



**SPECIALIST ADVICE TO
URBAN PROPERTY GROUP**

**ON
GEOTECHNICAL INVESTIGATION**

**FOR
PROPOSED MIXED-USE DEVELOPMENT – CCQ2**

**AT
26-30 MANN STREET, GOSFORD, NSW**

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ATTACHMENTS

Table A: Moisture Content, Atterberg Limits and Linear Shrinkage Test Report

Table B: Point Load Strength Index Test Report

Envirolab Services 'Certificate of Analysis 388075'

Borehole Logs 1 to 5 Inclusive (With Rock Core Photographs)

Figure 1: Site Location Plan

Figure 2: Borehole Location Plan

Figure 3: Interpreted Rock Surface Level Contour Plan

Figure 4: Interpreted Rock Surface Level Contour Plan – Amended

Figure 5: Inferred Geotechnical Cross Section A-A

Figure 6: Inferred Geotechnical Cross Section B-B

Vibration Emission Design Goals

Report Explanation Notes

Appendix A: Selected Information from Previous Investigations by Others

1 INTRODUCTION

This specialist advice report presents the results of a geotechnical investigation for the proposed missed-use development at 26-30 Mann Street, Gosford, NSW. The location of the site is shown in Figure 1. The investigation was commissioned by Urban Property Group in an email dated 15 July 2025. The commission was based on our revised fee proposal, Ref. P72125Prev1, dated 1 July 2025.

We have been provided with the following information:

- Architectural drawings prepared by DKO Furtado Sullivan for Early Works (Project No. 13122, Drawing Numbers DA1020, DA4100 to DA4102 all Revision 04, and DA403 Revision 2, all dated 31 October 2025);
- Survey Plan prepared by SDG Pty Ltd (Reference 9166, dated 20 March 2025).

Based on the supplied information, we understand the proposed development will comprise two mixed-use towers and a retail pavilion over a common ground floor level and basement car parking. The proposed lowest basement will be constructed at RL-9.0mAHD, requiring bulk excavation to approximately RL-9.5mAHD to allow for a hydrostatic slab if tanking is adopted, and will require excavation to depths of approximately 12.5m in the majority of the site, but to about 17.5m where the eastern side of the basement will be excavated along the side of the electricity substation near the north-eastern corner of the site. There will likely be localised excavations to depths of less than 2.5m below the basement such as for lift over-run pits, detention tanks etc. We understand the proposed basements will extend to the northern, western and southern site boundaries, and will be set back up to about 12m from the eastern site boundary. Structural loads typical of this type of development have been assumed.

The purpose of the investigation was to obtain geotechnical information on the subsurface conditions at five borehole locations and, combined with information from previous investigations of the site by others, to present our comments and recommendations on the basement structure, site preparation, excavation conditions, drainage, basement retention, footings, earthquake design parameters, exposure classification, lowest basement floor slabs, and additional investigations and analyses.

This report provides specialist advice for use by the structural and civil designers in preparing their designs and no part of this report is to be considered, or intended to be, a regulated design in accordance with the Design and Building Practitioners Act 2020.

2 PREVIOUS GEOTECHNICAL INVESTIGATIONS

We have been provided with the following geotechnical reports from previous geotechnical investigations of the site:

- Cardno report “Preliminary Geotechnical Assessment 32 Mann Street Gosford”, Reference 80516860, dated 29 April 2016 – Cardno (2016);

- Coffey Geotechnics report “Central Coast Quarter”, Reference SYDGE214942 Rev 3, dated 20 August 2019 - Coffey (2019);
- Cardno report “Geotechnical Investigation Factual Report Gosford North Tower”, Reference 304100748, dated 5 July 2022 – Cardno (2022);
- Stantec report “Central Coast Quarter Stage 2 Early Works”, Reference 304001328-002, dated 6 December 2024 – Stantec (2024);
- EI Australia Pty Ltd “Hydrogeological Report Including Groundwater Seepage Analysis and Dewatering Management Plan”, Reference E26584.E16_Rev0, dated 9 May 2025 – EI (2025).

