceramic,grass cuttings glass,root fibers)	SILTY SAND:grey/black brown,with medium to coarse gravel,with foreign material(ceramic, glass,root fibers)
Maximum Dry Density (t/m^3)	1.502 STD	1.602 STD	1.713 STD	1.380 STD	1.713 STD
Optimum Moisture Content (%)	26.8	15.9	11.3	17.6	13.4
Moulded Dry Density (t/m^3)	1.47	1.57	1.68	1.35	1.69
Sample Density Ratio (%)	98	98	98	98	98
Sample Moisture Ratio (%)	101	99	102	102	98
Moisture Contents					
Insitu (%)	30.2	19.1	4.3	9.0	4.7
Moulded (%)	27.0	15.7	11.5	18.0	13.2
After soaking and					
After Test, Top 30mm(%)	37.5	26.1	17.8	36.2	22.5
Remaining Depth (%)	34.6	19.4	15.4	27.7	16.7
Material Retained on 19mm Sieve (%)	0	0	0	0	0
Swell (%)	2.5	0.0	0.0	0.0	0.0
C.B.R. value: @5.0mm penetration	2.0	7	15	3.0	8

NOTES:

- Test Methods :
  - (a) Soaked C.B.R. : AS 1289 6.1.1
  - (b) Standard Compaction : AS 1289 5.1.1
  - (c) Moisture Content : AS 1289 2.1.1
- Test materials sampled and supplied by others on 24/9/09

NATA
NATA Accredited Laboratory Number:1327

Approved Signatory / Date
8/10/09
(A. Tatikonda)

APPENDIX E

STAGE 1 CONTAMINATION ASSESSMENT REPORT

URBAN ENVIRONMENTAL

STAGE 1
CONTAMINATION ASSESSMENT
UNSW ENERGY TECHNOLOGIES BUILDING
KENSINGTON NSW

Prepared for:

Pells Sullivan Meynink Pty Ltd
G3 56 Delhi Road
NORTH RYDE, NSW, 2113

7 October, 2009

Project Ref: UES006.R01

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1	UES006.R01	Final	7/10/09	Pells Sullivan Meynink	
1	UES006.R01	Final	7/10/09	Urban Environmental	

PREPARED BY

Franco Fuccenecco BSc (Hons) MAppSc
Principal Consultant

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APPENDICES

EXECUTIVE SUMMARY

Urban Environmental Services Pty Ltd was commissioned by Pell Sullivan Meynink Pty Ltd to undertake a Stage 1 contamination assessment of the area comprising the proposed UNSW Energy Technologies Building forming part of the University of NSW campus.

A preliminary contamination assessment as per the *NSW EPA (1997) Guidelines for Consultants Reports* – Stage 1 assessment was undertaken to determine potential contamination issues associated with the future redevelopment of the site.

The site currently comprises tennis courts with the university mall to the north, village green to the east, new college to the south and Anzac Parade to the west.

Review of the geological and hydrological setting indicates the site forms part of the Tuggerah Aeolian Landscape comprising gently undulating to rolling coastal dunefields. Geotechnical drilling undertaken by PSM indicated the site is underlain by fine to medium grained sands.

The nearest surface water feature is Eastlakes, located 1km to the south of the site.

Review of historical title information indicates that the site has the following history:

- University of NSW from 1964 to present
- Department of Education from 1952 – 1964
- Part of the site Commissioner of Railways and Trams 1940 – 1954
- Crown Land prior to 1952

Review of historical aerial photography indicates that the site has had the following history:

- The site appears as tennis courts within the university from 1970 to the present.
- The site appears as vacant land from 1951 – 1961.
- The site appears as race track in 1930.

A search of the NSW EPA website register indicated that there are no notices pertaining to environmental issues under the Contaminated Land Management Act (1997) for the sites.

Urban Environmental Services Pty Ltd concludes the following based on the historical evaluation of site usage:

- The subject site has had a history of education use since the 1950's.

- The site does not have a history of potential contaminating activities and is suitable for education redevelopment. No further investigations are warranted from a contamination perspective.

1 INTRODUCTION

1.1 Background

Urban Environmental Services Pty Ltd was commissioned by Pell Sullivan Meynink Pty Ltd to undertake a Stage 1 contamination assessment of the area comprising the proposed UNSW Energy Technologies Building forming part of the University of NSW campus. A site location plan is contained in Appendix A.

1.2 Objectives

The objective of the assessment was to determine the likelihood of site contamination by undertaking a Stage 1 Site Assessment as per the *NSW EPA (1997) Guidelines for Consultants Reports*.

1.3 Scope of Works

To achieve the objective, the following work scope was undertaken:

- Site review and discussions with the client;
- Review of background geological and hydrogeological information;
- Review of historical title deeds associated with the property;
- Review of historical aerial photography;
- Review of readily available reports and records;
- Preparation of a report detailing the findings of the assessment.

2 BACKGROUND INFORMATION

2.1 Site Identification

The proposed new building is located on the western part of the campus fronting Anzac Parade. The site comprises Lot 3 DP 1104617.

2.2 Regional Geology

Review of the Department of Land and Water Conservation Sydney Soil Landscape Series Sheet 9130 (2004) indicate the site is within the Tuggerah Aeolian Landscape comprising gently undulating to rolling coastal dunefields. Soils are podzols on dunes and podzol/humus podzols intergrades on swales. The soils pose a wind erosion hazard, non cohesive, highly permeable, localised flooding with permanently high watertables.

Review of the DLWC Acid Sulfate Soil Risk Map – Botany Bay, Edition 2, 1997 indicates the site is within a typical landform comprising bedrock slopes, elevated Pleistocene and Holocene dunes and elevated alluvial plains. Acid sulfate soils are not known or expected to occur in these environments. The environmental risk is indicated as land management activities not likely to be affected by acid sulfate soil materials.

Geotechnical drilling undertaken by PSM indicated the site is underlain by fine to medium grained sands.

2.3 Regional Hydrology and Hydrogeology

The nearest surface water feature is Eastlakes, located 1km to the south of the site.

2.4 Site Condition and Surrounding Environment

The site is situated in the campus of the University of NSW. The surrounding landuse is predominantly residential with Randwick racecourse to the north

3 SITE HISTORY

3.1 Site Title Deeds

The site title deeds indicated the properties have evolved as follows:

Lot 3 DP 1104617

Year	Proprietor
2006 – to date	The University of New South Wales
(2006 to date)	*(various current leases see Folio Identifier 3/1104617)*
(2006 to date)	*(various leases see Historical Folio 3/1104617)*
	(Lot 3 DP 553914)
1988 – 2006	The University of New South Wales
(1988 – 2006)	*(various leases see Historical Folio 3/553914)*
	(Lot 3 DP 553914 – CTVol 11821 Fol 74)
1972 – 1988	The University of New South Wales
(1972 – 1988)	*(various leases see CTVol 11821 Folio 74)*
	(Lot 3 DP 522797 – CTVol 10503 Fol 17)
1967 – 1972	The University of New South Wales
(1967 – 1972)	*(various leases see CTVol 10503 Folio 17)*
	(Lot 1 DP 509893 – CTVol 9787 Fol 110)
1964 – 1967	The University of New South Wales
1964 – 1964	The Minister for Education

See Notes (a) & (b)

Note (a)

	(Portion 1486 Parish Alexandria – Area 59 Acres 3 Roods 25 ¾ Perches – GG 28 Nov 1952 Fol 4355)
1952 – 1964	The Minister for Education
	(Portion 1486 Parish Alexandria – Area 59 Acres 3 Roods 25 ¾ Perches)
Prior – 1952	Crown Land
(Prior – 1952)	*(Reserve from sale or lease other than annual leases)*

Note (b)

	(Portion 1491 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches – GG 28 May 1954 Fol 1587)
1954 – 1964	The Minister for Education
	(Portion 1487 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches – GG 12 Jan 1940 Fol 66)

1940 – 1954	The Commissioner for Railways and Tramways
	(Portion 1487 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches)
Prior – 1940	Crown Land
(Prior – 1940)	*(Reserve from sale or lease other than annual leases)*

Review of historical title information indicates that the site has the following history:

- University of NSW from 1964 to present
- Department of Education from 1952 – 1964
- Part of the site Commissioner of Railways and Trams 1940 – 1954
- Crown Land prior to 1952

Detailed title information is contained in Appendix B.

3.2 Aerial Photography

Review of historical aerial photographs held by the Department of Land & Water Conservation indicates the site has undergone the following changes since 1930. A summary of photographs reviewed is outlined below:

- *Sydney 1:16,000 20044 Run 7 Photo 14 -25*

The site appears as tennis courts with the university mall to the north, village green to the east, new college to the south and Anzac Parade to the west.

- *Sydney 1:25,000 1994 Run 11 Photo 153-164*

The site appears as above.

- *Sydney 1:16,000 1986 Run 24e Photo 3527-116*

The site appears as above.

- *Cumberland 1:16,000 1978 Run 18 Photo 2713 -149*

The site appears as above.

- *Cumberland No Scale* *1970* *Run 19* *Photo 1909-5005*

The site appears as above.

- *Cumberland No Scale* *1961* *Run 38e* *Photo 1042-5174*

The site appears as vacant land with an outline of tennis courts and the village green.

- *Sydney* *1:12,200* *1951* *Run 15* *Photo 467-32*

The site appears as vacant land.

- *Sydney* *No Scale* *1930* *Run 17* *Photo 3428*

The site appears as race track.

Review of historical aerial photography indicates that the site has the following history:

- The site appears as tennis courts within the university from 1970 to the present.
- The site appears as vacant land from 1951 – 1961.
- The site appears as race track in 1930.

A copy of select aerial photography is contained in Appendix C.

3.3 Notices, Permits and Licences

A search of the NSW EPA website register indicated that there are no notices pertaining to environmental issues under the Contaminated Land Management Act (1997) for the site.

4 CONCLUSIONS

Based on the results of the preliminary stage 1 site assessment, Urban Environmental Services Pty Ltd concludes the following:

- The site appears as tennis courts with the university mall to the north, village green to the east, new college to the south and Anzac Parade to the west.

- Review of geological maps indicates the site form part of the Tuggerah Aeolian Landscape comprising gently undulating to rolling coastal dunefields. Geotechnical drilling undertaken by PSM indicated the site is underlain by fine to medium grained sands.

- Review of historical title deeds indicates the site was Crown Land prior to 1952, part of the site Commissioner of Railways and Trams 1940 – 1954, Department of Education from 1952 – 1964, University of NSW from 1964 to present.

- Review of historical aerial photography indicates the site appears as race track in 1930, vacant land from 1951 – 1961 and as tennis courts within the university from 1970 to the present.

- A search of the NSW EPA website register indicated that there are no notices pertaining to environmental issues under the Contaminated Land Management Act (1997) for the site.

- Urban Environmental concludes that based on the historical evaluation of site usage, the subject site has had a history of education use since the 1950's. The site does not have a history of potential contaminating activities and is suitable for education redevelopment. No further investigations are warranted from a contamination perspective.

5 REFERENCES

NSW Department of Mineral Resources (1983). Sydney Geological Series Sheet 9130 (Edition 1) 1:100,000 scale.

Department of Land and Water Conservation (2004). Sydney Soil Landscape Series Sheet 9130

NSW EPA (1997). Guidelines for Consultants Reporting on Contaminated Sites.

NEPC (1999). The National Environment Protection – Assessment of Site Contamination Measure (NEPM), National Environment Protection Council, December 1999.

PSM (2009). Geotechnical borelogs.

DISCLAIMER

Urban Environmental Services Pty Ltd have conducted work concerning the environmental status of the property which is the subject of this report, and has prepared this report on the basis of that assessment.

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within the time and budgetary requirements of the client, and in reliance on certain data and information made available to Urban Environmental Services Pty Ltd. The analyses, evaluations, opinions and conclusions presented in this report are based on that information, and they could change if the information is in fact inaccurate or incomplete.

Urban Environmental Services Pty Ltd will not update the report and has not taken into account events occurring after the time its assessment was conducted.

This report is intended for the sole use of the client and only for the purpose for which it was prepared. Any representation contained in the report is made only to the client. Any third party who relies on the report or on any representation contained in it does so at their own risk.

APPENDIX A
BACKGROUND RECORDS

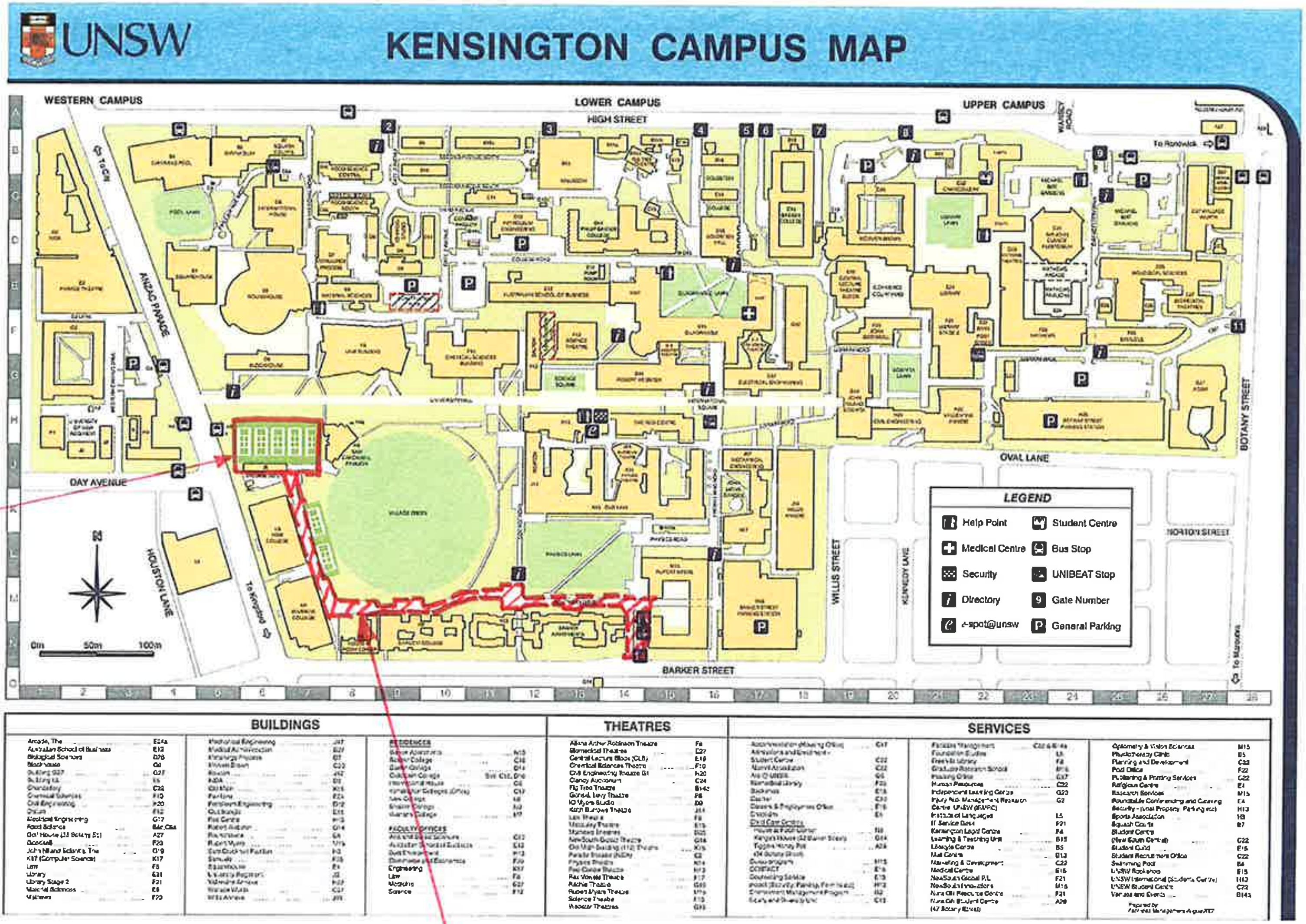
UNSW ETB

PROPOSED EXTENT OF BENKELMAN BEAM TESTS

10/8/09

TTW

091426



PROPOSED SITE OF ETB.

