Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Desktop Report on Geotechnical Assessment

Proposed Multi-Storey Mixed Use Development
10 Young St, 61 Central Coast Hwy & 1 Racecourse Rd, West Gosford

Prepared for
Japrico Developments Pty Ltd

Project 75808.03
August 2022

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	75808.03	Document No.	R.001.Rev0
Document title	Report on Geotechnical Assessment Proposed Multi-Storey Mixed Use Development		
Site address	10 Young St, 61 Central Coast Hwy & 1 Racecourse Rd, West Gosford		
Report prepared for	Japrico Developments Pty Ltd		
File name	75808.03.R.001.Rev0.Geotechnical Report		

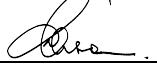
Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Troy McClelland	Darryl Carson	8 August 2022

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Jason Capuano, Japrico Developments Pty Ltd
Revision 0	1	1	Douglas Partners' Archives

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		8 August 2022
Reviewer		8 August 2022

bsi ISO 9001 Quality Management Systems CERTIFIED
FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 5, 3 Teamster Close
Tuggerah NSW 2259
Phone (02) 4351 1422

Douglas Partners
Geotechnics | Environment | Groundwater

Table of Contents

Page

Desktop Report on Geotechnical Assessment
Proposed Multi-Storey Mixed Use Development
10 Young St, 61 Central Coast Hwy & 1 Racecourse Rd, West Gosford

1. Introduction

This geotechnical report presents the results of a desktop study undertaken by Douglas Partners Pty Ltd (DP) for a proposed multi-storey mixed use development at 10 Young St, 61 Central Coast Hwy & 1 Racecourse Rd, West Gosford. DP had previously been engaged to carry out a desktop study that was commissioned in an email dated 13 July 2020 by Jason Capuano of Japrico Developments Pty Ltd and was undertaken in accordance with Douglas Partners' proposal CCT200104 also dated 13 July 2020. This present report has been carried out as an extension of that earlier engagement.

It is understood that the proposed development includes the construction of a 14 storey building within the eastern portion of the site and a five storey building in the western portion, both of which are located within the property of 10 Young Street.

Douglas Partners Pty Ltd (DP) has carried out a geotechnical investigation (DP, July 2015) for an earlier development proposal that did not proceed to construction, and the results of that investigation have been used to prepare this current report.

The aim of the previous investigation was to assess founding conditions for piles and to obtain information on subgrade conditions for the design of vehicular pavements. Similarly, this report also addresses these aspects.

2. Proposed Development

The current development proposal is for the construction of two interconnected buildings. For the purpose of this report, DP was provided with a set of architectural drawings (Revision G of Job 19062 dated 29 October 2021) produced by Marchese Partners International Pty Ltd.

Based on the architectural drawings, the eastern building will be 14 storeys high, and have hotel rooms (Levels 03 and 04) and residential apartments (Levels 05 and above). The hotel lobby and reception will be located on the ground floor level (Level 00) whilst Levels 01 and 02 will be the main parking levels.

The western building will be a five storey structure and have a footprint approximately half the size of the eastern building. A car showroom will be located on the ground floor level (Level 00), with the remaining storeys (Levels 01 to 04) having a similar carparking and hotel rooms levels as the larger building.

Figure 1 and Figure 2 show excerpts of the architectural drawings with the pertinent aspects described above.

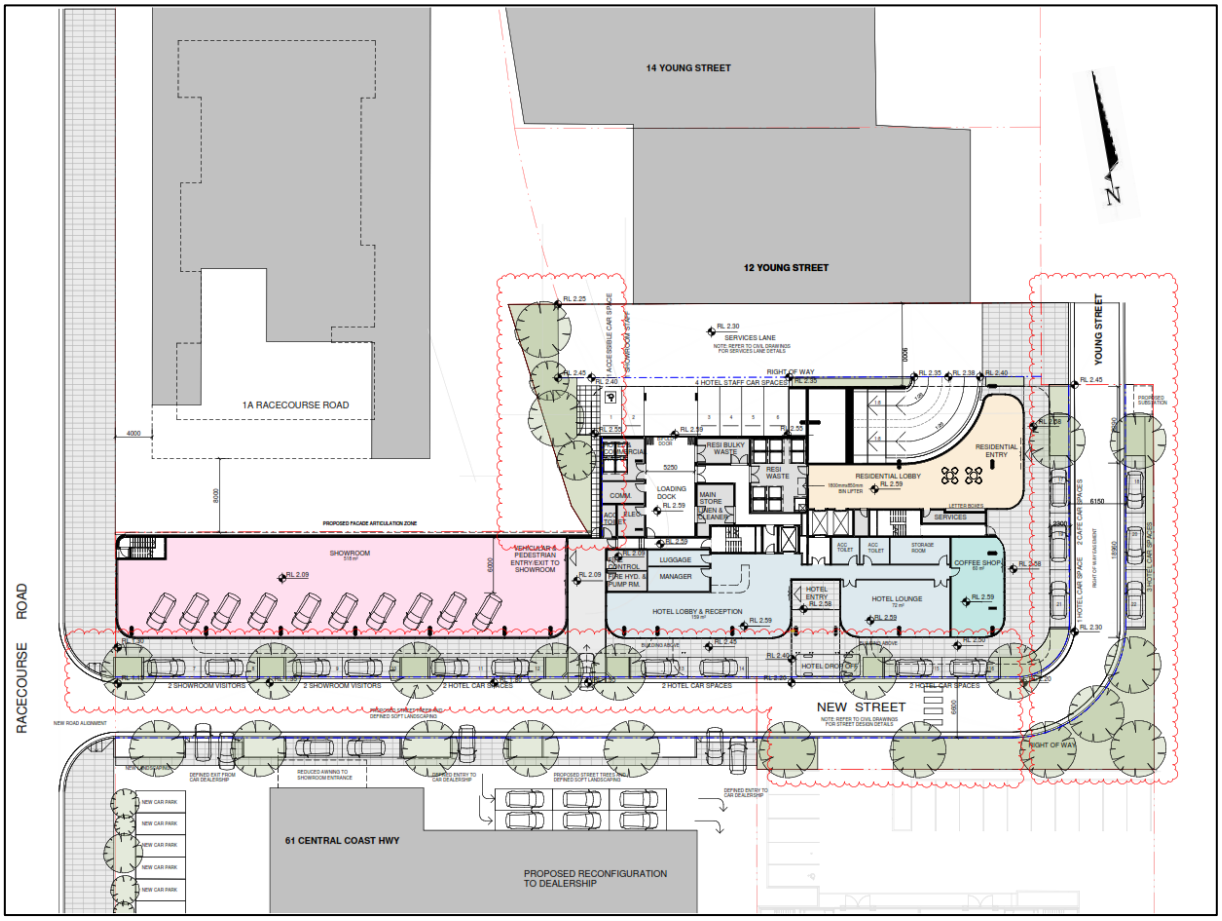


Figure 1: Ground floor plan for the proposed development

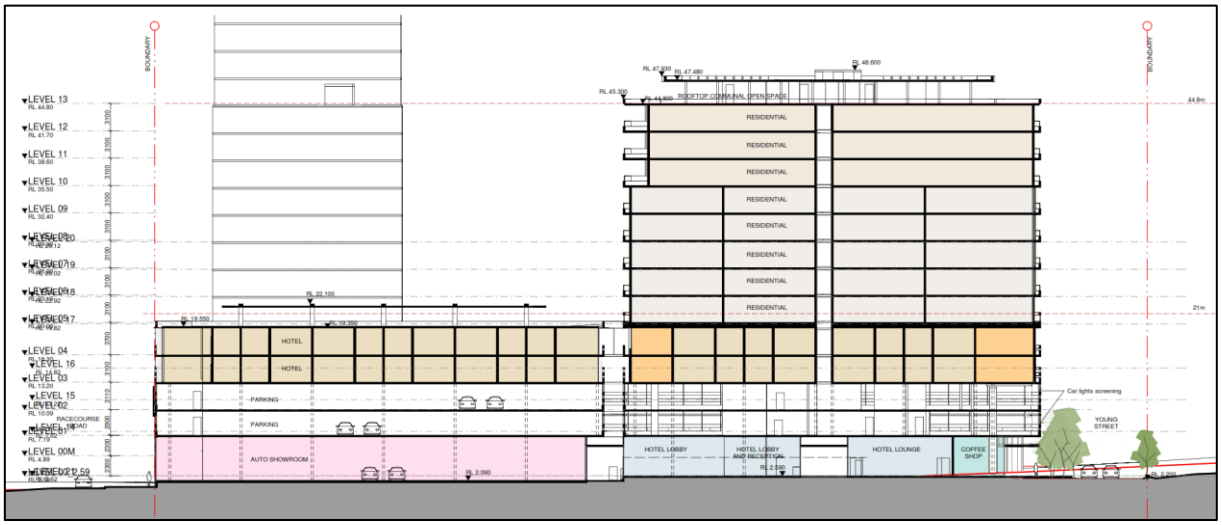


Figure 2: East-west section through proposed buildings

No basement level is proposed for this project, therefore, excavations are expected to be relatively minor and associated with slight regrading of the site to allow for the construction of the ground floor levels.