The relevant factual information from these reports has been reviewed and included in our assessment of the subsurface conditions provided in Section 4.2 below.

3 INVESTIGATION PROCEDURE

The investigation was carried out between 30 July 2025 and 1 August 2025, and comprised the drilling and testing of five boreholes (BH1 to BH5), at the locations shown on Figure 2, to depths between 16.06m (BH4) and 25.12m (BH1) below existing grade. The boreholes were completed using our truck mounted JK400 and JK500 drill rigs, which are equipped for site investigation purposes.

Prior to the commencement of the fieldwork, a specialist sub-consultant reviewed available ‘Before You Dig Australia’ information and electro-magnetically scanned the borehole locations for buried services.

The borehole locations were initially set out by tape measurements from existing site features, and the locations were later determined by surveying with a ‘Topcon’ differential GPS unit.

The soil and upper weathered bedrock profiles were spiral auger and washbore drilled with a casing advancer to depths ranging between 4.70m and 9.80m. The relative compaction/strength of the soil profile were assessed from the Standard Penetration Test (SPT) ‘N’ values, together with hand penetrometer readings on clayey soils recovered in the SPT split-spoon sampler, and by tactile examination. The strength of the underlying bedrock was initially assessed by observation of auger penetration resistance when using a twin-pronged tungsten carbide (TC) drill bit, together with examination of recovered cuttings. The boreholes were extended into the bedrock to their final depths by rotary diamond coring techniques, using HQ triple tube core barrels with water flush. The strength of the cored bedrock was assessed by examination of the recovered rock cores, together with correlations with subsequent laboratory Point Load Strength Index ($I_{s(50)}$) test results.

Groundwater observations were made in the boreholes during and on completion of drilling. Groundwater monitoring wells were installed in BH1, BH3, BH4 and BH5 with the machine slotted response zones in the bedrock. Additional wells were installed in shallow boreholes drilled adjacent to BH1 and BH4 (BH1A and BH4A) with the machine slotted response zones in the soil. All wells comprised 50mm diameter Class 18 PVC standpipes. BH1 was backfilled then sealed with bentonite to the base of the required response zone. The annulus between the borehole and the slotted length was backfilled with 2mm filter sand. Above the sand



backfill, each borehole was sealed with bentonite. Cast-iron 'Gatic' covers were concreted flush with the ground surface to protect the top of the groundwater monitoring wells. The installation details are presented on the borehole logs.

The water levels in the monitoring wells were allowed to stabilise, and then we returned to site on 11 August 2025 to pump water from the monitoring wells and install water level data loggers in each monitoring well, together with a single barometric logger to correct for atmospheric pressure. A further site visit was made on 15 August 2025 to download the water level data loggers to determine the water level recovery in the wells, which then allowed the assessment of the permeability of the soil and rock in the response zones. The measurements of groundwater levels are presented in Section 3.2 below.

Further details of the methods and procedures employed in the investigation are presented in the attached Report Explanation Notes.

Our geotechnical engineers (Christopher Rooke and John Lo) were present full-time during the fieldwork to set out the borehole locations, direct the borehole scanning, nominate testing and sampling, prepare the attached borehole logs, and to direct the groundwater monitoring well installations. The Report Explanation Notes define the logging terms and symbols used.

The recovered rock cores from each borehole were photographed and Point Load Strength Index tested. The rock core photographs are enclosed with the borehole logs. The Point Load Strength Index test results are plotted on the borehole logs and summarised in the attached Table B. The Unconfined Compressive Strengths (UCS), as estimated from the Point Load Strength Index test results, are also summarised in Table B.

