Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

Project 84823.00
20 May 2015
PMO

Toga Group
PO Box 1745
STRAWBERRY HILLS NSW 2012

Attention: Mr Mino Howard

Dear Sirs

Report on Due Diligence Assessment Proposed Residential Development Cnr Todman Ave & Anzac Pde, Kensington

1. Introduction

This report presents the results of a due diligence assessment undertaken at 111 – 125 Anzac Parade and 112 – 114 Todman Avenue, Kensington. The work was commissioned by Toga Group, prospective developers of the site.

The due diligence assessment was undertaken to determine geotechnical conditions on the site and to assess the potential contamination risks. For the purposes of this assessment it is assumed that the development will include a multi-storey residential unit building with one or more basement levels.

The assessment included the drilling of two boreholes, one cone penetration test and engineering interpretation. Details of the field work and comments relevant to geotechnical and contamination issues are provided in this report.

A hazardous building materials assessment was undertaken at the same time as this due diligence assessment and is reported separately.

2. Site Description

The development site is an irregular-shaped lot with a total area of approximately 3000 m^2. It is bounded by a residential unit building to the north, Anzac Parade to the east, Todman Avenue to the south, and residential dwellings/units to the west. A service station is located on the southern side of Todman Avenue. The ground surface is relatively level an in the order of RL 23 m relative to the Australian Height Datum (AHD).

At the time of the assessment the site was occupied by two-storey premises comprising commercial/retail space on the ground floor with overlying commercial and residential units. The commercial premises were occupied by a sports medicine clinic, a gym and café, a motor vehicle accessories shop, a restaurant, a dry cleaner and a tutoring facility. The site is shown on Drawing 1 in Attachment B.

3. Regional Geology and Hydrogeology

The *Sydney 1:100 000 Geological Series Sheet* indicates that the site is underlain by transgressive dunes which comprise medium to fine-grained marine sands with podsols. An extract from the geological map is shown in Figure 1.

Figure 1: Extract from geological map

The groundwater table is likely to be relatively shallow and flow in a west to south-west direction towards Alexandra Canal and ultimately Botany Bay. A search of licenced groundwater wells indicates that several monitoring wells are located within the service station on the southern side of Todman Avenue. The standing water level was recorded on the well installation records at between about 2.4 m and 2.9 m below the ground surface.

4. Contaminated Land Public Record

The site and adjacent sites are not identified as being significantly contaminated under the *Contaminated Lands Management Act 1997* as at 20 May 2015.

5. Field Work

5.1 Methods

Two boreholes (BH1 and BH2) were drilled to depths of 1.4 m and 2.0 m using a diamond-edged coring tube to drill through the concrete slabs and then hand-auger equipment. The materials recovered from the bores were logged by a geotechnical engineer.

One cone penetration test (CPT2) was undertaken to a depth of 19.6 m adjacent to BH2. A CPT involves pushing a 35 mm diameter instrumented cone and friction sleeve into the ground using hydraulic thrust from a ballasted truck-mounted testing rig. Measurements of cone resistance and sleeve friction are made at 20 mm depth intervals and are stored on a portable computer for subsequent interpretation.

The test locations are shown on Drawing 1 in Attachment B. The ground surface levels at the test locations were measured to AHD using an automatic level.

5.2 Results

The subsurface conditions encountered in the boreholes and inferred from the CPT are shown on the logs and results sheet included in Attachment C. Notes defining descriptive terms and classification methods are provided in Attachment A.

The conditions encountered in the boreholes and inferred from the CPT can be described as follows:

- PAVEMENT – 130 mm thick concrete slab;
- FILLING – silty sand filling with glass, ash, ceramic tile, metal, gravel and tree roots to depths of between 0.4 m and 0.7 m;
- SAND – initially loose to a depth of 3.7 m, medium dense to 4.5 m depth, and dense/very dense to the base of the CPT at 19.6 m depth.

Groundwater was observed at a depth of 2.6 m (RL 20.6 m AHD) immediately after the withdrawal of the CPT equipment.