Details of the structural loads for the building have not been provided to DP, however, based on other similar projects, it is expected that column structural loads may be up to 10,000 kN.

3. Site Description

The proposed buildings are located with 10 Young Street, which comprises an irregular shaped allotment identified as Lot 1 DP 1194024 on the NSW LPI spatial information exchange website. Proposed access pavements extend into the adjoining lots to the south (i.e. 1 Racecourse Road and 61 Central Coast Highway). The site is bounded by Racecourse Road to the west with a secondary access from Young Street to the north-east. At the time of the field work for the previous investigation (DP, July 2015), a new concrete access road had been constructed within a right of carriageway along the southern side of the site and this ran between Young Street and Racecourse Road.

During the previous field work, several stockpiles were present on the site, and these were associated with excavations to accommodate the new access road. The remainder of the site was covered with grass. Industrial properties were located to the north and east of the site. Figure 3 shows a recent aerial view of the site, and this indicates that, since the time of the investigation (DP, July 2015), it appears that a granular hardstand has been constructed and the site is now used as a vehicle storage compound. The red outline shows the boundary of 10 Young Street.

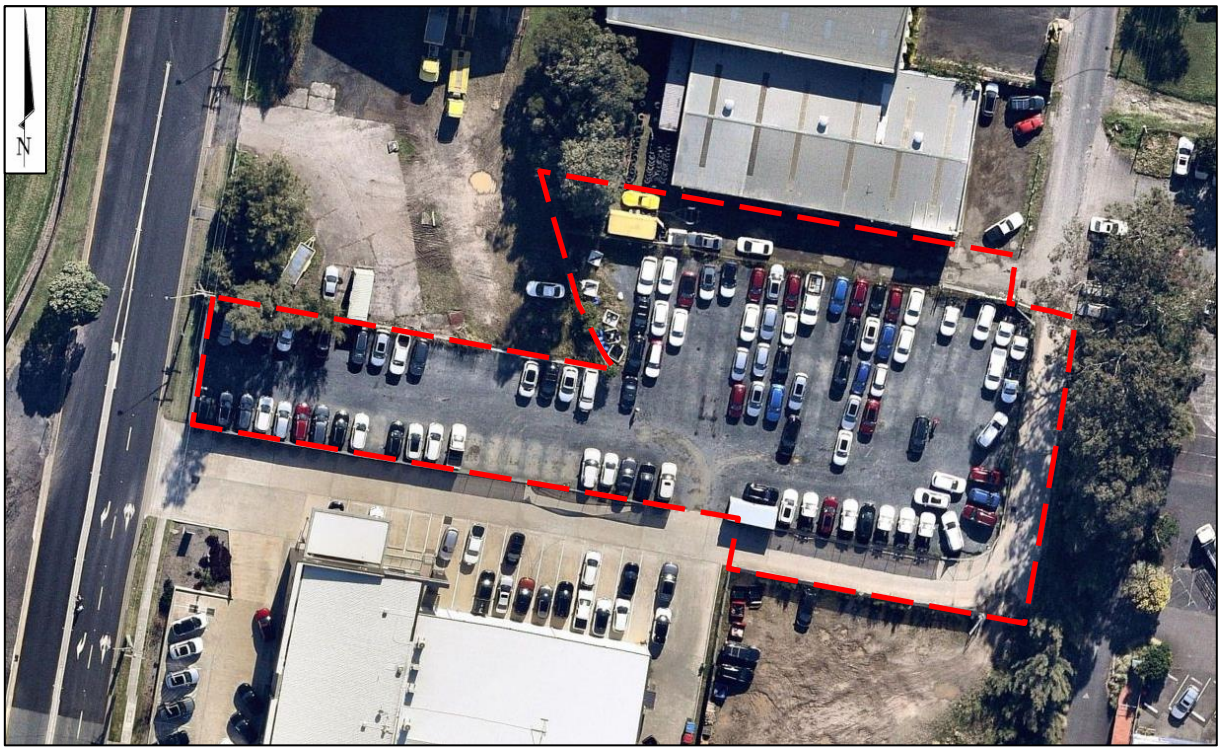


Figure 3: Aerial view of the site (sourced from NearMap imagery and dated 1 July 2020)

The site sits along the eastern fringe of the Narara Creek floodplain, whereas Presidents Hill is located to the north-east of the site, and its flanks merge into the floodplain slightly beyond the site boundary. Based on a survey plan included in the architectural drawings, current surface levels in the western portion of the site are typically in the range RL 1.2 m to RL 1.8 m, with the eastern portion slightly higher in the range RL 2.2 m to RL 2.4 m (levels relative to Australian Height Datum).

DP is aware that extensive civil works were carried out at the site approximately 10 years prior as part of a site remediation program.

It is noted that, at the time of the previous investigation in 2015, the site was identified as 1 Racecourse Road, West Gosford. This address has been retained on the borehole logs included with this report.

4. Regional Geology

Reference to the interim 1:25 000 Geological Series Sheet for Gosford indicates that the site is located in an area mapped as Quaternary Alluvium. The area of alluvium is associated with the Narara Creek valley and floodplain.

Alluvium in this area generally comprises relatively deep soils of variable grain sizes that are deposited underwater. They often have a shallow groundwater table, and different soil layers of varying strengths/densities.

The investigation encountered fill overlying alluvial soils consistent with the geological mapping. Continued drilling encountered rock strata that was considered to be of the Terrigal Formation which is mapped to be bordering the areas of alluvium. Presidents Hills is located within the area mapped as Terrigal Formation.

5. Summary of Previous Field Work

The following sections present the scope of the field work that was undertaken for the previous report (DP, July 2015) along with the results of that work. It is noted that that work had been carried out for a different client and based on a scope of work relevant to the development proposed at that time. Following the investigation, the site was sold and that earlier development proposal has since been abandoned.

5.1 Field Work Methods

The field work comprised the following:

- Four ‘deep’ boreholes (Bores 1 to 4) to depths ranging from 10.77 m (Bore 4) to 16.63 m (Bore 3);
- In-situ sampling and testing in Bores 1 to 4 included Standard Penetration Tests (SPTs) within the soil profile followed by NMLC diamond coring 6 m to 9 m into the rock profile; and

- Two 'shallow' boreholes (Bores 5 and 6) drilled to about 1.6 m depth using a push tube rig fitted with 60 mm diameter sampling tubes.

The locations of the boreholes are shown on Drawing 1 (reproduced from the previous investigation), which is included in Appendix A. The boreholes were positioned in the eastern portion of the site as this corresponded to the footprint of the building that was proposed at that time.

Conditions encountered in the boreholes were logged by a geotechnical officer who also directed sampling and in situ testing. Rock samples were placed in core boxes for subsequent logging, laboratory point load testing, and for storage. The retrieved core was photographed following placement in core boxes.

5.2 Field Work Results

Details of the subsurface conditions encountered in the previous boreholes are presented in the log sheets in Appendix B. These should be read in conjunction with the explanatory notes, which define the descriptive terms and classification methods. Photographs of the core are also included in Appendix B.

The boreholes encountered approximately 1 m of fill overlying relatively soft/loose alluvial soils comprising a mix of sand, silty and clay. The alluvium extended to about 4.5 m depth at Bores 2 and 4, whereas it was to about 7 m depth at Bores 1 and 3.