Selected soil and extremely weathered sandstone samples were returned to a NATA registered laboratory, Soil Test Services Pty Ltd (STS), for moisture content, Atterberg limits and linear shrinkage testing. The results of these tests are provided in the attached STS Table A. Additional soil and sandstone samples were returned to a NATA registered analytical laboratory, Envirolab Services Pty Ltd, for soil pH, chloride, sulphate and resistivity testing. The results are summarised in the attached Envirolab Services 'Certificate of Analysis 388075'.

4 RESULTS OF THE INVESTIGATION

4.1 Site Description

The site is located toward the southern end of the Gosford City Centre, at the transition from the toe of a hillside to the east, to flat and possibly reclaimed land adjacent to the Brisbane Water. The site was formerly used as part of the Gosford Public School, comprising single and double storey brick buildings which have since been demolished. The site is currently largely used as a construction compound for the first stage of the Central Coast Quarter development (CCQ1) which is located immediately to the north of the western side of the site.

Mann Street lies to the east of the site and slopes down south at about 3°. Vaughan Avenue lies to the south, and slopes down to the west at about 6°. To the west of the site is a grassed reserve and concrete footpath/driveway of relatively recent construction.

The western 20m of the site slopes from the Mann Street frontage and comprises a narrow near level bench close to the Mann Street level, which then slopes down to the west to the main site level at about 20° to 30°, with this slope being densely vegetated with grass, shrubs and trees. The total elevation relief between Mann Street and the main site level is about 6m. Near the toe of this slope is a timber soldier 'Koppers-Log' retaining wall of about 1m to 1.5m height which is in a dilapidated condition. This slope wraps around the southern side of the site, reducing in height to the west.

The remainder of the site is relatively level with stored building materials and shipping containers. Water was ponding on large areas of the surface with the fieldwork being carried out during heavy rain.

To the north of the western portion of the site is the CCQ1, comprising a multi-level development currently under construction. We understand from the DKO Furtado Sullivan 'Early Works' drawings that the lowest Basement 2 level of CCQ1 is at about RL+1.60m, with this basement extending to the common boundary with the subject site. We understand from the referenced Northrop drawings that the building is supported on piled footings, with the piles installed as a design and construct package.

To the north of the eastern portion of the site is a building with about six levels above Mann Street, and at least two 'basement' levels extending to at least the level of the lower 'flat' portion of the subject site. Based upon the size of the structure, we assume the building would be supported on piles founded within sandstone bedrock.

The surface on the southern side of the buildings to the north have been cut below the subject site surface levels by about 1.5m to 2.0m. This difference in elevation is supported by a sawn sandstone block retaining wall.

4.2 Subsurface Conditions

The 1:100,000 geological map of Gosford-Lake Macquarie (Geological Survey of NSW, Geological Series Sheet 9131 & Part 9231) indicates the site to be underlain by Terrigal Formation rock of the Narrabeen Group. Generally, the boreholes encountered inconsistent pavements then fill, overlying alluvial soils, then predominantly sandstone bedrock with siltstone bands and seams from moderate depth. The sandstone bedrock was encountered generally below depths ranging between 5m and 10m. Reference should be made to the attached borehole logs and Appendix A for specific details at each location. A summary of the encountered subsurface characteristics is provided below.

Pavements and Fill

Pavements (in some boreholes only) and fill were encountered in the boreholes drilled for this and the previous investigations. This fill generally ranged between 0.5m and 2m depth and mostly comprised more

sandy fill, though sandy clay fill was encountered in some locations such as in BH1 from this investigation. There was often a layer of more silty fill or clayey fill just above the alluvial soils, though this may be the upper layer of alluvial soil. Various gravel inclusions were found in the fill. Based on the SPT results, the assessed compaction of the fill was variable, though overall was assessed to be poorly compacted; that is the fill is not considered a controlled fill in accordance with AS3798-2007 'Guidelines on Earthworks for Commercial and Residential Developments'.