6. Comments

6.1 Inferred Subsurface Model

The site appears to be underlain by a minor depth of filling (<1 m) then natural sands to at least 19.6 m depth. The upper sand profile was loose and medium dense to 4.5 m, becoming dense and very dense with depth. Published information suggests that the depth to bedrock may be in the order of 30 m to 40 m below the ground surface. Groundwater was measured at a depth of 2.6 m which is consistent with the known level of groundwater in the Kensington area. The groundwater level may also fluctuate over time.

6.2 Geotechnical Considerations for Redevelopment

The following comments are provided in relation to the geotechnical aspects of the proposed redevelopment project. The comments have been provided on the basis that the redevelopment will include a multi-storey building over one or more basement levels.

- Excavation for the basement will be required in filling and sands. This will obviously be readily achievable using hydraulic excavators with bucket attachments. Rock excavation will not be required on the site.
- Shoring will be required to support the sides of the excavation. Excavation below the groundwater will probably require the use of impermeable shoring walls such as CSM walls or secant piles. If excavation is shallow then contiguous piles or steel sheet piles could be used. The dense and very dense sands may prevent the use of sheet piles below about 5 m depth due to issues associated with driving sheets in these materials.
- Dewatering will be required during construction if the excavation proceeds below the water table. This will probably require spear points around the perimeter of the site and possibly some internal wells.
- Care will need to be taken to prevent groundwater drawdown on adjacent sites. This is achieved by using a properly designed dewatering system, ensuring that shoring walls are founded at an appropriate depth, and the monitoring of groundwater levels outside the site during pumping.
- Temporary ground anchors will probably be required to support the shoring walls until the basement slabs have been constructed. Permission from neighbouring landowners will be required prior to installing anchors. Anchoring may not be possible/required along the northern boundary if the adjacent building contains a basement of similar depth to that proposed on the subject site.
- The basement structure will probably need to be tanked to the surface (and possibly higher depending on Council flood design requirements) to prevent water ingress into the basement. Long-term pumping of groundwater from within a basement is generally not allowed in highly permeable sands.
- Foundation conditions below a depth of about 4.5 m are relatively good with dense and very dense sands to at least 19.6 m depth. A raft slab or piles founded in the dense or very dense sands should be suitable for supporting structures on the site.

6.3 Contamination Considerations for Redevelopment

The following comments are provided in relation to the soil and groundwater contamination aspects of the proposed redevelopment project. The comments have been provided on the basis that the redevelopment will include a multi-storey residential unit building over one or more basement levels.

- Soil contamination from a land-use perspective is only likely to be an issue in areas of the site in which filling will remain (i.e. outside the basement footprint). Any filling that will remain on the site will need to be verified as having contaminant concentrations within relevant health-based and ecological-based limits.
- The quality of the filling within the basement footprint is largely irrelevant from a land-use perspective as it will be excavated and removed from the site. The boreholes indicate that the western portion of the site is underlain by between 0.4 m and 0.7 m of filling. This filling material contains ash and other unnatural inclusions and will therefore probably need to be disposed of to landfill. Asbestos could also be present as the filling contained building rubble.
- The sands underlying the filling are likely to be virgin excavated natural material (VENM) once excavated and should be able to be disposed of/reused as such.
- Acid sulphate soils are not expected to be an issue on the site as the sands are Quaternary-aged dune sands which are of wind-blown origin.
- The quality of the groundwater will primarily be relevant during construction when it will be removed from the site to facilitate the construction of the basement. Potential sources of groundwater contamination include the dry cleaning facility on the site and the service station to the south of the site.
- Historically, dry cleaners have been known to discharge chlorinated hydrocarbons and volatile organic compounds into the groundwater by either direct disposal into the soils on a site or by disposal into sewerage pipes which corrode and then discharge the chemicals below the ground surface. The dry cleaning operation is relatively small which reduces the risk of a large-scale plume being present on the site but unless site investigation proves otherwise, there remains a risk that groundwater contamination could be present on the site.
- Service stations are also known to have discharged hydrocarbons into the groundwater by leaking tanks/pipes as well as surface spillage. The service station to the south of the site appears to have a groundwater monitoring programme in place (based on the number of licenced wells on the site) and as the site is not listed on the Contaminated Land Public Record it could be presumed that significant leakage has not occurred. The service station is also likely to be down-gradient of the development site which further reduces the risk of groundwater contamination from this source, although excessive pumping during construction could draw water from down-gradient into the site.
- As the basement is likely to be tanked, the quality of groundwater should not impact upon the proposed land-use. The major risk for a purchaser in relation to groundwater contamination is if significant contamination is present and a regulatory authority requires the groundwater on adjacent sites to be remediated. Although the likelihood of this occurring appears to be relatively small, it cannot be confirmed until such time as groundwater quality testing has been undertaken.