DENOTES EXTENT OF BENKELMAN BEAM TEST

DP 1104617

Registered : 18/10/2006

Title System : TORRENS

Purpose : DEPARTMENTAL

Ref. Map : PARISH#

Last Plan : DP 553914

PLAN OF RESIDUE IN LOT 3 IN DP 553914 AFTER ROAD ACTION VIDE S134620

Lengths are in metres. Reduction Ratio - NTS

LPI Ref. : DRS SM12

Sheet 1 of 1 sheets

L. G. A. : RANDWICK

LOCALITY : KENSINGTON

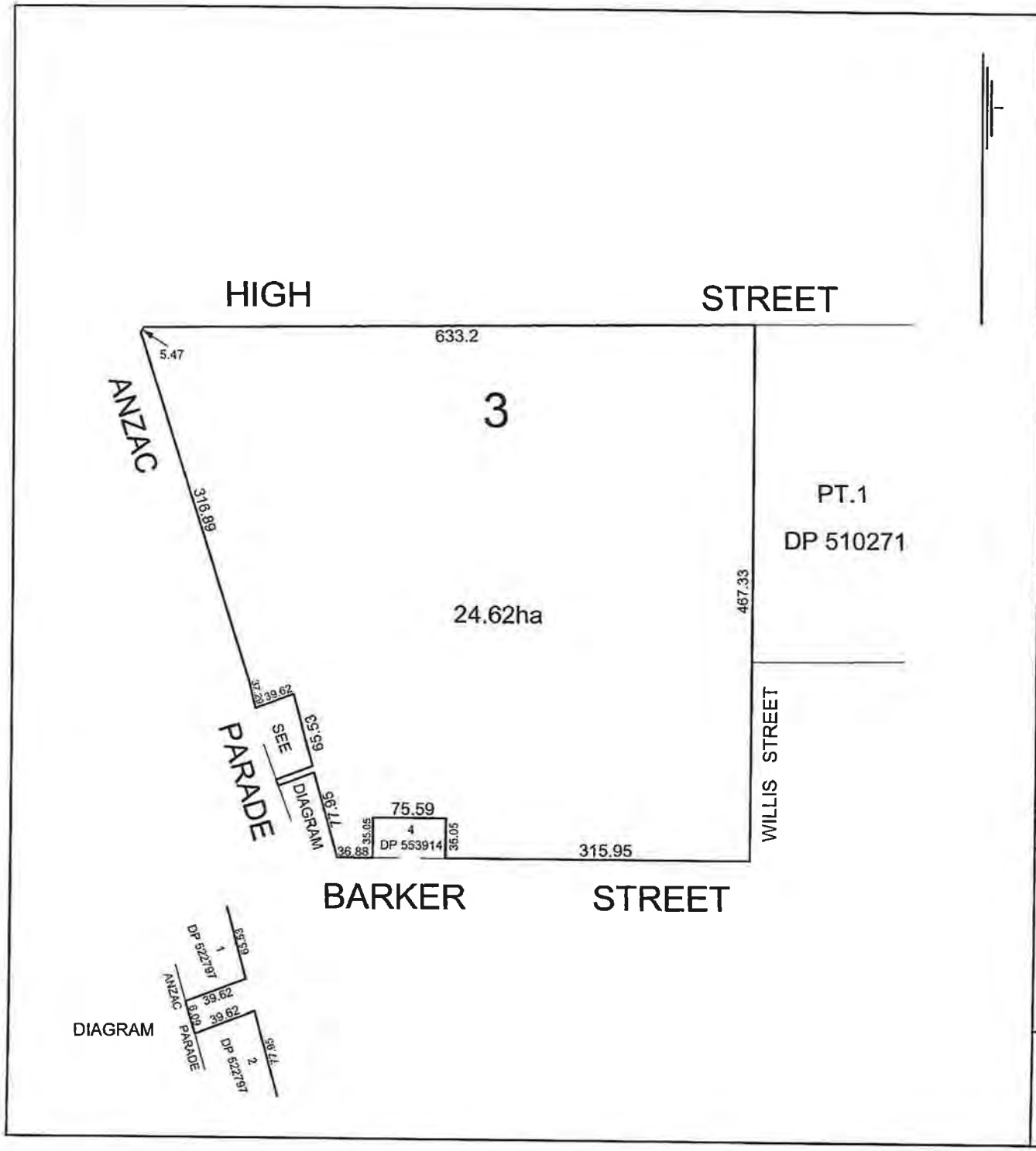
PARISH : ALEXANDRIA

COUNTY : CUMBERLAND (1)

LOT	PRIOR IDENTITY

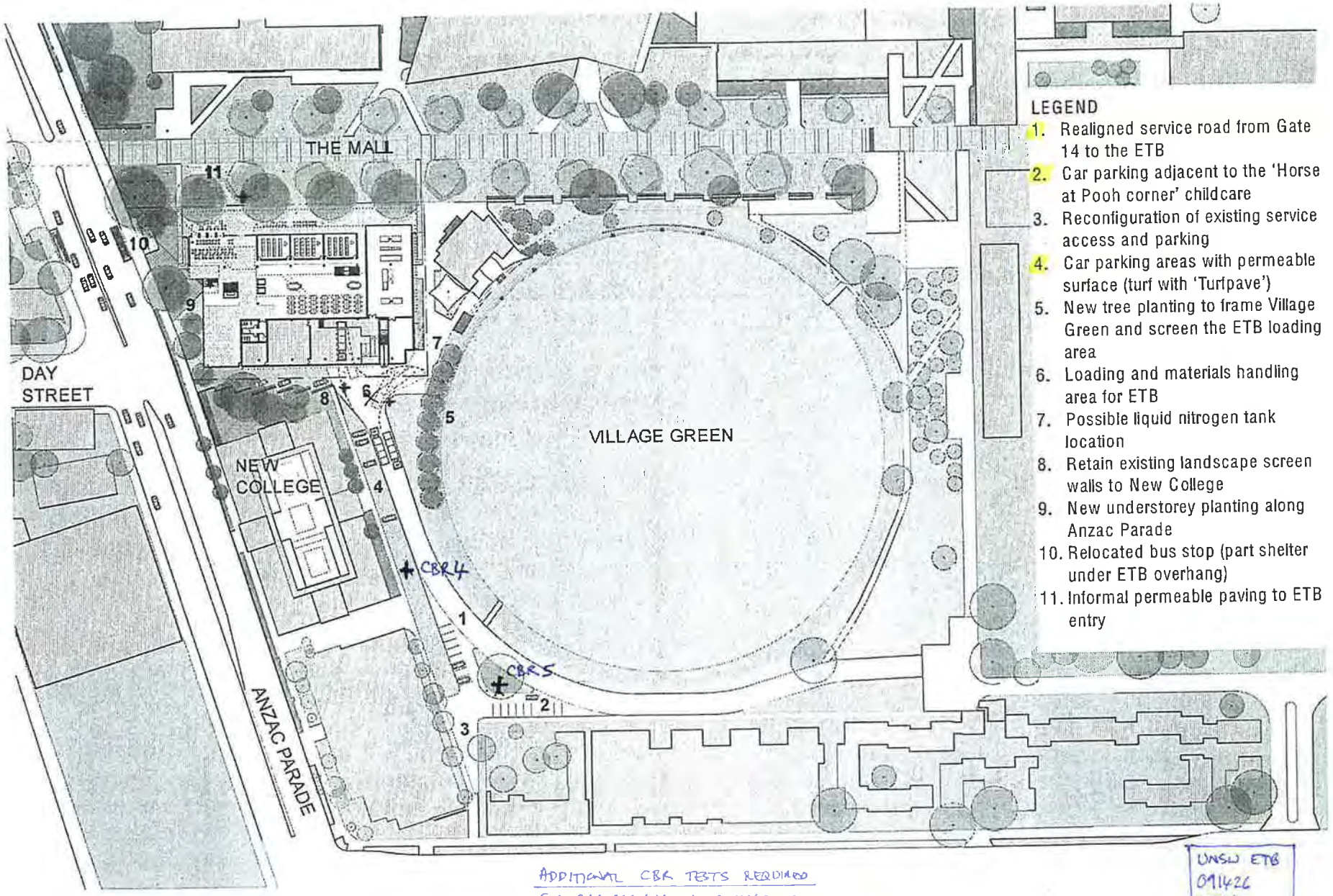
THIS PLAN HAS BEEN PREPARED TO PROVIDE AN UNIQUE IDENTITY FOR THE LAND IN THE CERTIFICATE OF TITLE REFERRED TO ABOVE

IT IS NOT A CURRENT PLAN IN THE TERMS OF 7A OF THE CONVEYANCING ACT, 1919.



the northern edge are more sympathetic in terms of scale and setback.

align the northern edge of the building with Spooner's former 'sandstock' brick walls



ADDITIONAL CBR TESTS REQUIRED FOR CAR PARKING AND REALIGNED SERVICE ROAD CBR4 AND CBR5

UNSW ETB
09142C
TTW
DT
18/3/09

APPENDIX B
TITLE RECORDS

ADVANCE LEGAL SEARCH PTY LIMITED

(ACN 077 067 068)
ABN 49 077 067 068

PO Box 149
Yagoona NSW 2199

Telephone: +612 9754 1590
Mobile: 0412 169 809
Facsimile: +612 9754 1364
Email: alsearch@optusnet.com.au

23rd September 2009

URBAN ENVIRONMENTAL CONSULTANTS PTY LTD
PO Box 1070,
ROZELLE NSW 2039

Attention: Franco Fuccenecco

RE: **University of New South Wales**
Anzac Parade,
Kensington

Current Search

Folio Identifier 3/1104617 (title attached)
DP 1104617 (plan attached)
Dated 17th September 2009
Registered Proprietor:
THE UNIVERSITY OF NEW SOUTH WALES

Title Tree
Lot 3 DP 1104617

Folio Identifier 3/1104617

Folio Identifier 3/553914

Certificate of Title Volume 11821 Folio 74

Certificate of Title Volume 10503 Folio 17

Certificate of Title Volume 9787 Folio 110

(a)	**(b)**
PA 43788	PA 43789
Government Gazette 28 November 1952 Folio 4355	Government Gazette 28 May 1954 Folio 1587
****	****

Summary of Proprietors
Lot 3 DP 1104617

Year	**Proprietor**
	(Lot 3 DP 1104617)
2006 – todate	The University of New South Wales
(2006 – todate)	*(various current leases see Folio Identifier 3/1104617)*
(2006 – todate)	*(various leases see Historical Folio 3/1104617)*
	(Lot 3 DP 553914)
1988 – 2006	The University of New South Wales
(1988 – 2006)	*(various leases see Historical Folio 3/553914)*
	(Lot 3 DP 553914 – CTVol 11821 Fol 74)
1972 – 1988	The University of New South Wales
(1972 – 1988)	*(various leases see CTVol 11821 Folio 74)*
	(Lot 3 DP 522797 – CTVol 10503 Fol 17)
1967 – 1972	The University of New South Wales
(1967 – 1972)	*(various leases see CTVol 10503 Folio 17)*
	(Lot 1 DP 509893 – CTVol 9787 Fol 110)
1964 – 1967	The University of New South Wales
1964 – 1964	The Minister for Education

See Notes (a) & (b)

Note (a)

	(Portion 1486 Parish Alexandria – Area 59 Acres 3 Roods 25 ¾ Perches – GG 28 Nov 1952 Fol 4355)
1952 – 1964	The Minister for Education
	(Portion 1486 Parish Alexandria – Area 59 Acres 3 Roods 25 ¾ Perches)
Prior – 1952	Crown Land
(Prior – 1952)	*(Reserve from sale or lease other than annual leases)*

****

Note (b)

	(Portion 1491 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches – GG 28 May 1954 Fol 1587)
1954 – 1964	The Minister for Education
	(Portion 1487 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches – GG 12 Jan 1940 Fol 66)
1940 – 1954	The Commissioner for Railways and Tramways
	(Portion 1487 Parish Alexandria – Area 3 Acres 2 Roods 32 Perches)
Prior – 1940	Crown Land
(Prior – 1940)	*(Reserve from sale or lease other than annual leases)*

****

APPENDIX C
AERIAL PHOTOGRAPHY


SITE
CUMBERLAND 1970 RUN 19 PHOTO 1909-5005
N


SITE
SYDNEY 1951 RUNS 12" 12200 PHOTO 467-32
N

URBAN ENVIRONMENTAL

7 October, 2009

Pell Sullivan Meynink Pty Ltd
G3 56 Delhi Road
NORTH RYDE NSW 2113

Attention: Mr Bernard Shen

Re: Waste Classification – UNSW Energy Technologies Building

Further to your request, we have undertaken laboratory analysis and reporting of soil samples collected from geotechnical drilling undertaken on site. The soils were assessed for contaminant characteristics and waste classification for planning purposes. Geotechnical drilling undertaken by PSM indicated the site is underlain by fine to medium grained sands.

Review of the Department of Land and Water Conservation Sydney Soil Landscape Series Sheet 9130 (2004) indicate the site is within the Tuggerah Aeolian Landscape comprising gently undulating to rolling coastal dunefields.

Review of the DLWC Acid Sulfate Soil Risk Map – Botany Bay, Edition 2, 1997 indicates the site is within a typical landform comprising bedrock slopes, elevated Pleistocene and Holocene dunes and elevated alluvial plains. Acid sulfate soils are not known or expected to occur in these environments.