Alluvial Sand and Clay

Alluvial soils were encountered below the fill in the majority of the boreholes from this and previous investigations, and from the surface in some of the previous boreholes. The upper layer of the alluvial soils often comprised soft and firm clayey silt and loose sand and clayey sand, generally to less than 3m depth. Below this more variable layer were generally sandy clay and silty clay of stiff and very stiff strength, mostly increasing to hard strength with depth. Bands of more clayey soil were logged in some of the boreholes such as the medium dense to dense clayey sand between 5.2m and 7.0m depth in the Stantec BHMW02.

Extremely Weathered Sandstone

In the current boreholes, extremely weathered sandstone of hard (soil) strength was encountered in BH3 between 5.2m depth and 7.1m, while several of the boreholes drilled for the Coffey (2018) investigation logged extremely weathered sandstone but with greater rock strength. The Stantec 2024 investigation logged contain extremely or highly weathered rock between depths of 4.0m and 7.2m (MW01) and between 7.0m and 10.7m (MW02).

Sandstone Bedrock

Sandstone bedrock was encountered in all current boreholes from depths ranging between 4.8m (BH5) and 9.8m (BH2). The majority of the sandstone was of medium and high strength, though often with bands of very low and low strength in the upper several metres of the core, and also often with closely spaced defects within the upper several metres of core. The exception to this is BH4, where the majority of the sandstone was of low to medium strength to 11.5m depth, and then often at the lower end of medium strength for several metres below bulk excavation level.

There were several core losses in the current boreholes including a 0.65m 'no-core' zone below the lowest proposed basement level in BH1, and 'no-core' zones of 0.13m and 0.15m thickness near the lowest proposed basement level in BH4. These core losses are often assumed to be seams and bands of clay or lower strength rock eroded by the flush water during the coring process, but can also be associated with material lost from mechanical disturbance when coring near or through vertical open joints.

The boreholes indicated numerous near vertical joints in the bedrock, together with near horizontal bedding partings, clay seams and extremely weathered seams. Several of the joints were located close to the proposed bulk excavation level and appear to be relatively open based on the degree of ironstaining on those joints, such as in BH1, BH2 and BH4.

The rock surface levels in the boreholes shown on Figure 2 have been used to generate an interpreted contour plot of the rock surface levels (ignoring extremely weathered rock of hard 'soil' strength). The following boreholes have been excluded from being used for the contouring:

- Cardno 2016 BH003 – the rock was only inferred from refusal of a low power drilling rig and appears anomalous with the rock levels shown in other nearby boreholes;
- Cardno 2016 BH004 – the bedrock was assessed only from refusal of a low powered drilling rig, and the 0.2m of sandstone was logged as being extremely weathered and so bedrock of at least low strength has not been identified.

The rock surface contour levels, ignoring extremely weathered sandstone of hard (soil) strength are shown on the attached Figure 3. A review of the interpreted rock surface contours suggests there is a deep depression in the bedrock surface in the northern portion of the site. This interpretation is from the logging of Coffey (2018) BH2 which shows soil extending to a depth of at least 15m, relating to a surface level of about RL-12.3mAHD. While there are geological features which could result in such deeper soils, such a dyke at the location of the borehole, the soil descriptions do not appear to be consistent with those derived from weathered igneous intrusions. We therefore suspect the rock encountered in Coffey (2018) BH2 is of relatively low strength and was not detected during the drilling and logging. This would be the only borehole within the site that would suggest bedrock will not be exposed at the proposed bulk excavation level of RL-9.0mAHD. We have therefore excluded the results of that borehole and completed a revised assessment of rock surface contours as shown in Figure 4. The rock surface contours in Figure 4 appear to be more consistent of usual bedrock surface profiles, showing a more level 'plateau' of rock in the south-eastern corner of the site at about RL-3mAHD, sloping away to the north and south to reduced levels of about RL-7mAHD. However, as this will be relatively close to the northern shoring wall, we strongly recommend an additional borehole be drilled close to the location of the Coffey (2018) BH2 to determine the rock levels locally and assess the implications for the design and construction, and update the interpreted rock surface contour plan as appropriate.