7. Limitations

Douglas Partners (DP) has prepared this report for this project at the corner of Todman Ave and Anzac Pde, Kensington in accordance with DP's proposal dated 22 April 2015 and acceptance received from Toga Group. This report is provided for the use of Toga Group for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed. Contamination testing was not in the scope of the current investigation.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

Peter Oitmaa
Senior Associate

Michael J Thom
Principal

Attachments:
A: Notes About this Report
B: Drawing
C: Field Work Results

Attachment A

Notes About this Report

About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:
  4,6,7
  N=13
- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:
  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Cone Penetration Tests

Introduction

The Cone Penetration Test (CPT) is a sophisticated soil profiling test carried out in-situ. A special cone shaped probe is used which is connected to a digital data acquisition system. The cone and adjoining sleeve section contain a series of strain gauges and other transducers which continuously monitor and record various soil parameters as the cone penetrates the soils.

The soil parameters measured depend on the type of cone being used, however they always include the following basic measurements

- Cone tip resistance q_c
- Sleeve friction f_s
- Inclination (from vertical) i
- Depth below ground z

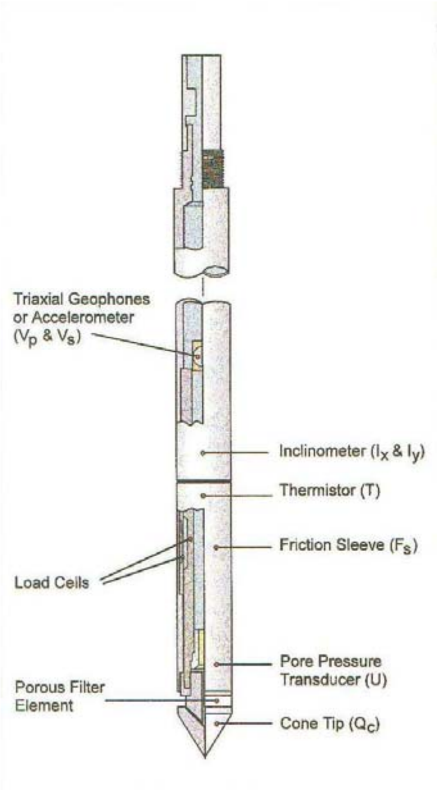

Figure 1: Cone Diagram

The inclinometer in the cone enables the verticality of the test to be confirmed and, if required, the vertical depth can be corrected.

The cone is thrust into the ground at a steady rate of about 20 mm/sec, usually using the hydraulic rams of a purpose built CPT rig, or a drilling rig. The testing is carried out in accordance with the Australian Standard AS1289 Test 6.5.1.

Figure 2: Purpose built CPT rig

The CPT can penetrate most soil types and is particularly suited to alluvial soils, being able to detect fine layering and strength variations. With sufficient thrust the cone can often penetrate a short distance into weathered rock. The cone will usually reach refusal in coarse filling, medium to coarse gravel and on very low strength or better rock. Tests have been successfully completed to more than 60 m.