Four samples of the soil material (CBR2 0.3, CBR3 0.25, BH101 0.2 & 2.0) were collected and analysed for a broad range of contaminants including Petroleum Hydrocarbons (TPH/BTEX), Polyaromatic Hydrocarbons (PAHs), Phenols, Polychlorinated Biphenyls, (PCB's), Pesticides (OCP/OPP) and Metals (Cu, Pb, Zn, Cr, Cd, Ni, As, Hg) to determine waste classification.

Results indicate no petroleum hydrocarbons (TPH/BTEX), Polyaromatic Hydrocarbons (PAHs), Phenols, Polychlorinated Biphenyls (PCB's), or Pesticides (OCP/OPP) were detected. Metals results were low indicating background levels. Laboratory Analytical Certificates are attached for reference.

Based on review of the results and applying the *NSW EPA (2008) Waste Classification Guidelines: Part 1 Classifying Waste*, the underlying sandy materials would be classified as virgin excavated natural material (VENM). The excavated material is suitable for reuse, subject to local government approvals, at other sites or is suitable for disposal as VENM to landfill. If during excavation, should any material exhibit signs of potential contamination (odours, staining or anthropogenic inclusions) the material should be stockpiled separately for inspection and assessment.

Yours faithfully,
URBAN ENVIRONMENTAL SERVICES PTY LTD

Franco Fuccenecco
Principal Consultant BSc (Hons) MAppSc

URBAN ENVIRONMENTAL SERVICES PTY LTD
E&J LYCETT BUILDING SUITE 1, 18 MOORE STREET, ROZELLE
PO BOX 1070, ROZELLE, 2039 NSW
PHONE: 02 9555 7570
FAX: 02 9555 6313
MOB: 0413 584 110
EMAIL: urban.environmental@bigpond.com

URBAN ENVIRONMENTAL

Waste Classification - Limitations

Urban Environmental Services Pty Ltd (UES) assessment of the site is based on a limited site investigation and upon the program of surface and subsurface screening and/or laboratory testing of samples. The findings of this report are based on site conditions existing at the time the inspection. On this basis UES cannot provide unqualified warranties or assume liability for site conditions not observed and/or not accessible during the time of its investigation. Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated.

Site characteristics may change in response to natural conditions, chemical reactions, spillage of contaminated substances or dumping of fill. These changes may occur subsequent to the investigations of UES. On this basis conclusions have been made from a limited number of observation points assuming that the geological and chemical conditions are representative across the site. No other warranties are made or intended.

This report and associated documents has been prepared solely for the use of Pells Sullivan Meynink Pty Ltd and interested parties for the purpose of transport of materials. Any reliance assumed by third parties on this report shall be at such parties own risk. Any ensuring liability resulting from use of the report by third parties cannot be transferred to UES.

Section 143 of the Protection of the Environment Operations Act 1997 (POEO) states that it is an offence for waste to be transported to a place that cannot lawfully be used as a facility to accept that waste. It is the duty of the owner and transporter of the waste to ensure that the waste is disposed appropriately and the site can accept the waste. UES does not accept responsibility for material tracking, loading, transport or disposal of waste from the site.

Prior arrangement with the receiving waste facility or relevant authority should be obtained prior to the disposal or reuse of any material offsite. The receiving site should check the materials received to ensure that the imported materials match the description provided in this report.

LabMark
ENVIRONMENTAL LABORATORIES

ilac-MRA NATA Accreditation No. 1645

Accredited for compliance with ISO/IEC 17025. The results of tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the APLAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

AQIS
AUSTRALIAN QUARANTINE AND INSPECTION SERVICE
SYDNEY License No. N0356

Quarantine Approved Premises criteria 5.1 for quarantine containment level 1 (QC1) facilities. Class five criteria cover premises utilised for research, analysis and testing of biological material, soil, animal, plant and human products.

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

FINAL CERTIFICATE OF ANALYSIS - ENVIRONMENTAL DIVISION

Laboratory Report No:	E044824
Client Name:	Urban Environmental
Client Reference:	PSM Syd Uni
Contact Name:	Franco Fuccenecco
Chain of Custody No:	na
Sample Matrix:	SOIL

Cover Page 1 of 4
plus Sample Results

Date Received: 28/09/2009
Date Reported: 06/10/2009

This Final Certificate of Analysis consists of sample results, DQI's, method descriptions, laboratory definitions, and internationally recognised NATA accreditation and endorsement. The DQO compliance relates specifically to QA/QC results as performed as part of the sample analysis, and may provide an indication of sample result quality. Transfer of report ownership from Labmark to the client shall only occur once full & final payment has been settled and verified. All report copies may be retracted where full payment has not occured within the agreed settlement period.

QUALITY ASSURANCE CRITERIA

Accuracy:	matrix spike:	1 in first 5-20, then 1 every 20 samples
	lcs, crm, method:	1 per analytical batch
	surrogate spike:	addition per target organic method
Precision:	laboratory duplicate:	1 in first 5-10, then 1 every 10 samples
	laboratory triplicate:	re-extracted & reported when duplicate RPD values exceed acceptance criteria
Holding Times:	soils, waters:	Refer to LabMark Preservation & THT table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil Metals 6 months general elements Mercury 28 days
Confirmation:	target organic analysis:	GC/MS, or confirmatory column
Sensitivity:	EQL:	Typically 2-5 x Method Detection Limit (MDL)

QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)

Accuracy:	spike, lcs, crm surrogate:	general analytes 70% - 130% recovery phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery
	anion/cation bal:	+/- 10% (0-3 meq/l), +/- 5% (>3 meq/l)
Precision:	method blank:	not detected >95% of the reported EQL
	duplicate lab RPD (metals):	0-30% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)
	duplicate lab RPD:	0-50% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)

QUALITY CONTROL ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC)

Accuracy:	spike, lcs, crm surrogate:	analyte specific recovery data <3xsd of historical mean
Uncertainty:	spike, lcs:	measurement calculated from historical analyte specific control charts

RESULT ANNOTATION

Data Quality Objective	s:	matrix spike recovery	p:	pending	bcs: batch specific lcs
Data Quality Indicator	d:	laboratory duplicate	lcs:	laboratory control sample	bmb: batch specific mb
Estimated Quantitation Limit	t:	laboratory triplicate	crm:	certified reference material	
not applicable	r:	RPD relative % difference	mb:	method blank	

Simon Mills
Quality Control (Report signatory)
simon.mills@labmark.com.au

Geoff Weir
Authorising Chemist (NATA signatory)
geoff.weir@labmark.com.au

Jeremy Truong
Authorising Chemist (NATA signatory)
jeremy.truong@labmark.com.au

Laboratory Report: E044824

Cover Page 2 of 4

NEPC GUIDELINE COMPLIANCE - DQO

1. GENERAL

A. Results relate specifically to samples as received. Sample results are not corrected for matrix spike, lcs, or surrogate recovery data.

B. EQL's are matrix dependant and may be increased due to sample dilution or matrix interference.

C. Laboratory QA/QC samples are specific to this project.

D. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at www.nata.asn.au.

E. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to extraction.

F. Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). If recovery data <20%, then the relevant results for that compound are considered not reliable.

G. Recovery data (ms, surrogate, crm, lcs) outside ASAC limits shall initiate an investigative action. Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations.

H. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date.

I. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

2. CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

A. SRN issued to client upon sample receipt & login verification.

B. Preservation & sampling date details specified on COC and SRN, unless noted.

C. Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

3. NATA ACCREDITED METHODS

A. NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer to subcontracted test reports for NATA accreditation status).

B. NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA documents. Corporate Accreditation No. 13542.

C. Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments.

Environmental Laboratory Industry Group
Foundation Member

Laboratory Report: E044824

Cover Page 3 of 4

4. QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix: **SOIL**

Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	BTEX by P&T	4	0	0%	0	0	0%
1	Volatile TPH by P&T (vTPH)	4	0	0%	0	0	0%
2	Petroleum Hydrocarbons (TPH)	4	0	0%	0	0	0%
3	Polyaromatic Hydrocarbons (PAH)	4	0	0%	0	0	0%
4	Phenols by GC/MS	4	0	0%	0	0	0%
5	Organochlorine Pesticides (OC)	4	0	0%	0	0	0%
6	Organophosphorus Pesticides (OP)	4	0	0%	0	0	0%
7	Polychlorinated Biphenyls (PCB)	4	0	0%	0	0	0%
8	Acid extractable metals (M7)	4	0	0%	0	0	0%
9	Acid extractable metals - mercury	4	0	0%	0	0	0%
10	Moisture	4	--	--	--	--	--

GLOSSARY:

#d	number of discrete duplicate extractions/analyses performed.
%d-ratio	NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%).
#t	number of triplicate extractions/analyses performed.
#s	number of spiked samples analysed.
%s-ratio	USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

Environmental Laboratory Industry Group
Foundation Member

Laboratory Report: E044824

5. ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, unless indicated below.

Laboratory QA/QC data shall relate specifically to this report, and may provide an indication of site specific sample result quality. LabMark DOES NOT report NON-RELEVANT BATCH QA/QC data. Acceptance of this self assessment certificate does not preclude any requirement for a QA/QC review by a accredited contaminated site EPA auditor, when and wherever necessary. Laboratory QA/QC self assessment references available upon request.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E044824
Client Name: Urban Environmental
Contact Name: Franco Fuccenecco
Client Reference: PSM Syd Uni EU5006

Date: 06/10/09
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		**229089**	**229090**	**229091**	**229092**	**lcs**	**mb**				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09	30/9/09	30/9/09				
Method : E002.2											
BTEX by P&T	**EQL**										
Benzene	0.2	<0.2	<0.2	<0.2	<0.2	85%	<0.2				
Toluene	0.5	<0.5	<0.5	<0.5	<0.5	88%	<0.5				
Ethylbenzene	0.5	<0.5	<0.5	<0.5	<0.5	85%	<0.5				
meta- and para-Xylene	1	<1	<1	<1	<1	89%	<1				
ortho-Xylene	0.5	<0.5	<0.5	<0.5	<0.5	88%	<0.5				
Total Xylene	--	--	--	--	--	--	--				
CDFB (Surr @ 10mg/kg)	--	*108%*	*107%*	*106%*	*104%*	*113%*	*116%*				
Method : E003.2											
Volatile TPH by P&T (vTPH)	**EQL**										
C6 - C9 Fraction	10	<10	<10	<10	<10	88%	<10				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E002.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/PID/MSD.
E003.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/FID.

Laboratory Identification		229089	229090	229091	229092	lcs	mb				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Method : E006.2											
Petroleum Hydrocarbons (TPH)	**EQL**										
C10 - C14 Fraction	50	<50	<50	<50	<50	--	<50				
C15 - C28 Fraction	100	<100	<100	<100	<100	94%	<100				
C29 - C36 Fraction	100	<100	<100	<100	<100	--	<100				
Sum of TPH C10 - C36	--	--	--	--	--	--	--				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E006.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/FID.

Laboratory Identification		229089	229090	229091	229092	lcs	mb				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Method : E007.2											
Polyaromatic Hydrocarbons (PAH)	**EQL**										
Naphthalene	0.5	<0.5	<0.5	<0.5	<0.5	125%	<0.5				
Acenaphthylene	0.5	<0.5	<0.5	<0.5	<0.5	126%	<0.5				
Acenaphthene	0.5	<0.5	<0.5	<0.5	<0.5	127%	<0.5				
Fluorene	0.5	<0.5	<0.5	<0.5	<0.5	121%	<0.5				
Phenanthrene	0.5	<0.5	<0.5	<0.5	<0.5	126%	<0.5				
Anthracene	0.5	<0.5	<0.5	<0.5	<0.5	128%	<0.5				
Fluoranthene	0.5	<0.5	<0.5	<0.5	<0.5	126%	<0.5				
Pyrene	0.5	<0.5	<0.5	<0.5	<0.5	128%	<0.5				
Benz(a)anthracene	0.5	<0.5	<0.5	<0.5	<0.5	129%	<0.5				
Chrysene	0.5	<0.5	<0.5	<0.5	<0.5	105%	<0.5				
Benzo(b)&(k)fluoranthene	1	<1	<1	<1	<1	122%	<1				
Benzo(a) pyrene	0.5	<0.5	<0.5	<0.5	<0.5	122%	<0.5				
Indeno(1,2,3-c,d)pyrene	0.5	<0.5	<0.5	<0.5	<0.5	118%	<0.5				
Dibenz(a,h)anthracene	0.5	<0.5	<0.5	<0.5	<0.5	117%	<0.5				
Benzo(g,h,i)perylene	0.5	<0.5	<0.5	<0.5	<0.5	120%	<0.5				
Sum of reported PAHs	--	--	--	--	--	--	--				
2-FBP (Surr @ 5mg/kg)	--	*82%*	*86%*	*84%*	*82%*	*99%*	*93%*				
TP-d14 (Surr @ 5mg/kg)	--	*90%*	*96%*	*79%*	*84%*	*109%*	*110%*				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E007.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/MS.

Laboratory Identification		229089	229090	229091	229092	lcs	mb				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Method : E008.2											
Phenols by GC/MS	**EQL**										
Phenol	0.5	<0.5	<0.5	<0.5	<0.5	104%	<0.5				
2-chlorophenol	0.5	<0.5	<0.5	<0.5	<0.5	111%	<0.5				
2-methylphenol	0.5	<0.5	<0.5	<0.5	<0.5	107%	<0.5				
3-&4-methylphenol	1.0	<1.0	<1.0	<1.0	<1.0	107%	<1.0				
2-nitrophenol	0.5	<0.5	<0.5	<0.5	<0.5	84%	<0.5				
2,4-dimethylphenol	0.5	<0.5	<0.5	<0.5	<0.5	115%	<0.5				
2,4-dichlorophenol	0.5	<0.5	<0.5	<0.5	<0.5	112%	<0.5				
4-chloro-3-methylphenol	0.5	<0.5	<0.5	<0.5	<0.5	104%	<0.5				
2,4,6-trichlorophenol	0.5	<0.5	<0.5	<0.5	<0.5	105%	<0.5				
2,4,5-trichlorophenol	0.5	<0.5	<0.5	<0.5	<0.5	95%	<0.5				
Pentachlorophenol	1	<1	<1	<1	<1	82%	<1				
Sum of reported phenols	--	--	--	--	--	--	--				
2-FP (Surr @ 5mg/kg)	--	*84%*	*88%*	*87%*	*85%*	*94%*	*99%*				
Phenol-d5 (Surr @ 5mg/kg)	--	*90%*	*89%*	*93%*	*81%*	*97%*	*96%*				
2,4,6-TBP (Surr @ 5mg/kg)	--	*97%*	*104%*	*104%*	*95%*	*112%*	*98%*				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E008.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/MS.