A layer of medium dense to dense, or very dense clayey sand or hard silty clay was encountered below the alluvium and this was considered to be 'residual' soil derived from the in-situ weathering of the parent rock. The residual soil was about 0.5 m to 0.9 m thick.

Bedrock was encountered at depths ranging from 4.7 m (Bore 4) to 7.8 m (Bore 1) with the results indicating that the bedrock surface generally dips to the west. The rock strength varied between bore locations and with depth, ranging from very low to low strength siltstone to high strength sandstone. Reference should be made to the individual borehole logs for details.

A summary of the subsurface conditions that were encountered in the four cored boreholes is presented in Table 1, below.

Table 1: Summary of Subsurface Conditions

Test Location	Surface Level at Test Location (m AHD)*	Depth to Top of Rock Profile (m)	Elevation of Top of Bedrock (m AHD)
Bore 1	2.1	7.8	-5.7
Bore 2	2.4	4.9	-2.5
Bore 3	2.1	7.5	-5.4
Bore 4	2.3	4.7	-2.4

* Surface level interpolated from survey plan provided by client at time of previous investigation

Bores 5 and 6 encountered fill materials to 1.3 m and 0.9 m depth, respectively, overlying alluvial soils (including soft or firm organic silt).

Groundwater was observed to be present at depths ranging from 1.2 m to 1.6 m below the ground surface. This corresponds with a groundwater table in the range RL 0.5 m AHD to RL 1.2 m AHD. It should be noted that groundwater levels are affected by recent rainfall, and will therefore vary over time.

6. Laboratory Testing

6.1 Point Load Tests

Axial point load strength tests were carried out in the laboratory on the core obtained from the bores.

A total of 32 point load tests were scattered throughout the length of the rock core sample. Individual test results are shown on the borehole log contained in Appendix B and are presented on the Point Load Test Report sheet in Appendix C.

The results of the point load tests were used as a basis for determining the strength of the rock.

6.2 California Bearing Ratio

A bulk sample of the subgrade materials was taken from 0.5 m to 0.8 m depth at Bore 5 and underwent laboratory testing to determine the CBR value for the material.

The sample was compacted to 100% Standard dry density ratio at close to the estimated optimum moisture content and then soaked for four days under a surcharge loading of 4.5 kg prior to testing. A summary of the results of this testing is given in Table 2, below, with detailed report sheets included in Appendix C.

Table 2: Summary of California Bearing Ratio Testing

Bore	Depth (m)	Soil Description	FMC (%)	OMC (%)	MDD (t/m^3)	CBR (%)	Swell during soaking (%)
5	0.5 – 0.8	Brown CLAY and SANDY CLAY (FILL)	13.5	13.0	1.91	9	0.8

Notes: FMC = Field moisture content
OMC = Optimum moisture content
MDD = Maximum dry density
CBR = California bearing ratio

7. Comments

7.1 Foundation Systems

Based on the anticipated magnitude of the structural loads that would be imposed by the proposed building, it is considered that piled footings will be required to support the building, with piles taken to the underlying bedrock. The rock was encountered at about 5 m to 8 m depth in the test bores, and the initial rock strength ranged from very low to low strength siltstone in Bore 2 to medium to high strength sandstone in Bore 4.

Given that the soil profile comprises various layers of clays, silts and saturated sands, piles would need to be able to be constructed using methods that maintain support to the pile hole throughout the installation procedure. Driven piles are considered unsuitable for this site, due to the likelihood that pile driving would generate relatively high vibrations that could cause damage to the nearby existing buildings. As such, it is considered that the following pile types would be suited to the ground conditions and the range of structural loads to be carried:

- Concrete bored piles; and
- Contiguous flight auger (CFA) piles.

These pile types are capable of constructing rock sockets however the presence of medium to high strength rock layers should be considered when selecting the appropriate piling rig; i.e. a heavy duty rig may be required if loads necessitate the formation of rock sockets that benefit from shaft adhesion.

7.2 Pile Footings

7.2.1 Geotechnical Strength Reduction Factor

The design geotechnical strength of a pile ($R_{d,g}$) is the ultimate geotechnical strength ($R_{d,ug}$) multiplied by the geotechnical strength reduction factor (ϕ_g), such that:

$$R_{d,g} = \phi_g \, . \, R_{d,ug}$$

The calculated design geotechnical strength ($R_{d,g}$) must equal or exceed the structural design action effect (E_d). Further reference can be made to (AS 2159, 2009) regarding these terms and the design procedure.

Selection of the basic geotechnical strength reduction factor (ϕ_g) is based on a series of individual risk ratings (IRR) which are weighted and lead to an average risk rating (ARR). The individual risk ratings and final value of ϕ_g depend on the following factors:

- Site: the type, quantity and quality of testing;
- Design: design methods and parameter selection;
- Installation: construction control and monitoring;
- Pile testing regime; testing benefit factor based on percentage of piles tested and the type of testing; and,
- Redundancy: whether other piles can take up load if a given pile settles or fails.

Using the methodology outlined in the piling code, an average risk rating of 3.41 has been calculated, which relates to a 'moderate' overall risk category. A basic geotechnical strength reduction factor, ϕ_{gb}, of 0.48 is applicable for low redundancy (i.e. single piles) whereas this would increase to 0.56 for a high redundancy pile arrangement (e.g. pile groups). For design purposes, the basic geotechnical strength reduction factor for a low redundancy pile configuration has been adopted as the geotechnical strength reduction factor (i.e. $\phi_g = \phi_{gb}$) with $\phi_g = 0.48$.

7.2.2 Bored Piles

Installation of bored piles would require the use of temporary or permanent (sacrificial) liners taken to bedrock to prevent collapse of the alluvial soils into the pile hole. Alternatively, the piles could be formed under bentonite.

A tremmie pipe or similar should be used to deliver concrete to the base of the hole for conventional bored piles, as concrete would separate and the integrity of the finished pile would be compromised if it is poured into the pile hole from the ground surface.

Table 3 provides the recommended limit state end bearing pressures and shaft adhesion values for piles socketed into the underlying sandstone and siltstone bedrock. It is recommended that all piles should be taken to bear on at least low to medium strength sandstone.

Table 3: Design Pressures and Depths for Founding Strata

Rock Strength of Strata	Rock Class[1, 2]	Where Encountered	Ultimate End Bearing[3,4] (kPa)	Serviceability End Bearing[3,5] (kPa)	Ultimate Shaft Adhesion[3,4,6,7] (kPa)
Very Low to Low	Class IV Shale	B2: 4.9 to 6.6m B3: 10.6 to 14.8m	3,000	1,000	150
Low to Medium	Class III Shale Class IV Sandstone	B3: 7.6 to 10.6m	7,500	2,500	400
Medium to High	Class II Sandstone	B1: 7.8 to 15.3m B2: 6.6 to 11.0m B4: 4.7 to 10.8m	40,000	6,000	2,000
High	Class I Sandstone	B3: 14.8 to 16.6m	120,000	10,000	3,000

Notes to Table 3:

1. Rock classification based on (Pells, Mostyn, & Walker, 1998)
2. For the purposes of rock class siltstone is classified as 'shale'
3. Design geotechnical strength (Rd,g) should be based on a strength reduction factor of $\phi g = 0.56$ for groups of at least four piles, and $\phi g = 0.48$ for individual piles or groups of fewer than four piles
4. Ultimate Values occur at large settlements (> 5% of minimum pile diameter/width)
5. Serviceability values to limit settlement to < 1% of minimum pile diameter/width
6. Shaft adhesion values based on a shaft roughness of R2 or better
7. Adopt 50% of shaft adhesion values for resistance to uplift

For design purposes, the ultimate bearing capacity of the piles is equal to the sum of the contribution from both shaft adhesion and end bearing resistance. The design of piles should include assessment of both strength and serviceability limit states.

Piles that are constructed in a manner that does not enable inspection or checking of the pile socket, or those that are likely to have an increased amount of smear over the length of the socket, should be designed based on parameters that are 20% lower than those given in Table 3. This would include piles installed using bentonite slurry.

The above parameters are given such that the pile holes have appropriately clean, dry bases and rough shafts (R2 or better) prior to pouring concrete. Specialised cleaning buckets should be used in order to achieve sufficiently clean bases, although some piling contractors are suitability equipped with good rock augers and have skilled operators that can also produce clean pile sockets and bases.