Types of CPTs

Douglas Partners (and its subsidiary GroundTest) owns and operates the following types of CPT cones:

Type	Measures
Standard	Basic parameters (q_c, f_s, i & z)
Piezocone	Dynamic pore pressure (u) plus basic parameters. Dissipation tests estimate consolidation parameters
Conductivity	Bulk soil electrical conductivity (σ) plus basic parameters
Seismic	Shear wave velocity (V_s), compression wave velocity (V_p), plus basic parameters

Strata Interpretation

The CPT parameters can be used to infer the Soil Behaviour Type (SBT), based on normalised values of cone resistance (Qt) and friction ratio (Fr). These are used in conjunction with soil classification charts, such as the one below (after Robertson 1990)

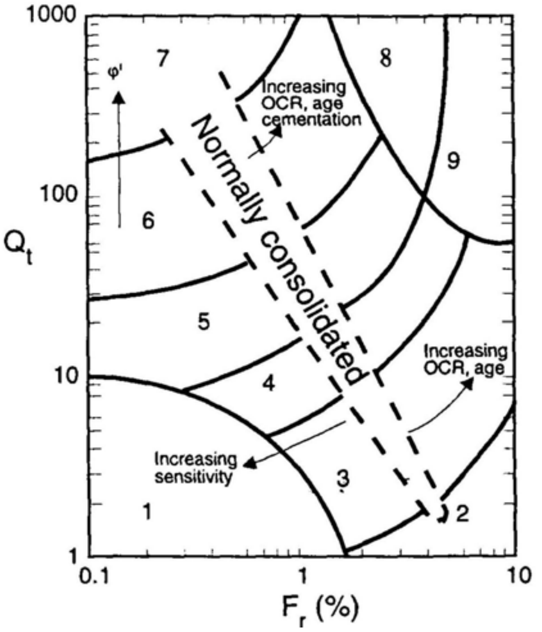

Figure 3: Soil Classification Chart

DP's in-house CPT software provides computer aided interpretation of soil strata, generating soil descriptions and strengths for each layer. The software can also produce plots of estimated soil parameters, including modulus, friction angle, relative density, shear strength and over consolidation ratio.

DP's CPT software helps our engineers quickly evaluate the critical soil layers and then focus on developing practical solutions for the client's project.

Engineering Applications

There are many uses for CPT data. The main applications are briefly introduced below:

Settlement

CPT provides a continuous profile of soil type and strength, providing an excellent basis for settlement analysis. Soil compressibility can be estimated from cone derived moduli, or known consolidation parameters for the critical layers (eg. from laboratory testing). Further, if pore pressure dissipation tests are undertaken using a piezocone, in-situ consolidation coefficients can be estimated to aid analysis.

Pile Capacity

The cone is, in effect, a small scale pile and, therefore, ideal for direct estimation of pile capacity. DP's in-house program ConePile can analyse most pile types and produces pile capacity versus depth plots. The analysis methods are based on proven static theory and empirical studies, taking account of scale effects, pile materials and method of installation. The results are expressed in limit state format, consistent with the Piling Code AS2159.

Dynamic or Earthquake Analysis

CPT and, in particular, Seismic CPT are suitable for dynamic foundation studies and earthquake response analyses, by profiling the low strain shear modulus G_0. Techniques have also been developed relating CPT results to the risk of soil liquefaction.

Other Applications

Other applications of CPT include ground improvement monitoring (testing before and after works), salinity and contaminant plume mapping (conductivity cone), preloading studies and verification of strength gain.