Laboratory Identification		**229089**	**229090**	**229091**	**229092**	**lcs**	**mb**				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09	30/9/09	30/9/09				
Method : E013.2											
Organochlorine Pesticides (OC)	**EQL**										
a-BHC	0.05	<0.05	<0.05	<0.05	<0.05	89%	<0.05				
Hexachlorobenzene	0.05	<0.05	<0.05	<0.05	<0.05	94%	<0.05				
b-BHC	0.05	<0.05	<0.05	<0.05	<0.05	89%	<0.05				
g-BHC (Lindane)	0.05	<0.05	<0.05	<0.05	<0.05	90%	<0.05				
d-BHC	0.05	<0.05	<0.05	<0.05	<0.05	100%	<0.05				
Heptachlor	0.05	<0.05	<0.05	<0.05	<0.05	86%	<0.05				
Aldrin	0.05	<0.05	<0.05	<0.05	<0.05	87%	<0.05				
Heptachlor epoxide	0.05	<0.05	<0.05	<0.05	<0.05	93%	<0.05				
trans-chlordane	0.05	<0.05	<0.05	<0.05	<0.05	89%	<0.05				
Endosulfan I	0.05	<0.05	<0.05	<0.05	<0.05	87%	<0.05				
cis-chlordane	0.05	<0.05	<0.05	<0.05	<0.05	92%	<0.05				
Dieldrin	0.05	<0.05	<0.05	<0.05	<0.05	91%	<0.05				
4,4-DDE	0.05	<0.05	<0.05	<0.05	<0.05	90%	<0.05				
Endrin	0.05	<0.05	<0.05	<0.05	<0.05	91%	<0.05				
Endosulfan II	0.05	<0.05	<0.05	<0.05	<0.05	92%	<0.05				
4,4-DDD	0.05	<0.05	<0.05	<0.05	<0.05	92%	<0.05				
Endosulfan sulphate	0.05	<0.05	<0.05	<0.05	<0.05	105%	<0.05				
4,4-DDT	0.2	<0.2	<0.2	<0.2	<0.2	88%	<0.2				
Methoxychlor	0.2	<0.2	<0.2	<0.2	<0.2	89%	<0.2				
DBC (Surr @ 0.2mg/kg)	--	*74%*	*75%*	*72%*	*75%*	*105%*	*77%*				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E013.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/dual ECD.

Laboratory Identification		**229089**	**229090**	**229091**	**229092**	**lcs**	**mb**				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09	1/10/09	1/10/09				
Method : E014.2											
Organophosphorus Pesticides (OP)	**EQL**										
Dichlorvos	0.5	<0.5	<0.5	<0.5	<0.5	127%	<0.5				
Mevinphos (Phosdrin)	0.5	<0.5	<0.5	<0.5	<0.5	122%	<0.5				
Demeton (total)	1	<1	<1	<1	<1	103%	<1				
Ethoprop	0.5	<0.5	<0.5	<0.5	<0.5	95%	<0.5				
Monocrotophos	0.5	<0.5	<0.5	<0.5	<0.5	60%	<0.5				
Phorate	0.5	<0.5	<0.5	<0.5	<0.5	82%	<0.5				
Dimethoate	0.5	<0.5	<0.5	<0.5	<0.5	105%	<0.5				
Diazinon	0.5	<0.5	<0.5	<0.5	<0.5	81%	<0.5				
Disulfoton	0.5	<0.5	<0.5	<0.5	<0.5	88%	<0.5				
Methyl parathion	0.5	<0.5	<0.5	<0.5	<0.5	94%	<0.5				
Ronnel	0.5	<0.5	<0.5	<0.5	<0.5	85%	<0.5				
Fenitrothion	0.5	<0.5	<0.5	<0.5	<0.5	82%	<0.5				
Malathion	0.5	<0.5	<0.5	<0.5	<0.5	76%	<0.5				
Chlorpyrifos	0.5	<0.5	<0.5	<0.5	<0.5	78%	<0.5				
Fenthion	0.5	<0.5	<0.5	<0.5	<0.5	79%	<0.5				
Parathion	0.5	<0.5	<0.5	<0.5	<0.5	84%	<0.5				
Stirofos	0.5	<0.5	<0.5	<0.5	<0.5	83%	<0.5				
Prothiofos	0.5	<0.5	<0.5	<0.5	<0.5	77%	<0.5				
Azinophos methyl	0.5	<0.5	<0.5	<0.5	<0.5	122%	<0.5				
Coumaphos	0.5	<0.5	<0.5	<0.5	<0.5	124%	<0.5				
TPP (Surr @ 2mg/kg)	--	*79%*	*81%*	*78%*	*75%*	*70%*	*74%*				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E014.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/MSD.

Laboratory Identification		229089	229090	229091	229092	lcs	mb				
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC				
Depth (m)		0.3	0.25	0.2	2.0	--	--				
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--				
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09				
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09	30/9/09	30/9/09				
Method : E013.2											
Polychlorinated Biphenyls (PCB)	**EQL**										
Arochlor 1016	0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5				
Arochlor 1232	0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5				
Arochlor 1242	0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5				
Arochlor 1248	0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5				
Arochlor 1254	0.5	<0.5	<0.5	<0.5	<0.5	84%	<0.5				
Arochlor 1260	0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5				
Sum of reported PCBs	--	--	--	--	--	--	--				
DBC (Surr @ 0.2mg/kg)	--	*74%*	*75%*	*72%*	*75%*	*85%*	*77%*				

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E013.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/dual ECD.

Laboratory Identification		229089	229090	229091	229092	crm	lcs	mb			
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC	QC			
Depth (m)		0.3	0.25	0.2	2.0	--	--	--			
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--	--			
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09			
Laboratory Analysis Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09			
Method : E022.2											
Acid extractable metals (M7)	**EQL**										
Arsenic	1	1	2	4	1	100%	87%	<1			
Cadmium	0.1	<0.1	<0.1	0.1	<0.1	92%	98%	<0.1			
Chromium	1	13	5	75	12	100%	95%	<1			
Copper	2	24	8	30	2	99%	95%	<2			
Nickel	1	62	2	62	6	104%	90%	<1			
Lead	2	8	26	9	<2	91%	96%	<2			
Zinc	5	62	74	65	6	98%	96%	<5			

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification		229089	229090	229091	229092	crm	lcs	mb			
Sample Identification		CBR2	CBR3	BH101	BH101	QC	QC	QC			
Depth (m)		0.3	0.25	0.2	2.0	--	--	--			
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09	--	--	--			
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09	30/9/09			
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09	30/9/09	30/9/09	30/9/09			
Method : E026.2											
Acid extractable metals - mercury	**EQL**										
Mercury	0.05	<0.05	0.09	0.09	<0.05	99%	92%	<0.05			

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification		**229089**	**229090**	**229091**	**229092**						
Sample Identification		CBR2	CBR3	BH101	BH101						
Depth (m)		0.3	0.25	0.2	2.0						
Sampling Date recorded on COC		25/9/09	25/9/09	25/9/09	25/9/09						
Laboratory Extraction (Preparation) Date		30/9/09	30/9/09	30/9/09	30/9/09						
Laboratory Analysis Date		1/10/09	1/10/09	1/10/09	1/10/09						
Method : E005.2											
Moisture	**EQL**										
Moisture	--	9	3	5	1						

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

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ENVIRONMENTAL LABORATORIES

Quality, Service, Support

Report Date : 29/09/2009
Report Time : 11:43:22AM

Sample Receipt Notice (SRN) for E044824

Client Details		Laboratory Reference Information	
Client Name:	Urban Environmental	Please have this information ready when contacting Labmark.	
Client Phone:	02 9555 7570	**Laboratory Report:**	**E044824**
Client Fax:	02 9555 6313	**Quotation Number:**	- Not provided, standard prices apply
Contact Name:	Franco Fuccenecco	**Laboratory Address:**	Unit 1, 8 Leighton Pl. Asquith NSW 2077
Contact Email:	urban.environmental@bigpond.com		
Client Address:	PO Box 1070 ROZELLE NSW 2039	**Phone:**	61 2 9476 6533
		Fax:	61 2 9476 8219
Project Name:	PSM Syd Uni	**Sample Receipt Contact:**	Ros Schacht
Project Number:	EU5006	**Email:**	Ros.Schacht@labmark.com.au
CoC Serial Number:	- Not provided -	**Reporting Contact:**	Leanne Boag
Purchase Order:	- Not provided -	**Email:**	leanne.boag@labmark.com.au
Surcharge:	No surcharge applied (results by 6:30pm on due date)		
Sample Matrix:	SOIL		
Date Sampled (earliest date):	25/09/2009	**NATA Accreditation:**	13542
Date Samples Received:	28/09/2009	**TGA GMP License:**	185-336 (Sydney)
Date Sample Receipt Notice issued:	29/09/2009	**APVMA License:**	6105 (Sydney)
Date Preliminary Report Due:	06/10/2009	**AQIS Approval:**	NO356 (Sydney)
Client TAT Request Date:	06/10/2009	**AQIS Entry Permit:**	200521534 (Sydney)

Reporting Requirements: Electronic Data Download required: No

Invoice Number: 09EA6103

Sample Condition: COC received with samples. Report number and lab ID's defined on COC.
Samples received in good order .
Samples received with cooling media: Crushed ice .
Samples received chilled.
Security seals not required. Direct Labmark's custody taken .
Sample container & chemical preservation suitable .

Comments:

Holding Times: Date received allows for sufficient time to meet Technical Holding Times.

Preservation: Chemical preservation of samples satisfactory for requested analytes.

Important Notes:
LabMark shall responsibly dispose of spent customer soil and water samples which includes the disintegration of the sample label. A sample disposal fee of $1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples shall be 31 days (water) and 3 months (soil, HN03 preserved samples) after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur $5.00/ sample/ 3 months. Additional refrigerated storage shall incur $30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Analysis comments:

Subcontracted Analyses:

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Report Date : 29/09/2009
Report Time : 11:43:22AM

Sample **Receipt** Notice (SRN) for **E044824**

Quality, Service, Support

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

GRID REVIEW TABLE

				Requested Analysis																			
No.	**Date**	**Depth**	**Client Sample ID**	BTEX by P&T	Acid extractable metals - mercury	Acid extractable metals (M7)	Moisture	Organochlorine Pesticides (OC)	Organophosphorus Pesticides (OP)	Polyaromatic Hydrocarbons (PAH)	Polychlorinated Biphenyls (PCB)	Phenols by GC/MS	PREP Not Reported	Petroleum Hydrocarbons (TPH)	Volatile TPH by P&T (vTPH)								
229089	25/09	0.3	CBR2	●	●	●	●	●	●	●	●	●	●	●	●								
229090	25/09	0.25	CBR3	●	●	●	●	●	●	●	●	●	●	●	●								
229091	25/09	0.2	BH101	●	●	●	●	●	●	●	●	●	●	●	●								
229092	25/09	2.0	BH101	●	●	●	●	●	●	●	●	●	●	●	●								
			Totals:	4	4	4	4	4	4	4	4	4	4	4	4								

'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Quality, Service, Support

Report Date : 29/09/2009
Report Time : 11:43:22AM

Sample Receipt Notice (SRN) for E044824

No.	Date	Depth	Client Sample ID	Requested Analysis: M8 - M7-T_S
229089	25/09	0.3	CBR2	●
229090	25/09	0.25	CBR3	●
229091	25/09	0.2	BH101	●
229092	25/09	2.0	BH101	●
			Totals:	4

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

PAGE 1 OF 1

CHAIN OF CUSTODY

Form QSC073, Rev.10 : Date Issued 11/10/2008.
SOOC01

Serial No. S06001

LABMARK — NATA 13542, AQIS N0356

Dispatch samples to:
Unit1/ 8 Leighton Place
Asquith NSW 2077
or
116 Morey Street
South Melbourne VIC 3205

Tel (SYD): 612-9476-6533
Fax (SYD): 612-9476-6219
(MEL): 613-9865-0344
Fax (MEL): 613-9826-7544
(DB): 0409449684, (PW): 0439029265
rea.schecht@labmark.com.au
paul.woodward@labmark.com.au

Client Details

Company & Address: URBAN ENVIRONMENTAL
Project Manager: FRANCO FUCCENECIO Sampler: PSM
Project Name: PSM 54 DUNI
Project Type (eg. Service Station):
Project No: SUE5006
Tel: 95557570
Fx: 95556313
Date Required: —
Lab. Quote No:

Global Specifications I require (default is Not required if Not ticked):

YES (tick)

1. Urgent TAT required? (please circle: 1 day 2 days 3 days ..... days)
2. Do you require sediment present in waters to be included in organic/ inorganic extractions?
3. Do you require additional QA/QC reported where sample batches submitted are < 10 samples? (Fee Applies)
4. Do you require additional EQA or batch specific LCS/ MS results every 20 samples? (Fee Applies)
5. Do you require DIFFERENT standard EQL's from those stated in the current LabMark price catalogue?
6. Do you wish chromatograms to be supplied? (Additional fee applies).
7. Electronic data transfer (circle: .xls .csv .pdf). Please specify.

Note1: Additional water sample must be submitted for lab. duplicate & spike analysis.
Note2: Contact lab if consolidating multiple analyses into a single sample container.