Piled footing excavations should be inspected by a geotechnical engineer to confirm that the design bearing stratum has been achieved and that the pile holes have been sufficiently cleaned prior to placing reinforcing steel and pouring concrete.

7.2.3 Continuous Flight Auger Piles

As an alternative to drilling bored piles using conventional piling rigs, continuous flight auger (CFA) piles (also commonly referred to as 'grout-injected' piles) could be installed at the site. This method is generally limited to equipment fitted with augers having a diameter of up to about 600 - 1000 mm.

The main differences between grout-injected piles and large diameter bored piles are:

- Inspection of founding material during boring is not possible with grout-injected piles;
- Higher torque and thrust capacity boring equipment is required in order for the CFA stem to penetrate to the same depth as bored pile rigs fitted with the same diameter auger; and
- Better control of grout/concrete levels during pile construction is possible for large diameter bored piles.

For these reasons, it is recommended that the design pressures given in Table 3 for bored piles be reduced by 20% when applied to grout-injected piles.

Despite the aforementioned shortcomings, CFA piles do have a significant advantage over bored piles in that they can be drilled without the need to install casing, as the auger and column of spoil supports the sides of the pile during construction. Upon reaching the required depth or founding strata, grout or concrete is injected through the hollow stem of the auger whilst simultaneously withdrawing the auger from the ground. A steel reinforcing cage is then inserted into the column of fluid concrete.

CFA equipment used to install piles at the site would need to have sufficient torque capacity to penetrate into the stronger rock at a moderate rate. This is because decompression of the surrounding soils, particularly the saturated sand layers, would likely occur if the auger is to rotate repeatedly without achieving significant penetration.

It is recommended that on-board instrumentation and experience piling rig operators be used so that the surface of the rock at each pile location can be adequately recorded, together with periodic inspections/observations by a geotechnical engineer.

7.3 Design Parameters for Earthquakes

Sections 3 and 4 of (AS 1170.4, 2007) provides details regarding hazard factors and site sub-soil classes in relation to earthquakes.

Reference to Table 3.2 of (AS 1170.4, 2007) indicates that a Hazard Factor, Z, of 0.09 would be applicable for earthquake design at this site, as the site would fall under the location of "Gosford".

Conditions encountered in the boreholes indicate a soil profile consisting of mainly firm to stiff clays and loose or medium dense sands underlain by sandstone bedrock at about 5 m to 8 m depth. Very loose sand was, however, encountered at Bore 2 from 1.2 m to 1.8 m depth. On account of the very loose sand, reference to Section 4 of (AS 1170.4, 2007) then indicates that the site would be classed as a "deep soil site", for which a sub-soil Class D_e would apply.

Site specific direct measurement of shear wave velocity, by means of seismic cone testing, might allow a refinement of the sub-soil class and a re-classification.

7.4 Pavements

Based on the results of the boreholes and laboratory testing, it is expected that subgrade materials at the site will comprise a mix of clay, sand and gravel fill.

Given the variability of the near surface conditions, it is recommended that pavements be designed based on a soaked CBR value of 5%. This assumes that the subgrade will be adequately compacted (refer to Section 7.5).

It is anticipated that pavement designs for this project would be carried out by others.

7.5 Site Preparation

At the time of the previous investigation (DP, July 2015) various site preparations measures were recommended to be carried out. It is noted that a granular hardstand has since been constructed over the site, therefore, extensive site preparation is likely to be unnecessary.

Due to the widespread presence of fill materials and disturbed ground, it is recommended that the ground floor slab be designed as a suspended slab, otherwise, there is the potential for excessive settlement if structural loads are applied.

Geotechnical inspection and testing for pavements could be carried out under Level 2 standard as per (AS 3798, 2007).

7.6 Slope Stability

Based on a review of the local geological maps together with the results of the boreholes, the site is underlain by Quaternary Alluvium to about 5 m to 8 m depth. The site has surface slopes of less than 5°, and is more than 60 m from the waterfront or river, for which Table M1 of (CCC, 2013) indicates that the site would be a Category 1 – 'Low Hazard Area'.

Table R1 of (CCC, 2013) indicates that a risk based slope stability assessment report is not required for a Category 1 hazard areas, hence a detailed slope stability assessment was not required as part of the current assessment.

7.7 Further Investigation

This report has been prepared in connection with a proposed multi-storey mixed use development at 10 Young St, 61 Central Coast Rd and 1 Racecourse Rd, West Gosford and has been based on the results of an earlier investigation (DP, July 2015) that was carried out for a smaller scale development.

As such, investigation within the western portion of the site was limited to the drilling of a single shallow borehole (Bore 6) which was aimed at assessing near surface conditions for an on-grade carpark. Given that the current development proposal is for a five storey building in this portion of the site, it is recommended that further investigation drilling including coring of the rock be carried out.

Furthermore, consideration could be given to undertaking seismic cone penetration testing should the current sub-soil class be refined and possibly reclassified.

8. References

AS 1170.4. (2007). *Structural Design Actions, Part 4: Earthquake Actions in Australia.* Reconfirmed 2018. Incorporating Amendments 1 & 2: Standards Australia.

AS 2159. (2009). *Piling - Design and Installation.* Standards Australia.

AS 3798. (2007). *Guidelines on Earthworks for Commercial and Residential Developments.* Standards Australia.

CCC. (2013). *Chapter 6.4 of Development Control Plan 2013 - Geotechnical Requirements for Development Applications.* Central Coast Council.

DP. (July 2015). *Report on Geotechnical Investigation, Proposed Mulit-Storey Hotel, 1 Racecourse Road, West Gosford.* Document 75808.01.R.001.Rev0: Douglas Partners Pty Ltd.

Pells, P. N., Mostyn, G., & Walker, B. F. (1998). Foundations on Sandstone and Shale in the Sydney Region. *Australian Geomechanics, No 33 Part 3*, 17-29.

9. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at West Gosford in accordance with DP's proposal dated 13 July 2020 and acceptance received from Japrico Developments Pty Ltd dated 13 July 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Japrico Developments Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. 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 subsurface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface 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. In this regard, it is noted that the report has been prepared based on the results of an earlier investigation with field work undertaken by DP in 2014. Furthermore, since the time of the investigation, AS 1726 was revised and this included changes regarding classification of soil and rock. As these changes do not materially change the recommendations provided in this report, the former descriptions have been retained and reference should be made to the notes that accompany the borehole logs for the appropriate descriptive and classification methods.

DP's advice is based upon the conditions encountered during the previous investigation (DP, July 2015). The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

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.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of fill of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such fill may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawing 1 – Locations of Previous Tests

About this Report

Douglas Partners

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.

Copyright

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.