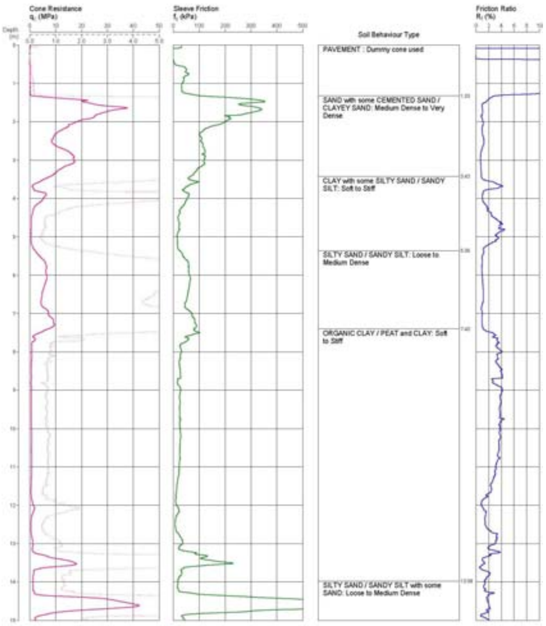

Figure 4: Sample Cone Plot

Attachment B

Drawing

Note: Hand-auger at location 1; Hand-auger and Cone Penetration Test at location 2

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Toga Group	Locations of Tests	PROJECT No:	84823.00
	OFFICE:	Sydney	Due Diligence Investigation	DWG No:	1
	DATE:	1 May 2015	Todman Ave & Anzac Pde, Kensington	REVISION:	0

Attachment C

Field Work Results

BOREHOLE LOG

CLIENT: Toga Group Pty Ltd
PROJECT: Due Diligence Investigation
LOCATION: Cnr Todman Ave & Anzac Pde, Kensington

SURFACE LEVEL: 22.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 84823.00
DATE: 28/4/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		CONCRETE SLAB	△						
	0.13	FILLING - dark grey-brown, silty sand filling with some fine to coarse glass, ash and ceramic (tile) gravel, fine to medium grained sand, humid	☒	A	0.2 0.3				
	0.4	SAND - yellow-orange, fine to medium grained sand, humid	⋰	A	0.5 0.6				
		0.9m: becoming grey	⋰	A	1.0 1.1				
		1.25m: becoming light yellow	⋰	A	1.3 1.4				
	1.4	Bore discontinued at 1.4m							

RIG: Hand auger **DRILLER:** GP **LOGGED:** IW **CASING:** Uncased
TYPE OF BORING: Hand auger to 1.4m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Toga Group Pty Ltd
PROJECT: Due Diligence Investigation
LOCATION: Cnr Todman Ave & Anzac Pde, Kensington

SURFACE LEVEL: 23.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 84823.00
DATE: 28/4/2015
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		CONCRETE SLAB							
23	0.13	FILLING - dark brown, silty sand filling with some fine to medium ash gravel, traces of organic material (tree roots) fine to medium grained sand, humid		A	0.2 0.3				
	0.4	FILLING - light brown, sandy filling with some fine to coarse ceramic, metal, ash gravel, fine to medium grained sand, humid		A	0.5 0.6				
	0.7	SAND - yellow-orange, fine to medium grained sand with traces of silt, humid							
	1			A	1.0 1.1				1
22									
		1.5m: becoming grey		A	1.5 1.6				
				A	1.8 1.9				
		1.9m: becoming light grey							
	2 2.0	Bore discontinued at 2.0m							2
21									
	3								3
20									
	4								4
19									

RIG: Hand auger **DRILLER:** GP **LOGGED:** IW **CASING:** Uncased
TYPE OF BORING: Hand auger to 2.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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CONE PENETRATION TEST