Analysis Request

Lab. Number	Sample ID	Sample Depth	Sampling Date	Matrix (soil / water / air / paint, sludge / other)	Container Type (Nat. = unpreserved, Oxalate, P=plastic)	Combo (circle) <1> <2> <3> <4> <5> <6> <7> <8> <9> <10> <11> <12> <13> <14> <15>	Volatile Tests 125g: BTEX+vTPH(C6-C10) PT-GC/FID/PID/MS; VHC PT-GC/MS; THM PT-GC/MS; MTBE PT-GC/MS; VAC PT-GC/MS; VOC PT-GC/MS	Semi & Non-Volatile Tests 125g (max. 4 tests): TPH(C10-36) GC/FID; PAH's GC/MS; Phenols GC/MS; Aromatic/Aliphatic TPH GC/FID; (circle) OC, OP, PCB GC/ECD/FID; SVOC GC/MS; Phenoxy Acid Herbicides GC/MS; Explosives HPLC; (circle) Metals* (dissolved / total); TCLP (specify test - other); ZHE TCLP (specify test - other)	Leach	Nutrient Tests 125g (max. 4 tests) 0.1 - 1L (Chemical groups): (circle) pH, EC; (circle) NH_3, TKN, N_{org}, TN; (circle) NO_3, NO_2, NO_x; (circle) TP, ortho-P, TKP; (circle) Cl, F, SO_4 (circle) soluble/ total; (circle) Total Alk, Speciated Alk; (circle) Free CN, WAD, Total CN; Total Phenolics; Cations (circle) sol/ total - Ca, Mg, Na, K	Other (eg. TCLP tests here)
229089	CBL2	0.3	25/9	✓	✓	✓					
229090	CBL3	0.25									
229091	BH101	0.2									
229092	BH101	2.0									
Totals											

*Metals (circle): As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Cr^{6+}, Cr^{3+}, Fe^{2+}, Fe^{3+}, Be, B, Al, V, Mn, Fe, Co, Se, Sr, Sn, Mo, Ag, Ba, Tl, Bi, Sb

Comments (Highly contaminated samples):

Lab Report No. E044824

Security Seal Applied: YES/NO
Security Seal Serial #:

Relinquished by (print): [illegible] Signed: Date: 25/9

Received By: Date: 26/9/09 Time: 1300

Relinquished by (print): Signed: Date: /

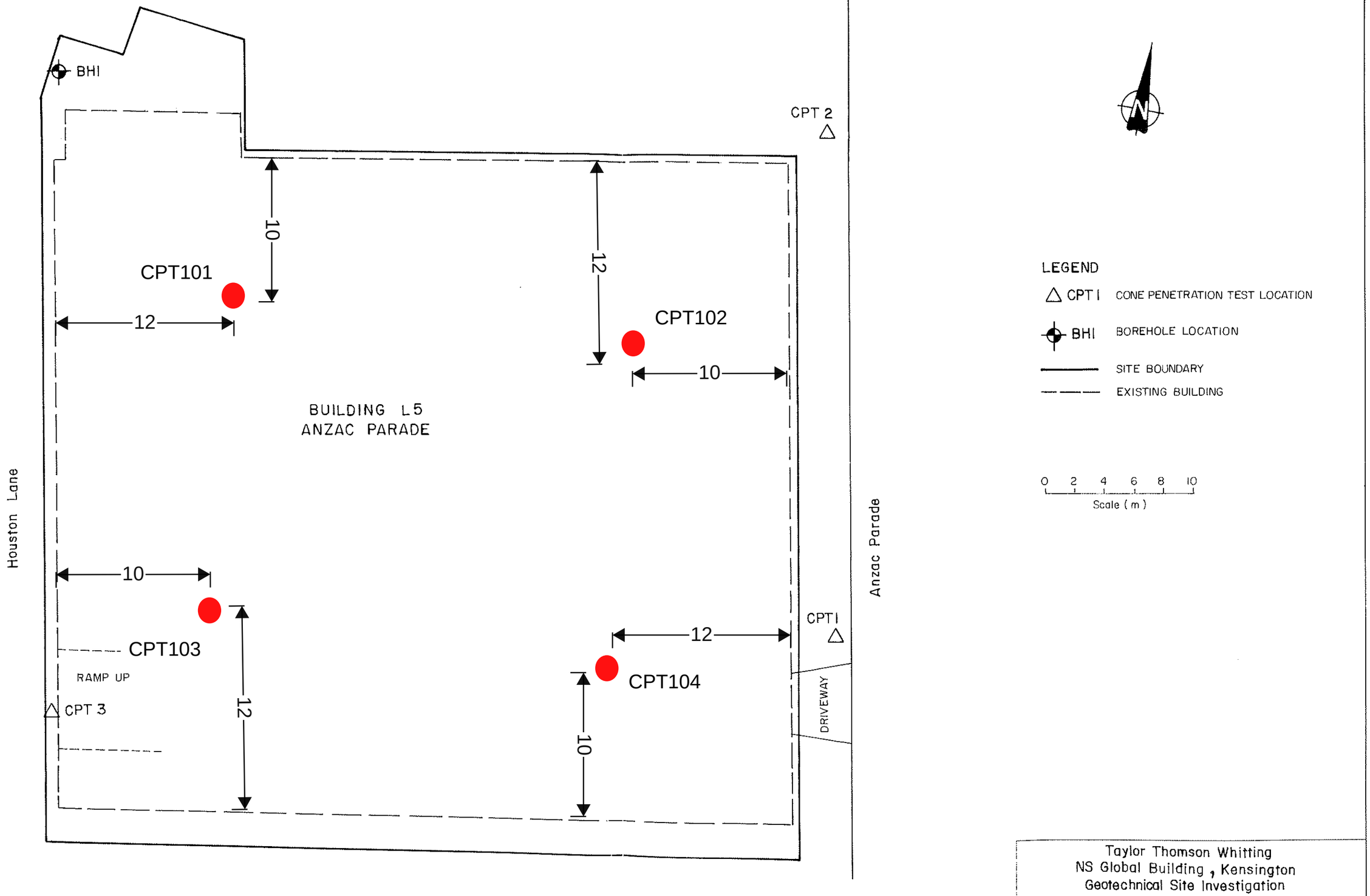
Received By: Date: Time:

tear along perforation

28/03/2009 09:27 0295556313 URBAN ENVIRONMENTAL PAGE 02/02

APPENDIX F

BUILDING L5 AND F8 CONE PENETRATION TEST RESULT SHEETS



Taylor Thomson Whitting
NS Global Building , Kensington
Geotechnical Site Investigation

SITE PLAN & TEST LOCATIONS

PSM

Pells Sullivan Meynink Pty Ltd

PSM 595-R1 | Figure 1

CONE PENETRATION TEST

CLIENT PELLS SULLIVAN MEYNINK PTY. LTD.

PROJECT PROPOSED RESIDENTIAL DEVELOPMENT

LOCATION 221 ANZAC PARADE, KENSINGTON

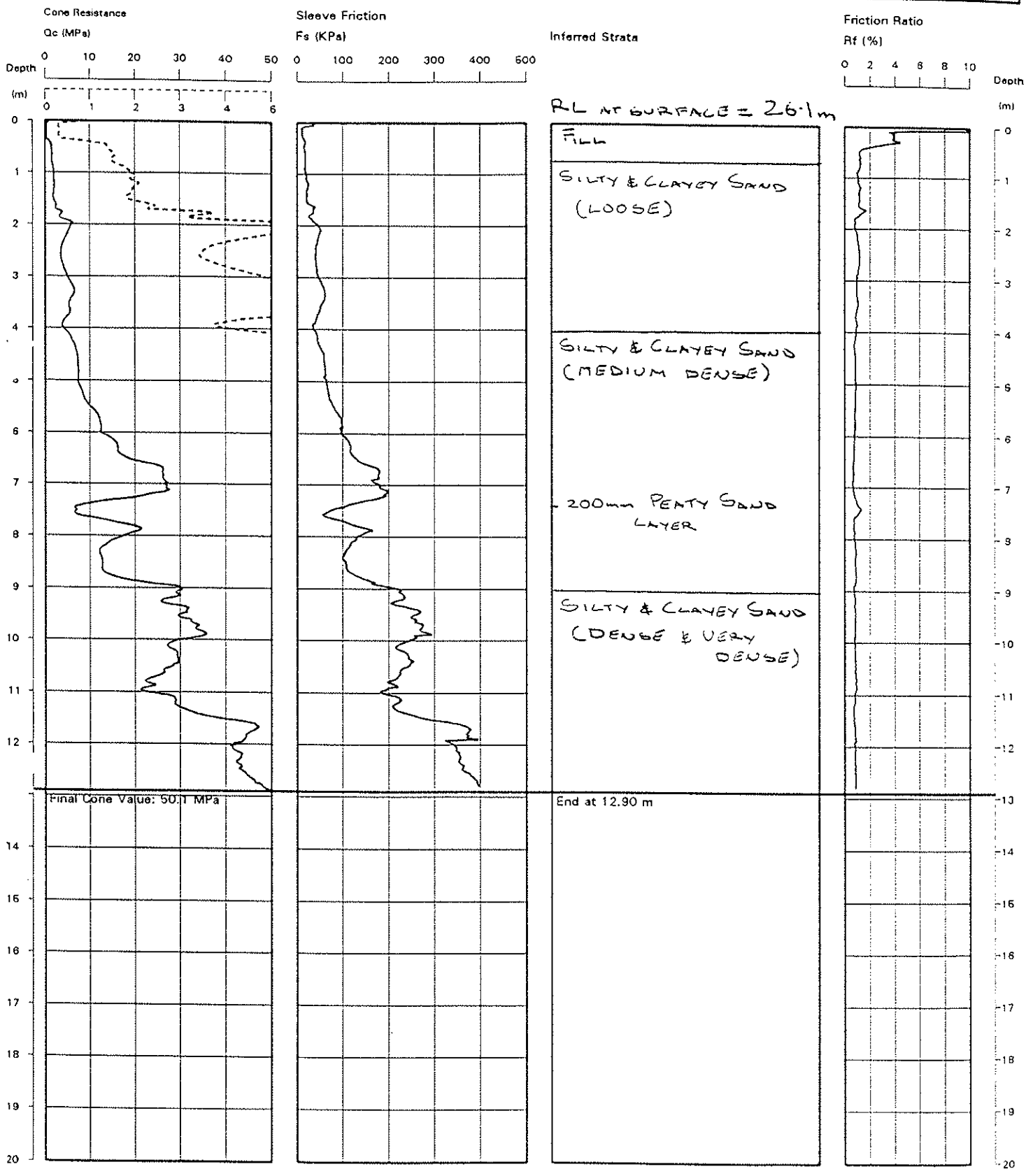
PROJECT No 36245

CPT 01

Page 1 of 1

DATE 27/6/2002

SURFACE RL



REMARKS: HOLE COLLAPSE AT END OF TEST: 0.4 m

Date	27.6.02
Plotted	KSM
Checked	

File: A:\36245-01.CPT
Cone ID: CONE-203 Type: Standard

GROUND TEST PTY LTD
A subsidiary of Douglas Partners Pty Ltd

CONE PENETRATION TEST

CLIENT PELLS SULLIVAN MEYNINK PTY. LTD.

PROJECT PROPOSED RESIDENTIAL DEVELOPMENT

LOCATION 221 ANZAC PARADE, KENSINGTON

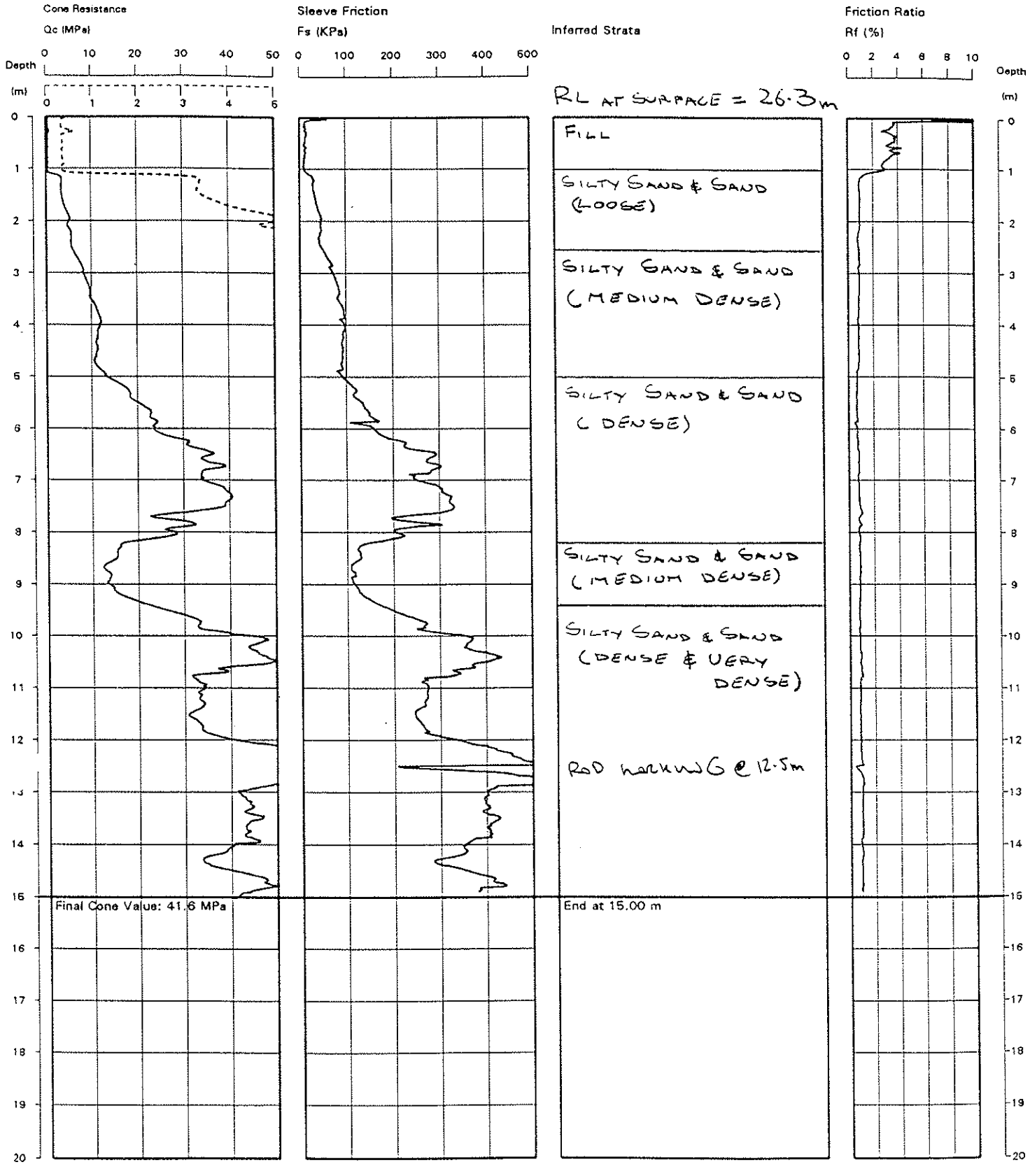
PROJECT No 35245

CPT 02

Page 1 of 1

DATE 27/5/2002

SURFACE RL



REMARKS: HAND AUGER TO 1.0 m
HOLE COLLAPSE AT END OF TEST: 1.1 m

Date	27.5.02
Plotted	KJM
Checked	

File: A:\35245-02.CPT
Cone ID: CONE-203 Type: Standard

GROUND TEST PTY LTD
A subsidiary of Douglas Partners Pty Ltd

CONE PENETRATION TEST

CLIENT PELLS SULLIVAN MEYNINK PTY. LTD.