About this Report

Site Anomalies

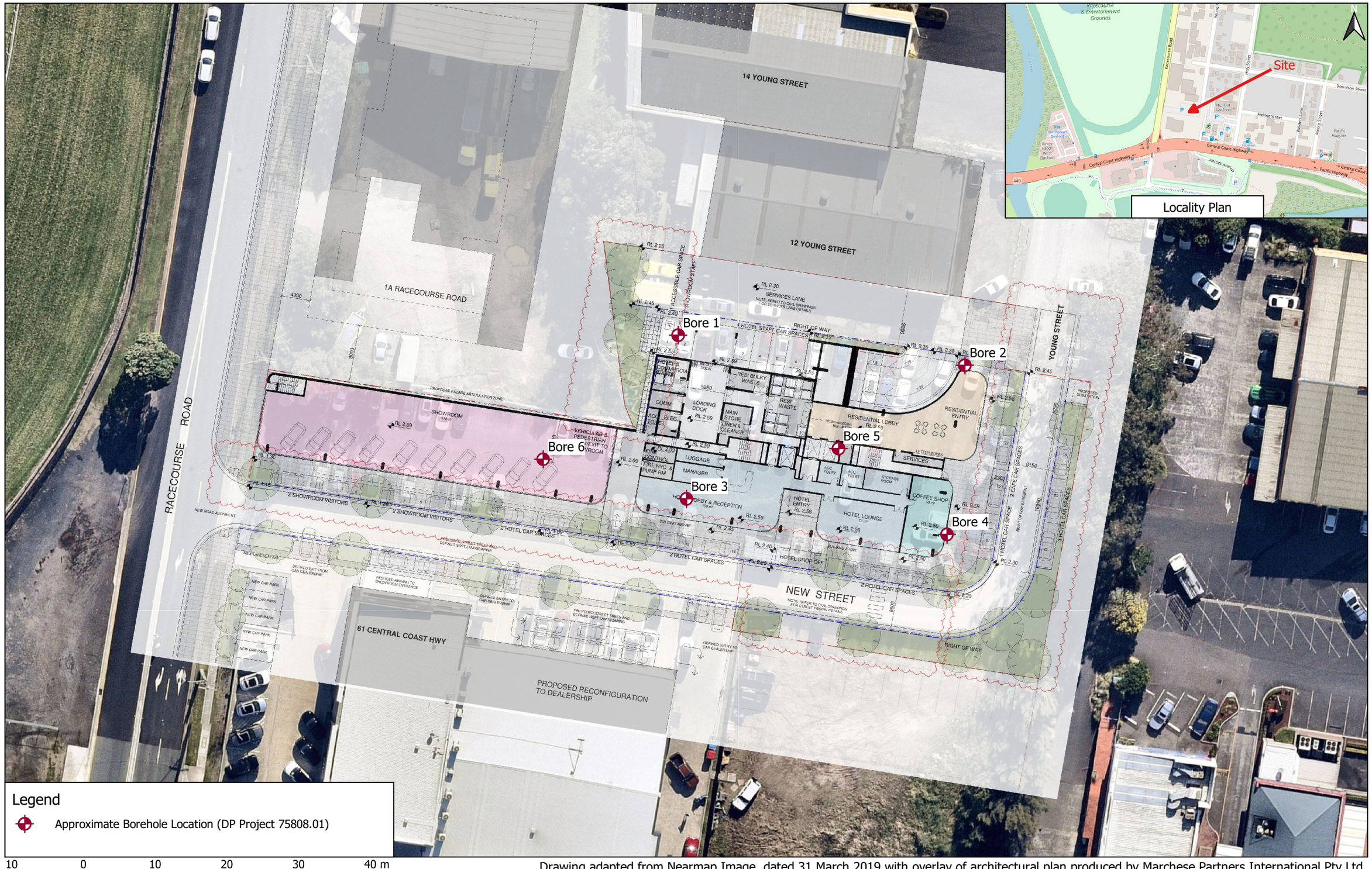
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later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



Drawing adapted from Nearmap Image, dated 31 March 2019 with overlay of architectural plan produced by Marchese Partners International Pty Ltd

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	Japrico Developments Pty Ltd		
OFFICE:	Central Coast	DRAWN BY:	TDM
SCALE:	1:500 @ A3	DATE:	08.08.2020

TITLE: **Test Location Plan**
Proposed Multi-Storey Mixed Use Development
10 Young St, 61 Central Coast Hwy and 1 Racecourse Rd, West Gosford

PROJECT No:	75808.03
DRAWING No:	1
REVISION:	0

Appendix B

Sampling Methods

Soil Descriptions

Rock Descriptions

Symbols & Abbreviations

Results of Field Work

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.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

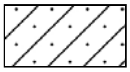
Soils


Topsoil

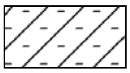

Peat


Clay

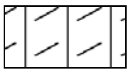

Silty clay

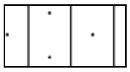

Sandy clay

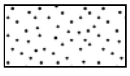

Gravelly clay

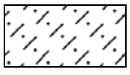

Shaly clay

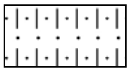

Silt


Clayey silt


Sandy silt

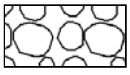

Sand

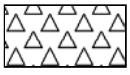

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

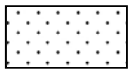

Talus

Sedimentary Rocks

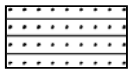

Boulder conglomerate

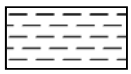

Conglomerate


Conglomeratic sandstone

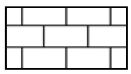

Sandstone


Siltstone


Laminite

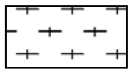

Mudstone, claystone, shale

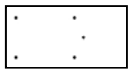

Coal


Limestone

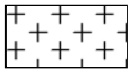
Metamorphic Rocks

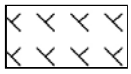

Slate, phyllite, schist

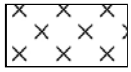

Gneiss

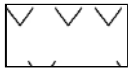

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.1 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 75808.01
DATE: 5/12/2014
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
2	0.0	FILLING: Generally comprising brown silty sandy clay and sandy gravel, M>Wp/moist/wet							D			
									D			
1	0.6	FILLING: Generally loosely compacted, generally comprising dark brown and grey silty sandy clay with trace of gravel and decomposed organics, wet							S			3,1,1 N = 2
	1.6	CLAYEY SILTY SAND: Loose, dark brown clayey silty sand with a trace of decomposed organics, wet/saturated				▼			D			
0	1.8	CLAYEY SAND: Firm, light brown grey clayey sand, saturated							D			
2									S			0,0,0 N = 0 pp = 50-80
-1	2.9	SILTY CLAY: Firm, light grey and brown silty clay with some fine grained sand, M>Wp										
3												
-2									S			pp = 100 1,2,3 N = 5
4												
-3												
5												
									S			1,1,2 N = 3
-4	5.8	SAND: Very loose, light brown, medium grained, sand, saturated										
6												
-5		- becoming medium and medium to coarse grained from 7.0m							S			4,12,11 N = 23
7	7.4	CLAYEY SAND: Very dense, light grey, medium grained, clayey sand, moist						Start Coring at 7.8m				
-6	7.8	SANDSTONE: Medium strength, slightly weathered, slightly fractured, orange brown and grey medium grained sandstone						8.28m: J10°,ir,ro,inf,slt 5mm	C	100		PL(A) = 0.55
8												
-7								9.1m: J40°, pl,ro,inf,clay 20mm 9.17m: J40°, pl,ro,he,fe				PL(A) = 0.58
9									C	100		

RIG: FE102 **DRILLER:** M Lynch **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 7.8m then NMLC coring to 15.3m

WATER OBSERVATIONS: Free Groundwater Observed at 1.6m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.1 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 75808.01
DATE: 5/12/2014
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
								10.3m: J5°, ir,ro,fe,cln 10.47m: J5°, ir,ro,fe,cln 10.55m: J5°, ir,ro,fe,cln 10.57m: Cz 20mm	C	100		PL(A) = 0.59
	10.56	SILTSTONE: Medium strength, moderately weathered, fractured, grey siltstone - becoming highly fractured from 11.18 - 11.45m - becoming fresh stained from 12.05m - low to medium strength from 12.5m						11.18m: J5°, ir,ro,fe,cln 11.3m: J5°, ir,ro,fe,he 11.315m: J5°, ir,ro,fe,he 11.33m: J5°, ir,ro,fe,he 11.4m: J30°, ir,ro,fe,fg 10mm 11.45m: J45°, ir,ro,fe 11.66m: J10°, ir,ti,fe 11.68m: J5°,ir,ro,fe,co,slt 11.7m: J10°, pl,he,fe,cln 11.71m: J10°, pl,he,fe,cln 12.28m: J10°,ir,ro,cl,slt 12.48m: J10°,ir,ro,cl,slt 12.58m: J85°,ir,ro,fe,ti 12.65m: J30°,ir,ro,fe,cln 13.23m: J25°,ir,ro,co,slt	C	100		PL(A) = 0.34 PL(A) = 0.52 PL(A) = 0.23 PL(A) = 0.38
	15.3	Bore discontinued at 15.3m . Limit of investigation						13.69m: J15°,ir,ro,co,slt 13.75m: J20°,ir,ro,co,slt 13.9m: J80°,ir,ro,fe,cln 14.05m: J5°, pl,ro,co,slt 14.08m: J5°, pl,ro,co,slt 14.15m: J5°, pl,ro,co,slt 14.18m: J5°, pl,ro,co,slt 14.2m: Fg 20mm 14.41m: J5°,ir,ro,inf,slt 10mm 14.52m: J5°,ir,ro,co,slt 14.83m: J5°,ir,ro,co,slt 14.84m: J5°,ir,ro,co,slt 14.94m: Fg 40mm 15.05m: J85°,ir,he,fe 15.14m: J15°,ir,ro,co,slt 15.15m: J15°,ir,ro,co,slt	C	100		PL(A) = 3.14