CLIENT: TOGA GROUP PTY LTD

PROJECT: DUE DILIGENCE INVESTIGATION

LOCATION: CNR TODMAN AVE & ANZAC PDE, KENSINGTON

REDUCED LEVEL: 23.2

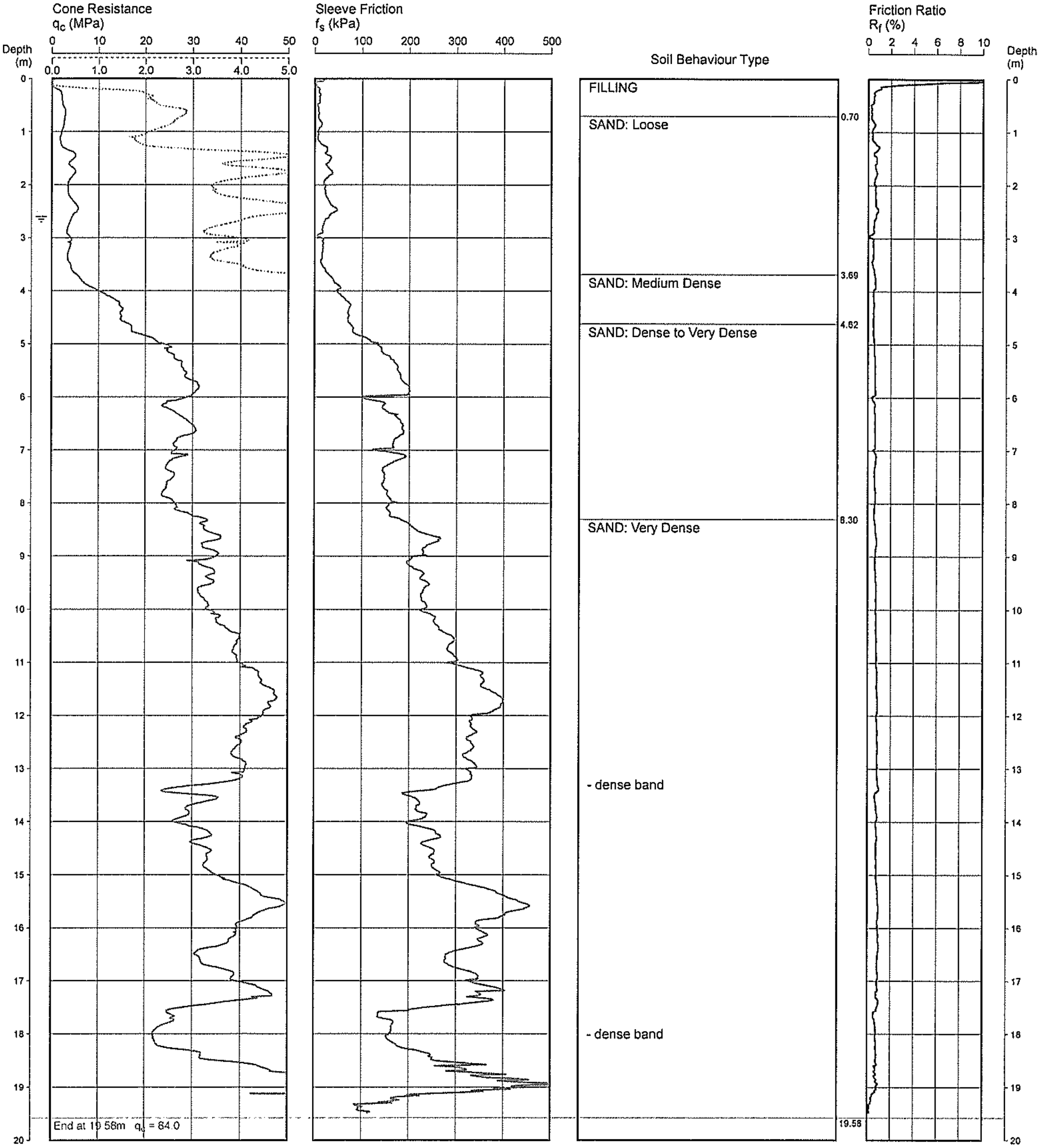
COORDINATES:

CPT2

Page 1 of 1

DATE 28/4/2015

PROJECT No: 84823



REMARKS: CONCRETE SURFACE SLAB CORED TO 0.13 m DEPTH PRIOR TO TESTING; HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; GROUNDWATER OBSERVED AT 2.6 m DEPTH AFTER WITHDRAWAL OF RODS.

Water depth after test: 2.60m depth (measured)

File: P:\84823.00 - KENSINGTON Todman Ave & Anzac Pde DD\4.0 Field Work\CPT Results 28.4.15\CPT2.cpt

Cone ID: 120631 Type: I-CFXY-10

ConePlot Version 5.9.2

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