PROJECT PROPOSED RESIDENTIAL DEVELOPMENT

LOCATION 221 ANZAC PARADE, KENSINGTON

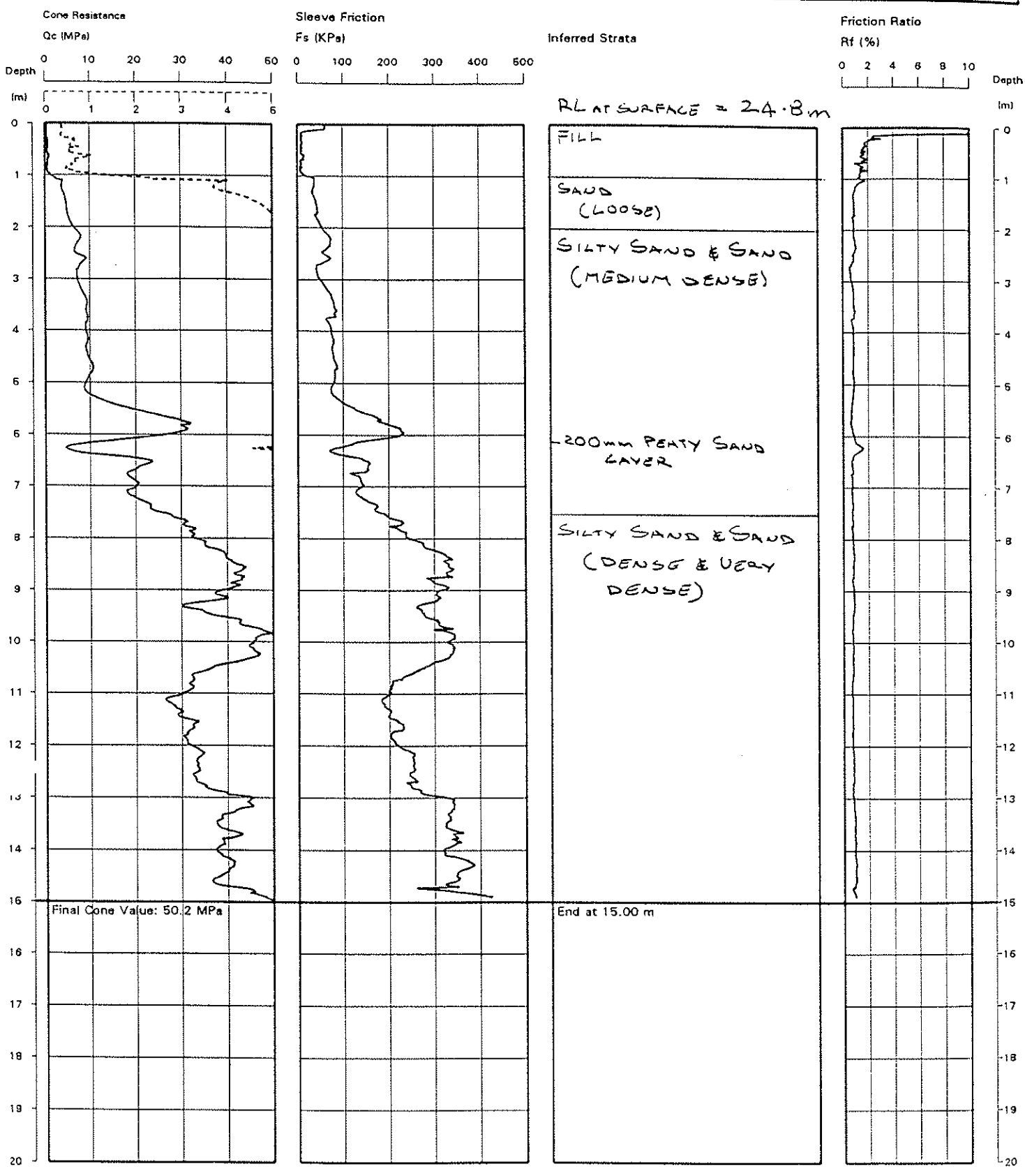
PROJECT No 35246

CPT 03

Page 1 of 1

DATE 27/6/2002

SURFACE RL



REMARKS: HOLE COLLAPSE AT END OF TEST: 3.8 m

Date	27.5.02
Plotted	KSVL
Checked	

File: A:\35246-03.CPT
Cone ID: CONE-203 Type: Standard

GROUND TEST PTY LTD
A subsidiary of Douglas Partners Pty Ltd

CONE PENETRATION TEST

CLIENT: PELLS SULLIVAN MEYNINK PTY LTD

PROJECT: NSG BUILDING

LOCATION: 221 ANZAC PARADE, KENSINGTON

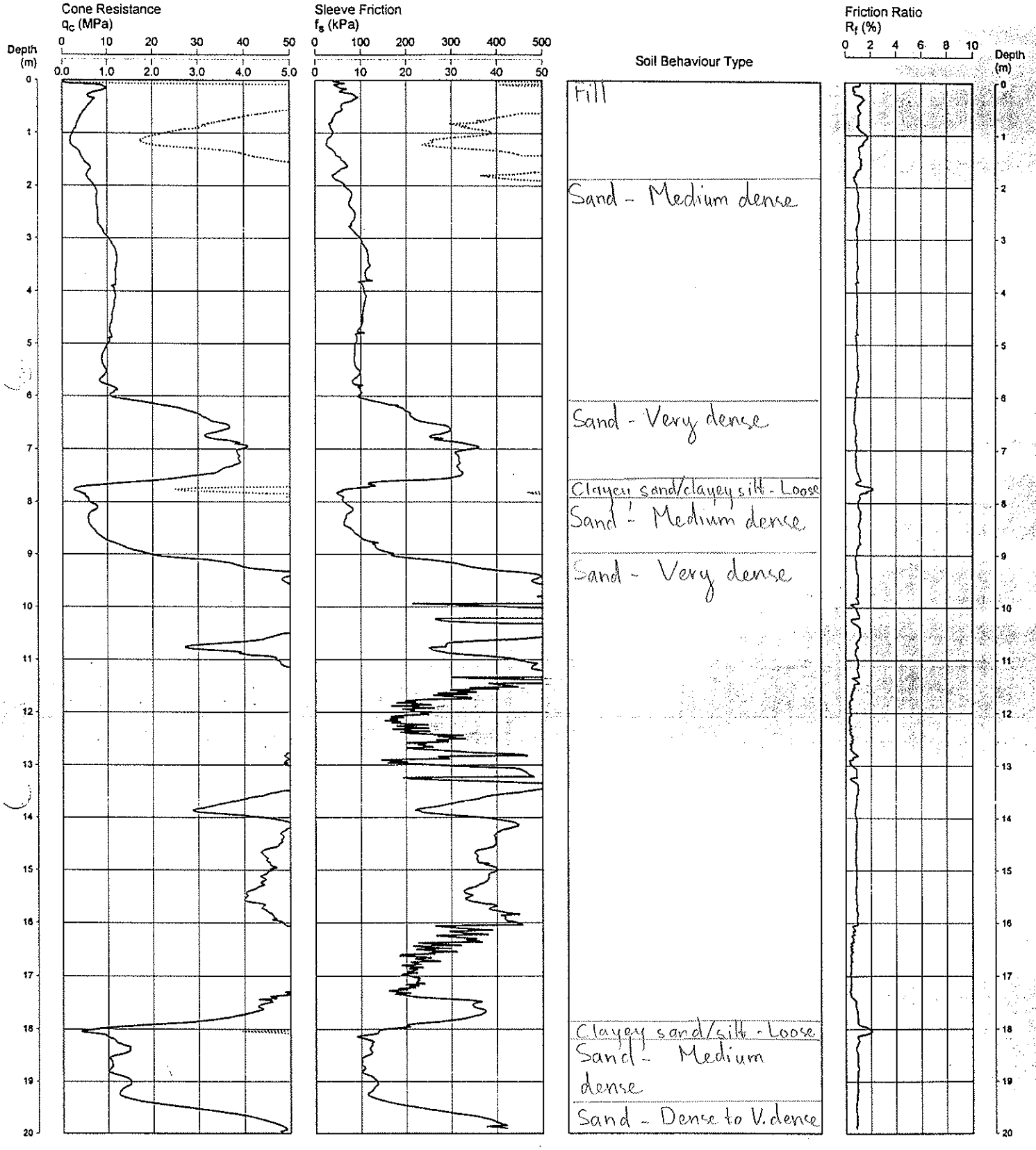
PROJECT No: 36051

CPT 101

Page 1 of 2

DATE 28 May, 2003

SURFACE RL: RL 25.4 m *



REMARKS: HOLE COLLAPSE AT 4.8 m AT COMPLETION OF TEST.
* LEVELLING TO BOREHOLE ON HOUSTON LANE TAKEN AS RL 25.9 m AHD.

Date Plotted 28/5
Checked

File: C:\dutchcone\36051101.cp5
Cone ID: CONE-404 Type: 2 Standard

ConaPlot Version 5.7.2

Douglas Partners
Geotechnics · Environment · Groundwater

CONE PENETRATION TEST

CLIENT: PELLS SULLIVAN MEYNINK PTY LTD

PROJECT: NSG BUILDING

LOCATION: 221 ANZAC PARADE, KENSINGTON

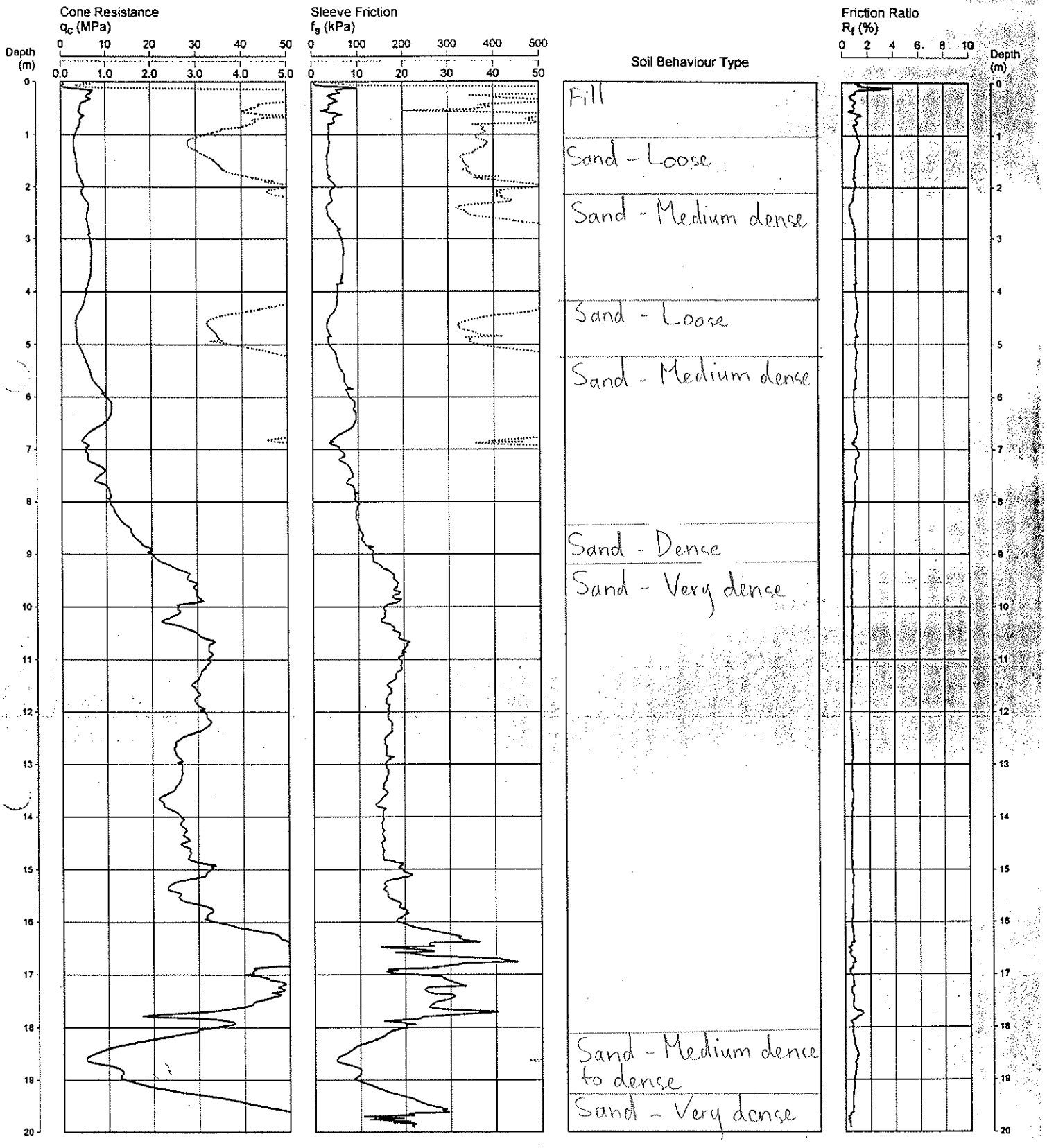
PROJECT No: 36051

CPT 102

Page 1 of 2

DATE 28 May, 2003

SURFACE RL: RL 25.4 m *



REMARKS: HOLE COLLAPSE AT 4.4 m AT COMPLETION OF TEST.
* LEVELLING TO BOREHOLE ON HOUSTON LANE TAKEN AS RL 25.9 m AHD.

Date Plotted 28/5
Checked

File: C:\dutchcone\36051102.cp5
Cone ID: CONE-404 Type: 2 Standard

ConePlot Version 5.7.2

Douglas Partners
Geotechnics · Environment · Groundwater

CONE PENETRATION TEST

CLIENT: PELLS SULLIVAN MEYNINK PTY LTD

PROJECT: NSG BUILDING

LOCATION: 221 ANZAC PARADE, KENSINGTON

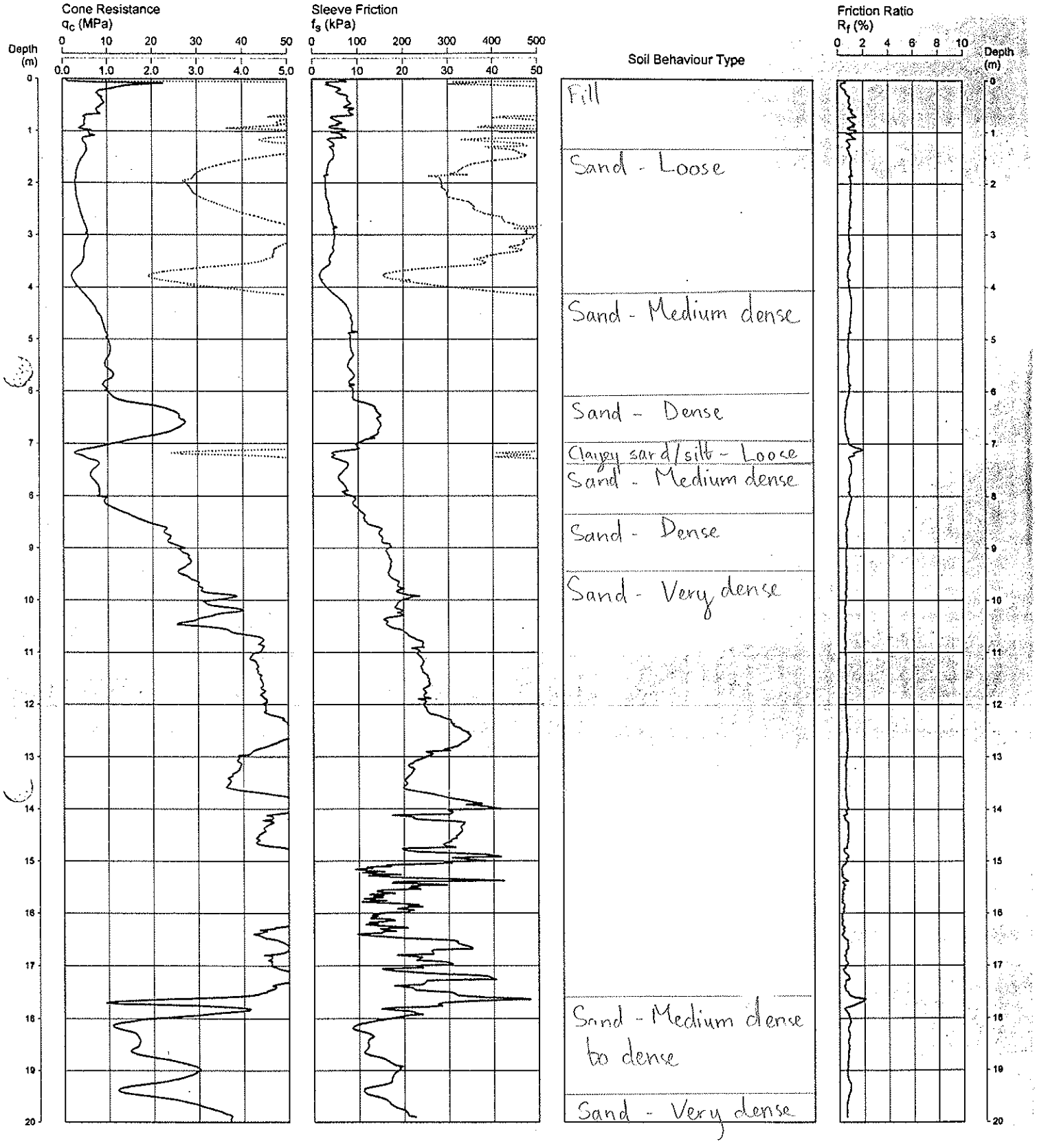
PROJECT No: 36051

CPT 103

Page 1 of 2

DATE 28 May, 2003

SURFACE RL: RL 25.2 m*



REMARKS: HOLE COLLAPSE AT 4.6 m AT COMPLETION OF TEST.
* LEVELLING TO BOREHOLE ON HOUSTON LANE TAKEN AS RL 25.9 m AHD.