RIG: FE102 **DRILLER:** M Lynch **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 7.8m then NMLC coring to 15.3m

WATER OBSERVATIONS: Free Groundwater Observed at 1.6m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-STOREY HOTEL
1 RACECOURSE ROAD, WEST GOSFORD

PROJECT 75808.01 BORE 1 5 December 2014

7.8 – 15.3m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75808.01
	Proposed Multi-Storey Hotel	PLATE No: 1
	1 Racecourse Road, West Gosford	REV: A
	CLIENT: Trimont Pty Ltd	DATE: 30/6/2015

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.4 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 75808.01
DATE: 17/12/2014
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
2	0.4	FILLING: Generally comprising a mixture of sandy gravels and clay filling, moist							D			
		FILLING: Orange brown clay filling							D			
	0.8	SANDY CLAYEY SILT: Soft, dark grey sandy clayey silt with traces of decomposed organics, M>Wp							D			
1	1.2	SILTY SAND: Very loose, brown silty, medium grained sand, saturated				▼			S			0,0,0 N = 0
1	1.8	CLAY: Stiff, light grey mottled red brown clay with a trace of sand and silt, M>Wp							D			
0	2.5	SANDY CLAY/CLAYEY SAND: Stiff/ loose, light grey mottled red brown sandy clay/clayey sand, M>Wp/wet							S			2,4,4 N = 8
-1	4.0	SILTY CLAY: Hard, light grey mottled red brown silty clay with weathered rock like properties						Start Coring at 4.9m	S			16,30,20/70 refusal
-2	4.9	SILTSTONE: Very low strength, highly weathered, slightly fractured light grey and red brown ironstained siltstone							C	100		PL(A) = 0.04
-3		- from 5.8m, becoming very low to low strength										PL(A) = 0.06
-4		- from 6.2m, becoming moderately weathered, low strength						6.17m: J,5° ir,ro,fe,cln 6.35m: J5° ir,ro,fe,cln				
-5	6.6	SANDSTONE: Medium strength, light grey medium grained sandstone						6.77m: J10° ir,ro,fe,ti,cln 6.86m: J5° ir,ro,fe,cln	C	100		PL(A) = 0.49
-6								8.15m: J15° ir,ro,fe,cln 8.26m: J15° ir,ro,fe,cln 8.28m: J15° ir,ro,fe,cln 8.3m: J15° ir,ro,fe,cln 8.64m: J15° ir,ro,fe,cln 8.83m: J15° ir,ro,fe,cln	C	100		PL(A) = 0.34 PL(A) = 0.12
-7		- from 8.8-9.0m, low strength siltstone band						9.22m: Cs 30mm 9.32m: J5° ir,ro,fe,cln 9.67m: J5° ir,ro,fe,cln 9.69m: fg 10mm	C	100		PL(A) = 0.85

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 4.9m then NMLC coring to 11.0m

WATER OBSERVATIONS: Free Groundwater Observed at 1.2m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.4 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 75808.01
DATE: 17/12/2014
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-8		SANDSTONE: Medium strength, light grey medium grained sandstone *(continued)*						10.04m: J5° ir,ro,fe,cln 10.1m: J60° he,ir,ro,fe 10.25m: J20° ir,ro,fe 10.35m: J80° he,ir,ro,fe	C	100		PL(A) = 0.9
-9	11 11.0	Bore discontinued at 11.0m . Limit of investigation										
-10	12											
-11	13											
-12	14											
-13	15											
-14	16											
-15	17											
-16	18											
-17	19											

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 4.9m then NMLC coring to 11.0m

WATER OBSERVATIONS: Free Groundwater Observed at 1.2m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

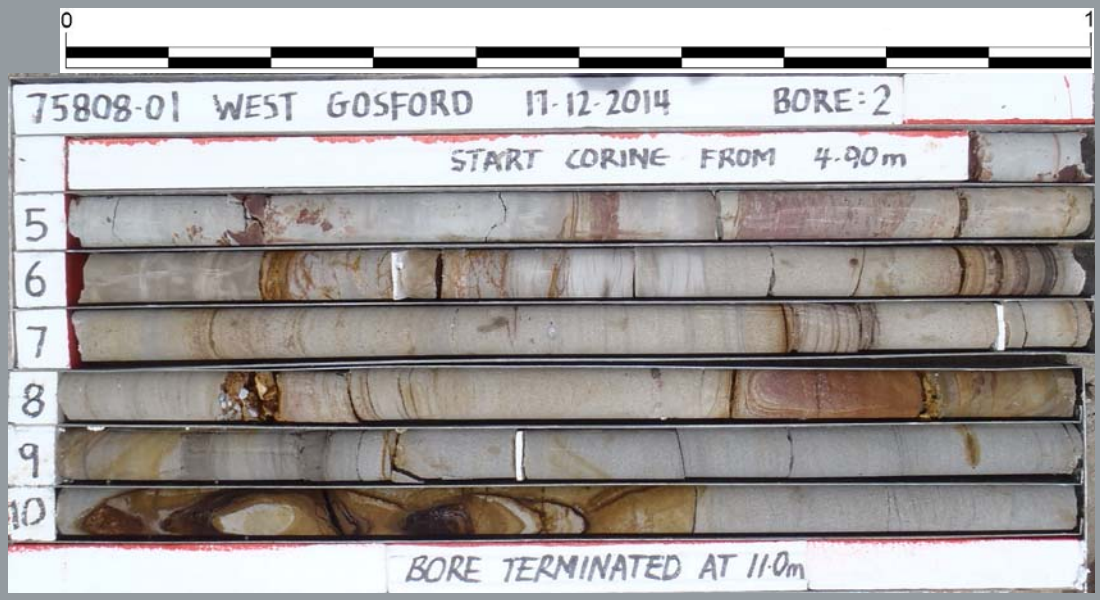
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample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

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-STOREY HOTEL
1 RACECOURSE ROAD, WEST GOSFORD

PROJECT 75808.01 BORE 2 17 December 2014



4.9 – 11.0m

Douglas Partners Geotechnics / Environment / Groundwater	Rock Core Photograph	PROJECT: 75808.01
	Proposed Multi-Storey Hotel	PLATE No: 2
	1 Racecourse Road, West Gosford	REV: A
	CLIENT: Trimont Pty Ltd	DATE: 30/6/2015

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.1 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 75808.01
DATE: 18/12/2014
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
2		FILLING: Generally consisting, brown gravelly sands with traces of clay, dry							D			
									D			
	0.6	SANDY SILT/SILTY SAND: Soft/loose, dark grey sandy silt with trace of decomposed organics and silty sand, M>>Wp/wet							S			1,1,4 N = 5
1						▼						
0	2								S			0,0,0 N = 0 pp=50kPa
-1	3											
-2	4	4.0 SILTY SANDY CLAY: Stiff, light grey silty sandy clay, M>Wp							S			3,5,6 N = 11 pp=50kPa
-3	5											
	5.3	SAND: Very loose to loose, light grey, medium grained sand, saturated							S			2,2,1 N = 3
-4	6											
-5	7	7.0 CLAYEY SAND: Very dense, light grey clayey sand with weathered rock like properties						Start Coring at 7.55m	S			30,25/20 refusal
	7.55	SANDSTONE: Medium strength, moderately weathered unbroken light grey and brown, medium grained sandstone							C	100		PL(A) = 0.04
-6	8											
-7	9											PL(A) = 0.64
		- low strength from 9.7m							C	92		

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 7.55m then NMLC coring to 16.63m

WATER OBSERVATIONS: Free Groundwater Observed at 1.5m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.1 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 75808.01
DATE: 18/12/2014
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-8									C	92		PL(A) = 0.29
	10.43											
	10.56	CORE LOSS						10.43m: CORE LOSS: 130mm				
		SILTSTONE: Low strength, moderately weathered, fractured grey siltstone with some very thinly bedded sandstone inclusions										
-9	11											PL(A) = 0.16
								11.3m: J5° ir,ro,inf slt 10mm	C	100		
								11.58m: J5° ir,ro,fe,cln				
								11.7m: J80° ir,ro,fg 5mm				
-10	12							11.86m: J5° ir,ro,intslt 5mm				PL(A) = 0.26
								12.22m: J15° ir,ro,fe,cln				
								12.37m: J35°ir,ro,fe, fg 5mm				
								12.52m: J5° ir,ro,cio,slt				
-11	13							12.64m: J5° ir,sm,inf slt10mm	C	100		PL(A) = 0.24
								12.75m: J25° ir,ro,fe,ti				
								13.5m: J40° ir,ro,fe,cln				
		- high to very high strength band from 13.7-14.0m						13.7m: J60° ir,ro,fe,cln				PL(A) = 3.24
-12	14								C	100		PL(A) = 0.22
	14.8											
		SANDSTONE: High strength, moderately weathered, fractured light brown and grey medium grained sandstone						14.8m: J85° ir,ro,fe,cln				
-13	15							14.95m: J55° ir,ro,fe,cln				PL(A) = 3.33
								15.55m: J85°, he,ir,ro,fe,cln				
								15.8m: J70° ti,ir,ro,fe,cln	C	100		
-14	16											PL(A) = 2.77
	16.63							16.5m: J70° ir,ro,fe,cln				
		Bore discontinued at 16.63m . Limit of investigation										
-15	17											
-16	18											
-17	19											

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 7.55m then NMLC coring to 16.63m

WATER OBSERVATIONS: Free Groundwater Observed at 1.5m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-STOREY HOTEL
1 RACECOURSE ROAD, WEST GOSFORD

PROJECT 75808.01 BORE 3 18 December 2014

7.55 – 16.63m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75808.01
	Proposed Multi-Storey Hotel	PLATE No: 3
	1 Racecourse Road, West Gosford	REV: A
	CLIENT: Trimont Pty Ltd	DATE: 30/6/2015

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.3 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 75808.01
DATE: 18/12/2014
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
2	0.0	FILLING: Generally comprising, brown gravelly clayey sand							D			
		- from 0.4m, comprising mainly silty clay							D			
1	0.6	SANDY SILT: Firm, dark grey sandy silt with some decomposed organics, M>Wp				▼			S			2,4,2 N = 6
0	2.2	SANDY CLAY/CLAYEY SAND: Very stiff/medium dense, light grey, medium grained sandy clay/clayey sand, M<Wp/wet							S			3,8,7 N = 15
-1	4.0	CLAYEY SAND: Medium dense to dense, light grey medium grained clayey sand with a trace of silt, saturated							S			16,12,11 N = 23
-2	4.7	SANDSTONE: Medium to high strength, slightly fractured, moderately weathered, medium grained sandstone						Start Coring at 4.77m				PL(A) = 2.02
-3								5.45m: J5° ir,ro,co,slt				
-4									C	100		PL(A) = 0.93
-5		- slightly weathered from 7m						6.9m: J5° ir,ro,fe,cln				PL(A) = 1.33
-6		- clay band from 7.94-8.15m						7.94m: Cz 210mm 8.13m: J5° ir,ro,cln				PL(A) = 0
-7									C	100		PL(A) = 0.62
									C	100		

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 4.77m then NMLC coring to 10.77m

WATER OBSERVATIONS: Free Groundwater Observed at 1.4m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.3 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 75808.01
DATE: 18/12/2014
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-8		SANDSTONE: Medium to high strength, slightly fractured, moderately weathered, medium grained sandstone *(continued)*						10.25m: J80° cu,ro,fe,cln 10.4m: J85° ir,ro,fe,cln	C	100		PL(A) = 0.96 PL(A) = 0.8
	10.77	Bore discontinued at 10.77m . Limit of investigation										
-9	11											
-10	12											
-11	13											
-12	14											
-13	15											
-14	16											
-15	17											
-16	18											
-17	19											

RIG: FE101 **DRILLER:** D Dudley **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: Spiral flight auger to 4.77m then NMLC coring to 10.77m

WATER OBSERVATIONS: Free Groundwater Observed at 1.4m

REMARKS: * Surface level interpolated from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-STOREY HOTEL
1 RACECOURSE ROAD, WEST GOSFORD

PROJECT 75808.01 BORE 4 18 December 2014

4.77 – 10.77m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75808.01
	Proposed Multi-Storey Hotel	PLATE No: 4
	1 Racecourse Road, West Gosford	REV: A
	CLIENT: Trimont Pty Ltd	DATE: 30/6/2015

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.3 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 75808.01
DATE: 19/12/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING: Generally comprising a mixture of clayey sandy gravel and crushed recycled concrete		D	0.2				
	0.5	FILLING: Generally comprising a mixture of light brown clay and sandy clay with a trace of gravel, M>Wp		B	0.5				
				D	0.7 - 0.8				
				D	1.2			▼	
	1.3	ORGANIC SILT: Firm, dark grey silt with some sand and decomposed organics		D	1.5				
	1.6	Bore discontinued at 1.6m . Limit of investigation							

RIG: Toyota 4WD **DRILLER:** M Hickman **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.4m

REMARKS: * Surface level interpolated from survey plan provided by client

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Trimont Pty Ltd
PROJECT: Proposed Multi-Storey Hotel
LOCATION: 1 Racecourse Road, West Gosford

SURFACE LEVEL: 2.1 mAHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 75808.01
DATE: 19/12/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING: Generally comprising a mixture of orange brown and brown sandy gravel, clay and silty sand, moist		D	0.1				
				D	0.5				
	0.9	ORGANIC SILT: Soft, dark grey brown silt with some decomposed organics and sand, M>Wp		D	1.0			▼	
	1.2	CLAYEY SAND/SANDY CLAY: Loose/firm, light grey brown clayey sand/sandy clay, saturated		D	1.5				
	1.7	Bore discontinued at 1.7m . Limit of investigation			1.7				

RIG: Toyota 4WD **DRILLER:** M Hickman **LOGGED:** M Hickman **CASING:**

TYPE OF BORING: 60mm ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.2m

REMARKS: * Surface level interpolated from survey plan provided by client

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix C

Results of Laboratory Testing

POINT LOAD TEST REPORT

CLIENT :	Trimont Pty Ltd	**DATE:**	5/12/2014	**BORE:**	1
PROJECT :	Proposed Multi-Storey Hotel	**PROJECT NO :**	75808.01		
LOCATION :	1 Racecourse Road, West Gosford	**TESTED BY :**	MVH	**SHEET:**	1
TEST METHOD:	AS 4133.4.1				

DEPTH (m)	ROCK DESCRIPTION	TEST TYPE Axial (A), Diametral (D)	DIMENSIONS Min. Width (W) (mm)	Depth (D) (mm)	FAILURE READING (KN)	POINT LOAD INDEX Is_{50} Axial (A)	POINT LOAD INDEX Is_{50} Diametral (D)	INTERPRETED ROCK STRENGTH
8.0	Sandstone	A	51	32	1.19	0.55	-	MEDIUM
9.0	Sandstone	A	51	35	1.35	0.58	-	MEDIUM
10.0	Sandstone	A	51	30	1.22	0.59	-	MEDIUM
11.0	Siltstone	A	51	35	0.78	0.34	-	MEDIUM
11.6	Siltstone	A	51	21	0.81	0.52	-	MEDIUM
12.8	Siltstone	A	51	22	0.38	0.23	-	LOW
13.4	Siltstone	A	51	30	0.79	0.38	-	MEDIUM
14.6	Sandstone	A	51	35	7.28	3.14	-	V HIGH

CHECKED	
Initials	
Date	

Douglas Partners
Geotechnics / Environment / Groundwater

POINT LOAD TEST REPORT

CLIENT :	Trimont Pty Ltd	**DATE:**	17/12/2014	**BORE:**	**2**
PROJECT :	Proposed Multi-Storey Hotel	**PROJECT NO :**	75808.01		
LOCATION :	1 Racecourse Road, West Gosford	**TESTED BY :**	MVH	**SHEET:**	**1**
TEST METHOD:	AS 4133.4.1				