Date Plotted 28/5
Checked

File: C:\dutchcone\36051103.cp5
Cone ID: CONE-404 Type: 2 Standard

ConePlot Version 5.7.2

Douglas Partners
Geotechnics · Environment · Groundwater

CONE PENETRATION TEST

CLIENT: PELLS SULLIVAN MEYNINK PTY LTD

PROJECT: NSG BUILDING

LOCATION: 221 ANZAC PARADE, KENSINGTON

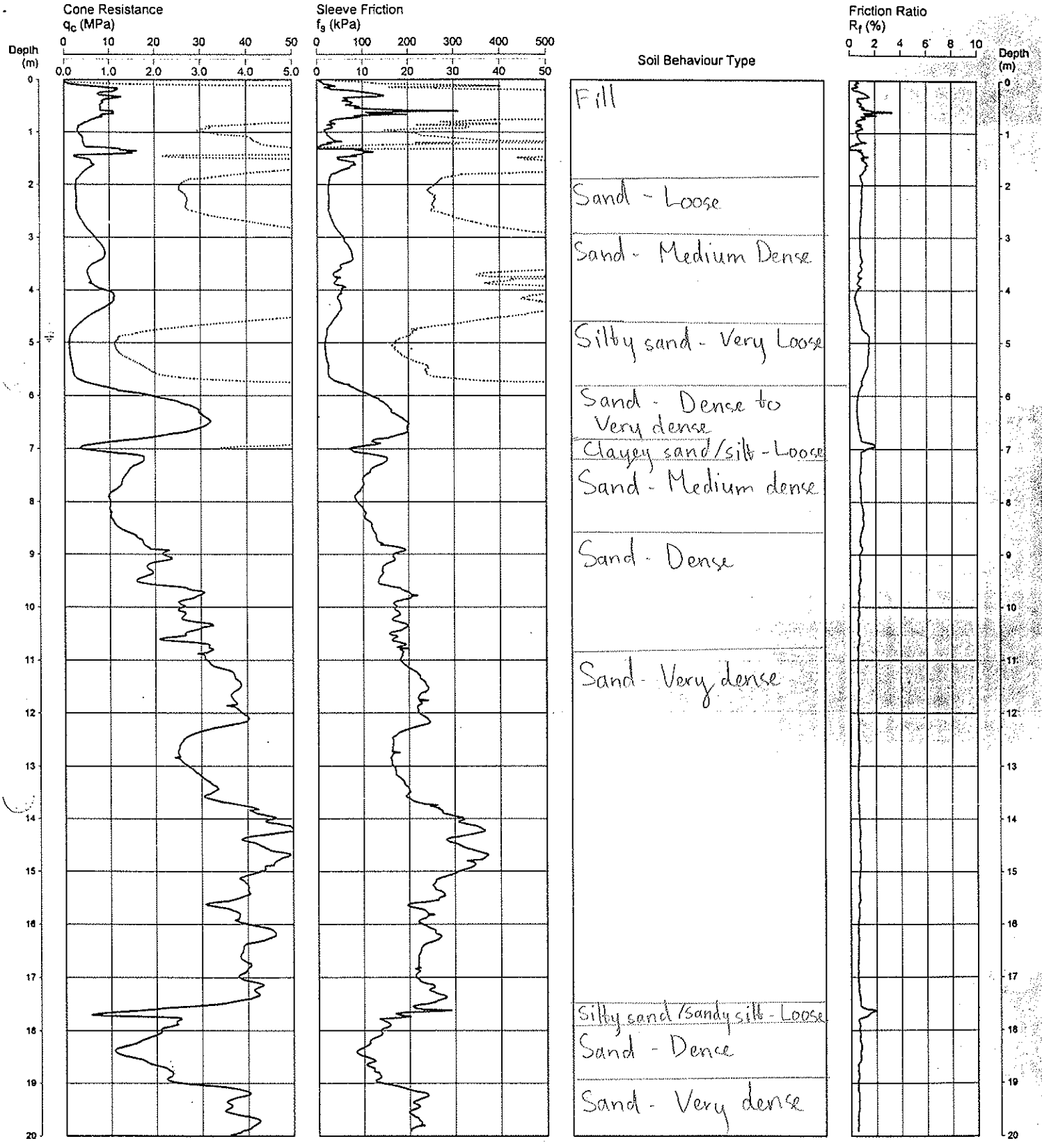
PROJECT No: 36051

CPT 104

Page 1 of 2

DATE 28 May, 2003

SURFACE RL: RL 25.4 m *



REMARKS: GROUNDWATER LEVEL AT COMPLETION OF TEST: 4.9 m
* LEVELLING TO BOREHOLE ON HOUSTON LANE TAKEN AS RL 25.9 m AHD.

Date Plotted 28/5
Checked

File: C:\dutchcone\36051104.cp5
Cone ID: CONE-404 Type: 2 Standard

ConePlot Version 5.7.2

Douglas Partners
Geotechnics · Environment · Groundwater

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: BH1

job no: PSM595
client: Taylor Thomson Whitting
project: Building L5 Site Investigation
drilling subcontractor: McDermott Drilling Pty Ltd
date hole commenced: 31/05/02
date hole complete: 31/05/02

drill information: Truck Mounted Drill Rig
borehole location: E N
inclination/azimuth: -90° /
surface R.L.: 25.9 m
datum: AHD
core diameter:

Sheet 1 of 2
Logged by: DP

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	USCS	Material Description (Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Soil Moisture	Consistency / Density: Cohesive (VS S F ST VST H Fb VL L MD D VD)	Consistency / Density: Non Cohesive	Comments (Soil Origin, Structure etc)
Hand Auger			25	0		FILL	ASPHALT: Road Surface ROAD BASE	D			FILL
				1		SW	SAND: medium to fine grained, white and light grey with some brown, dry				QUATERNARY MARINE SAND
			24	2		SC	CLAYEY SAND: medium grained, brown and light brown sand, with dark grey clay				
						SW	SAND: medium grained, orange and yellow sand				
	SPT 6,7,10 N=17		23	3			- moist from 3.0 m	M			
Auger			22	4							
	SPT 9,9,10 N=19	31/05/02 During Drilling	21	5			SILTY SAND: medium grained grey and light grey with a trace of dark grey clay				
			20	6		SM	- yellow brown and grey from 0.6 m	W			
Washboring	SPT 33,25/75R N>50		19	7			- grey and dark grey with trace of peat and clay from 7.0 m				- Concrete piece recovered from SPT Possibly affected the SPT result.
			18								

SOILS LOG BH11.GPJ PSMV3.GDT 05/06/02

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: BH1

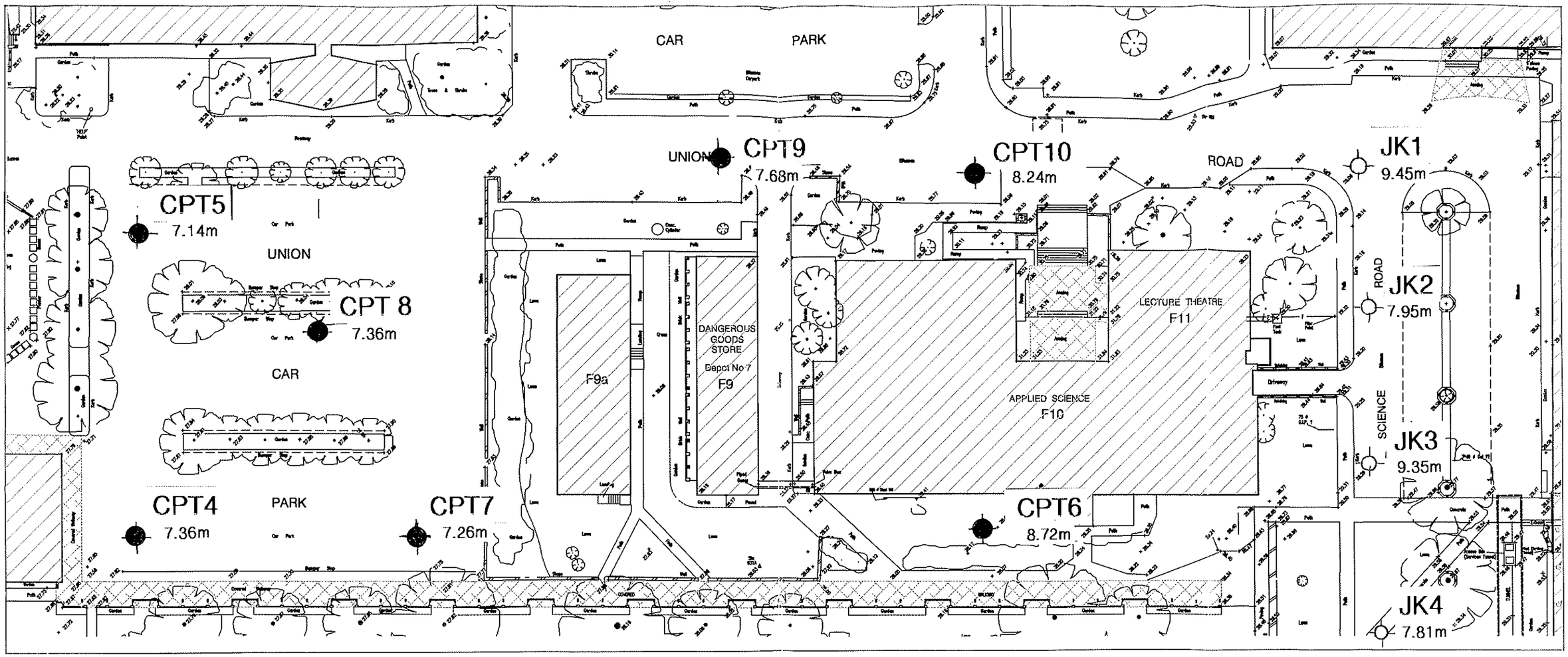
job no: PSM595
client: Taylor Thomson Whitting
project: Building L5 Site Investigation
drilling subcontractor: McDermott Drilling Pty Ltd
date hole commenced: 31/05/02
date hole complete: 31/05/02

drill information: Truck Mounted Drill Rig
borehole location: E N
inclination/azimuth: -90° /
surface R.L.: 25.9 m
datum: AHD
core diameter:

Sheet 2 of 2
Logged by: DP

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	USCS	Material Description (Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Soil Moisture	Consistency / Density: Cohesive (VS S F ST VST H)	Consistency / Density: Non Cohesive (VL L MD D VD)	Comments (Soil Origin, Structure etc)
Washboring	SPT 5,6,7,11,12 17 N=47		17	9		SM	PEATY SAND: medium grained, dark grey sand with dark brown peat and clay cuttings very visible in cuttings				
						SC-OH	CLAYEY SAND: fine to medium grained, dark grey and grey sand, with dark grey clay				
			16	10		SC					
	SPT 11,25,51,18/10R N>50		15	11			SAND: medium grained, light grey brown sand with some grey clay	W			
			14	12			- light grey with some a trace of clay from 12.0 m				SPT bouncing. Stopped testing at 35 blows for 75 mm movement.
	SPT 35/75R N>50					SW-CL					
			13	13			- light grey at 13.6 m				
	SPT 11,25,29,40/40R N>50		12	14			End of Hole at 13.95m				
			11	15							
			10								