DEPTH (m)	ROCK DESCRIPTION	TEST TYPE Axial (A), Diametral (D)	DIMENSIONS Min. Width (W) (mm)	Depth (D) (mm)	FAILURE READING (KN)	POINT LOAD INDEX Is_{50} Axial (A)	POINT LOAD INDEX Is_{50} Diametral (D)	INTERPRETED ROCK STRENGTH
5.0	Siltstone	A	51	35	0.10	0.04	-	V LOW
6.0	Siltstone	A	51	32	0.14	0.06	-	V LOW
7.0	Sandstone	A	51	40	1.27	0.49	-	MEDIUM
8.0	Sandstone	A	51	30	0.70	0.34	-	MEDIUM
8.9	Siltstone	A	51	30	0.25	0.12	-	LOW
9.5	Sandstone	A	51	35	1.98	0.85	-	MEDIUM
11.0	Sandstone	A	51	40	2.33	0.90	-	MEDIUM

CHECKED	
Initials	
Date	

Douglas Partners
Geotechnics / Environment / Groundwater

POINT LOAD TEST REPORT

CLIENT :	Trimont Pty Ltd	**DATE:**	18/12/2014	**BORE:**	3
PROJECT :	Proposed Multi-Storey Hotel	**PROJECT NO :**	75808.01		
LOCATION :	1 Racecourse Road, West Gosford	**TESTED BY :**	MVH	**SHEET:**	1
TEST METHOD:	AS 4133.4.1				

DEPTH (m)	ROCK DESCRIPTION	TEST TYPE Axial (A), Diametral (D)	DIMENSIONS Min. Width (W) (mm)	Depth (D) (mm)	FAILURE READING (KN)	POINT LOAD INDEX Is_{50} Axial (A)	POINT LOAD INDEX Is_{50} Diametral (D)	INTERPRETED ROCK STRENGTH
7.8	Sandstone	A	51	30	0.08	0.04	-	V LOW
9.0	Sandstone	A	51	20	0.97	0.64	-	MEDIUM
10.0	Sandstone	A	51	32	0.63	0.29	-	LOW
11.0	Siltstone	A	51	32	0.35	0.16	-	LOW
12.0	Siltstone	A	51	29	0.53	0.26	-	LOW
13.0	Siltstone	A	51	30	0.49	0.24	-	LOW
13.8	Sandstone	A	51	35	7.52	3.24	-	V HIGH
14.5	Siltstone	A	51	31	0.46	0.22	-	LOW
15.1	Sandstone	A	51	31	7.04	3.33	-	V HIGH
16.3	Sandstone	A	51	32	6.00	2.77	-	HIGH

CHECKED	
Initials	
Date	

Douglas Partners
Geotechnics / Environment / Groundwater

POINT LOAD TEST REPORT

CLIENT :	Trimont Pty Ltd	**DATE:**	18/12/2014	**BORE:**	**4**
PROJECT :	Proposed Multi-Storey Hotel	**PROJECT NO :**	75808.01		
LOCATION :	1 Racecourse Road, West Gosford	**TESTED BY :**	MVH	**SHEET:**	**1**
TEST METHOD:	AS 4133.4.1				

DEPTH (m)	ROCK DESCRIPTION	TEST TYPE Axial (A), Diametral (D)	DIMENSIONS Min. Width (W) (mm)	Depth (D) (mm)	FAILURE READING (KN)	POINT LOAD INDEX Is_{50} Axial (A)	POINT LOAD INDEX Is_{50} Diametral (D)	INTERPRETED ROCK STRENGTH
5.0	Sandstone	A	51	35	4.68	2.02	-	HIGH
6.0	Sandstone	A	51	30	1.91	0.93	-	MEDIUM
7.0	Sandstone	A	51	32	2.89	1.33	-	HIGH
8.0	Siltstone	A	51	30	0.00	0.00	-	EXT LOW
9.0	Sandstone	A	51	35	1.44	0.62	-	MEDIUM
10.0	Sandstone	A	51	34	2.19	0.96	-	MEDIUM
10.3	Sandstone	A	51	33	1.78	0.80	-	MEDIUM

CHECKED	
Initials	
Date	

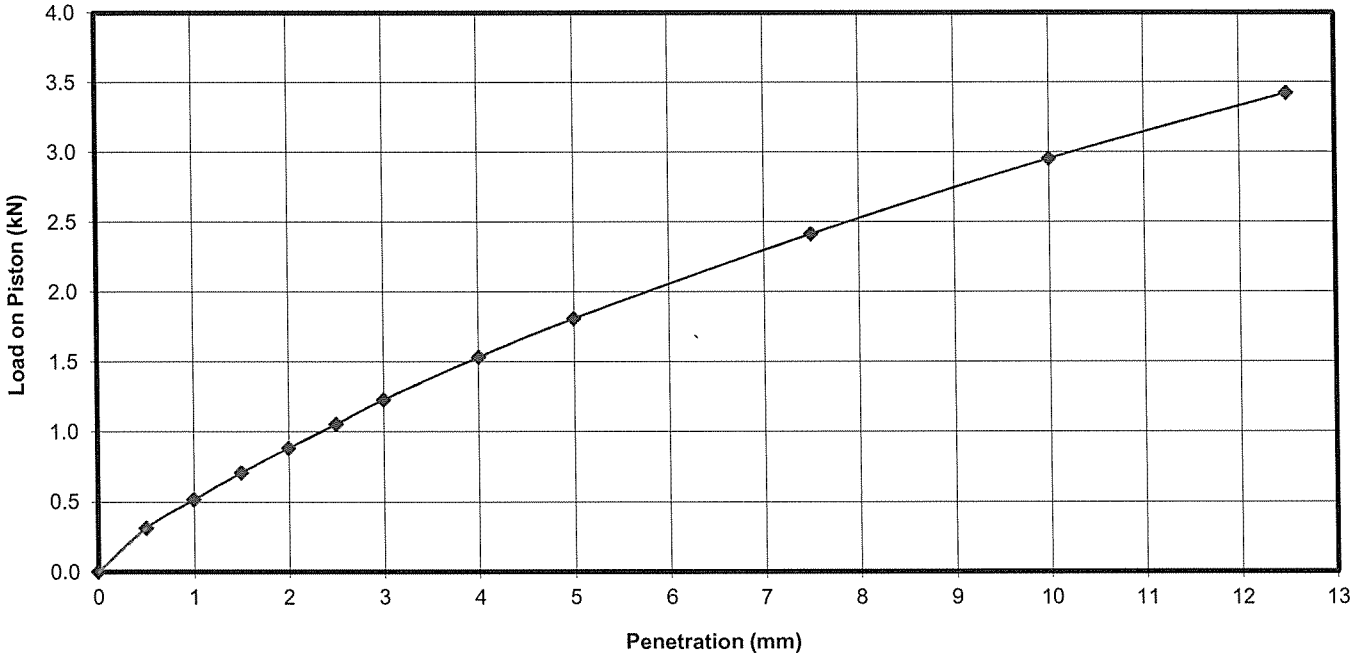
Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 5, 3 Teamster Close
Tuggerah NSW 2259
Phone (02) 4351 1422
Fax (02) 4351 1410

Result of California Bearing Ratio Test

Client :	Trimont Pty Ltd	**Project No. :**	75808.01
		Report No. :	CC15-005
Project :	Proposed Multi-storey Hotel	**Report Date :**	21.01.2015
		Date Sampled :	19.12.2014
Location :	1 Racecourse Road, West Gosford	**Date of Test:**	05.01.2015
Test Location :	Bore 5		
Depth / Layer :	0.5 - 0.8m	**Page:**	1 of 1



Description: Brown CLAY and SANDY CLAY **Test Method(s):** AS 1289.6.1.1, AS 1289.2.1.1

Sampling Method(s): Sampled by Douglas Partners' Engineers

Remarks:

Percentage > 19mm: 0.0%

LEVEL OF COMPACTION: 100% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 0.8%

MOISTURE RATIO: 99% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		12.9	1.91
After soaking		14.0	1.90
After test	Top 30mm of sample	14.5	-
	Remainder of sample	14.4	-
Field values		13.5	-
Standard Compaction		13.0	1.91

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**5.0mm**	**9**

NATA Accredited Laboratory Number: 828

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Accredited for compliance with ISO/IEC 17025

Tested:	AG
Checked:	DB

Dan Byrnes
Laboratory Manager