SOILS LOG BH11 GPJ PSMV3 GDT 05/06/02



LEGEND

CPT4 PSM CONE PENETROMETER TESTS

JK1 J&K BOREHOLES

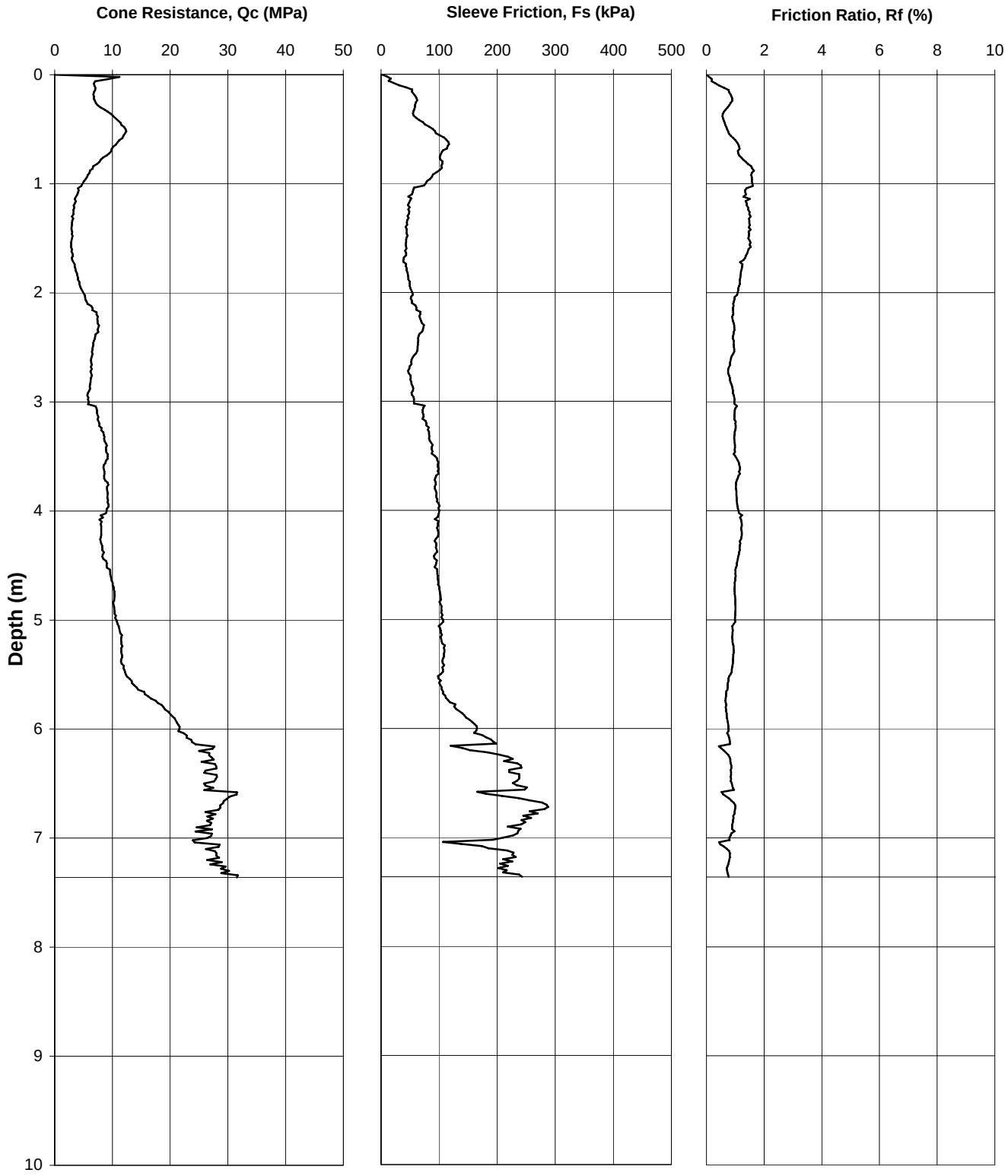
0 5 10 15 20 25
Scale (m)

Taylor Thomson Whitting
Chemical Sciences Building UNSW

SITE PLAN SHOWING
INVESTIGATION LOCATIONS

Pells Sullivan Meynink Pty Ltd

PSM 604-R1 | Figure 1

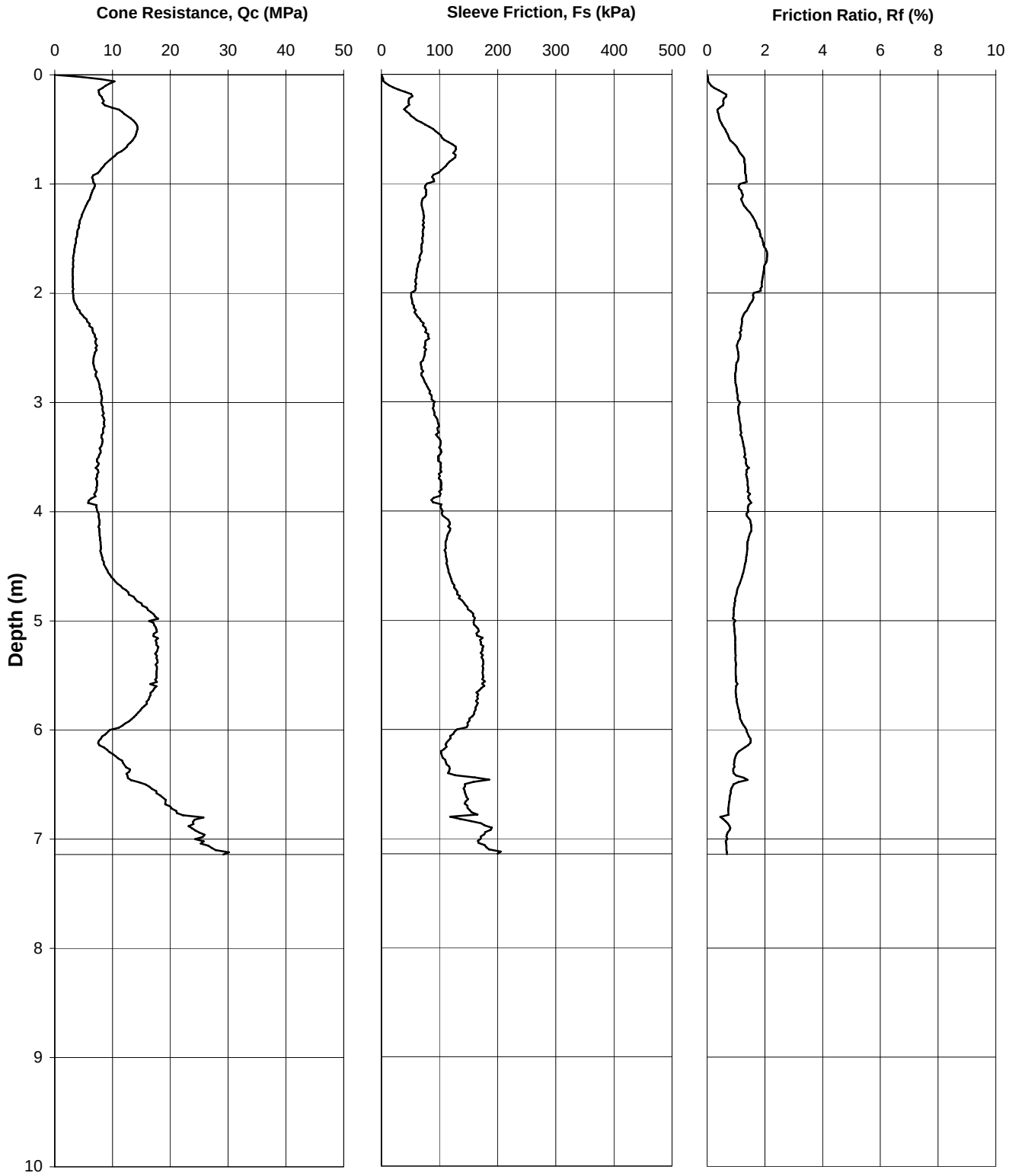


Taylor Thomson Whitting Pty Ltd
UNSW Chemical Sciences Building

ELECTRIC FRICTION CONE PLOT
CPT 4

Pells Sullivan Meynink Pty Ltd

PSM604.R1	Figure A1

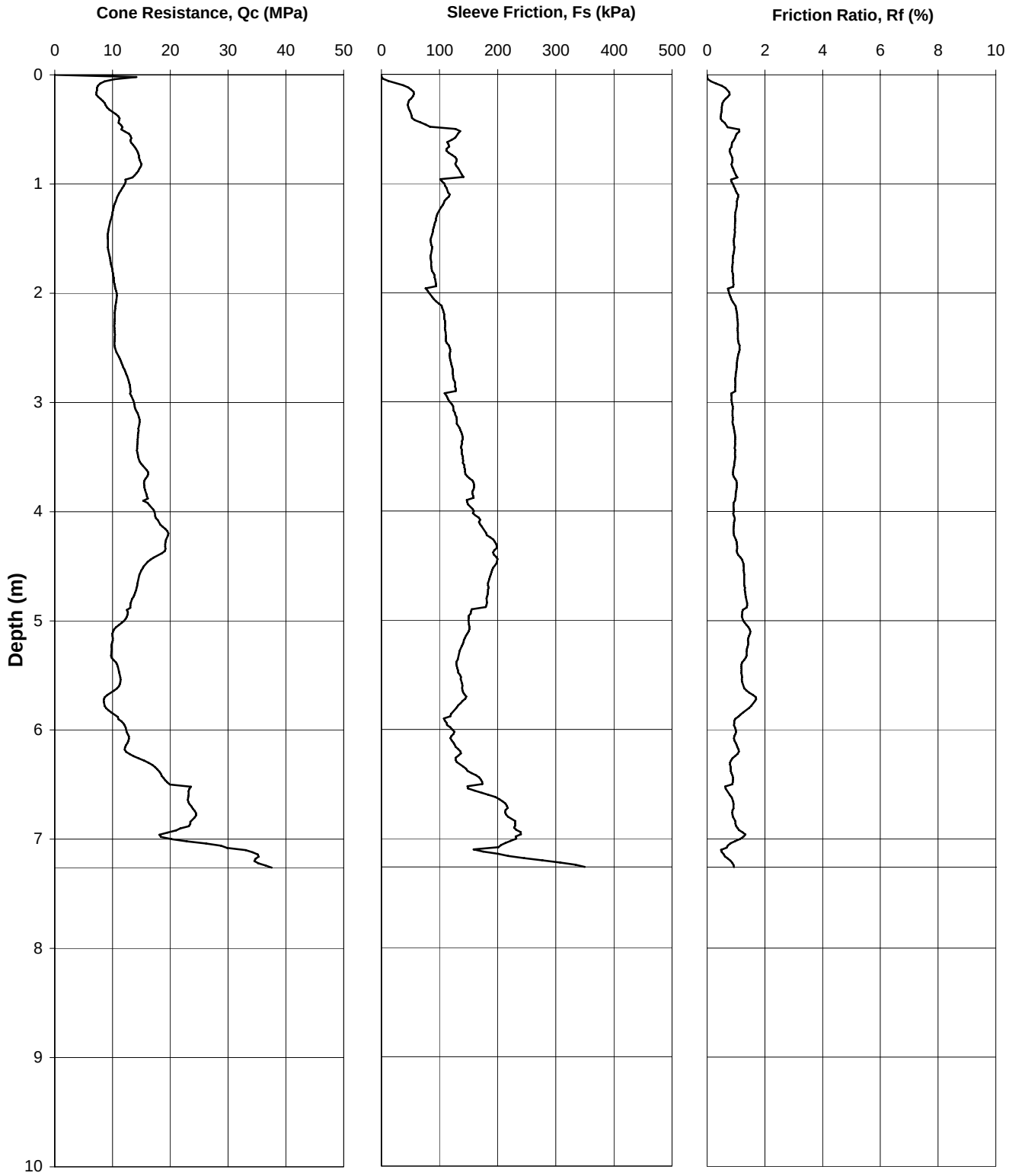


Taylor Thomson Whitting Pty Ltd
UNSW Chemical Sciences Building

ELECTRIC FRICTION CONE PLOT
CPT 5

Pells Sullivan Meynink Pty Ltd

PSM604.R1	Figure A2

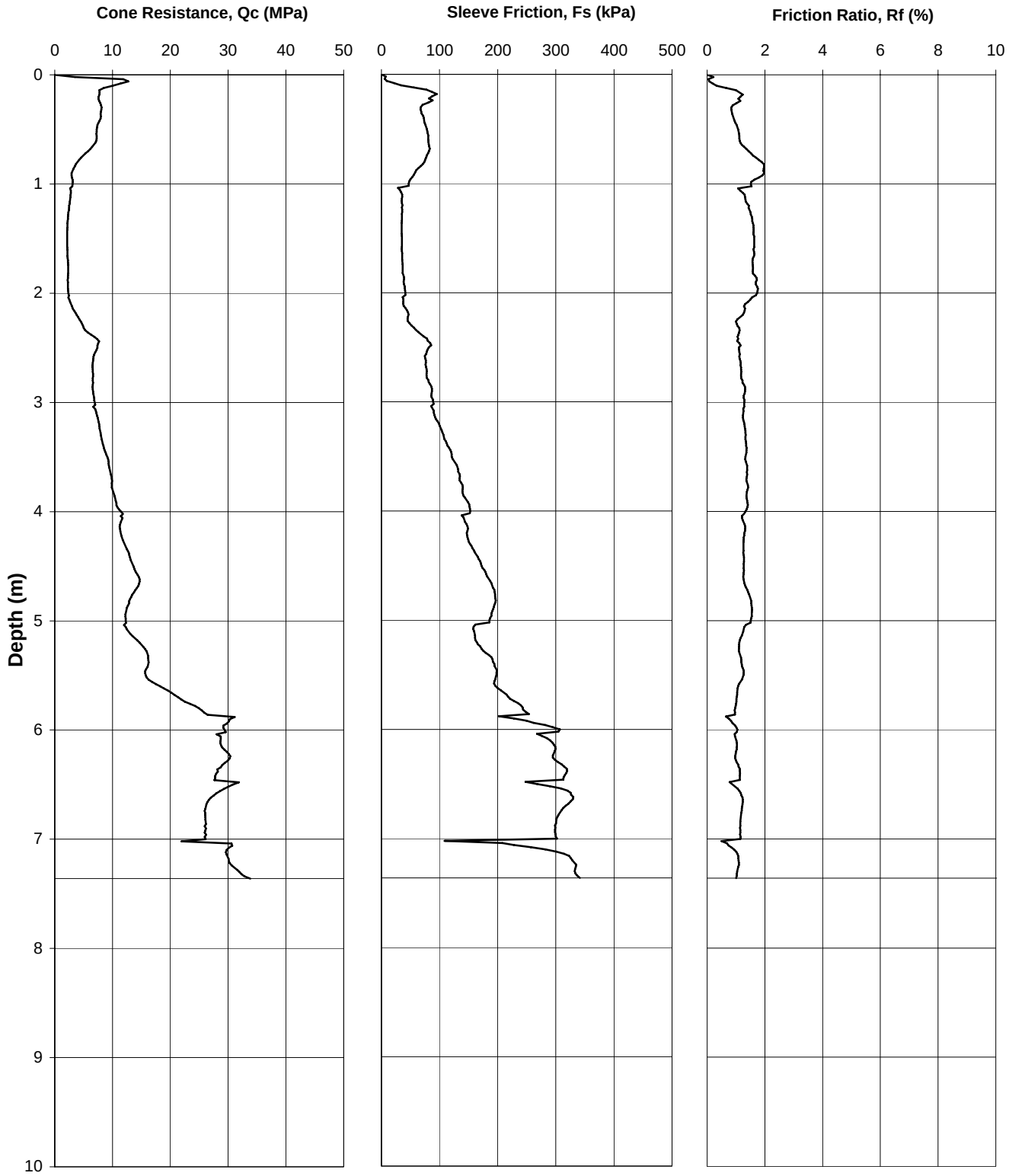


Taylor Thomson Whitting Pty Ltd
UNSW Chemical Sciences Building

ELECTRIC FRICTION CONE PLOT
CPT 7

Pells Sullivan Meynink Pty Ltd

PSM604.R1	Figure A4



Taylor Thomson Whitting Pty Ltd
UNSW Chemical Sciences Building

ELECTRIC FRICTION CONE PLOT
CPT 8

Pells Sullivan Meynink Pty Ltd

PSM604.R1	Figure A5