Groundwater

No meaningful groundwater level measurements were made on completion of rock coring due to the introduced drill flush water. On 11 & 15 August 2025, we returned to site to measure the groundwater levels in all six wells. The measurements are summarised in the table below, while the groundwater measurements from the previous investigations are provided in the second table. In flat areas close to a tidal estuary, the groundwater levels are usually at about RL+1mAHD or above, and so we are uncertain as to why some of the recorded levels in the previous boreholes were so low.



Groundwater Levels From This Investigation

Groundwater Monitoring Well	Installation	Surface Reduced Level (mAHD)	Groundwater Level Monitoring Results			
			Depth m/ (RL mAHD)	Date	Depth m/ (RL mAHD)	Date
BH1	Deep	2.7	1.3/(1.4)	11/8/25	1.2/(1.5)	15/8/25
BH1A	Shallow	2.7	1.4/(1.3)	11/8/25	1.5/(1.2)	15/8/25
BH3	Deep	2.5	1.5/(1.0)	11/8/25	0.9/(1.6)	15/8/25
BH4	Deep	2.7	1.1/(1.6)	11/8/25	1.1/(1.6)	15/8/25
BH4A	Shallow	2.7	0.7/(2.0)	11/8/25	0.8/(2.0)	15/8/25
BH5	Deep	3.1	1.5/(1.6)	11/8/25	1.4/(1.7)	15/8/25

Groundwater Levels From Previous Investigations

Groundwater Monitoring Well	Installation	Surface Reduced Level (mAHD)	Groundwater Level Monitoring Results			
			Depth m/ (RL mAHD)	Date	Depth m/ (RL mAHD)	Date
Stantec (2024)						
MW01	Full Profile	2.7	4.8/(-2.1)	18/10/2024	4.5/(-1.8)	8/11/2024
MW02	Full Profile	2.6	4.0/(-1.4)	18/10/2024	3.7/(-1.1)	8/11/2024
Coffey (2018)						
BH1	Full Profile	2.5	5.2/(2.7)	22/2/2018	-	-
BH2	Full Profile	2.7	4.0/(-1.3)	23/2/2018	-	-
BH5	Full Profile	2.3	2.5/(0.2)	28/2/2018	-	-
BH6	Full Profile	4.0	1.7/(2.3)	1/3/2018	-	-
BH7	Full Profile	2.5	2.0/(0.5)	2/3/2018	2.1/(0.4)	6/8/2019
Cardno (2022)						
BH6	Full Profile	2.7	1.8/(0.9)	31/5/2022		
BH7	Full Profile	2.7	2.2/(0.5)	31/5/2022		
Cardno (2016)						
BH002	Full Profile	3.0	2.2/(0.8)	21/9/2015	0.9/(2.1)	22/9/2015
BH003	Full Profile	3.0	1.3/(1.7)	22/9/2015		
BH004	Full Profile	3.0	2.2/(0.8)	21/9/2015		
EI Australia (2025)						
MW01	8-12m depth	2.9	0.0/(2.9)	9/4/2025		
MW02	5-8m depth	2.5	1.7/(0.8)	9/4/2025		
MW03	8-12m depth	4.2	3.0/(1.2)	9/4/2025		

4.3 Permeability Testing

Pump-out (rising head) tests were completed in all wells installed as part of this investigation. The recovery of the water levels in the monitoring wells was recorded by automatic data loggers which were downloaded four days following the pump-out testing. The coefficient of permeability for each well was then estimated using the time-lag method, with the results tabulated below.

Borehole Number	Response Strata	Coefficient of Permeability (k) m/sec
BH1A	Soil	2.4×10^{-6}
BH4A	Soil	5.6×10^{-7}
BH1	Bedrock	2.5×10^{-7}
BH3	Bedrock	6.8×10^{-8}
BH4	Bedrock	3.2×10^{-7}
BH5	Bedrock	2.8×10^{-7}

Coefficients of permeability reported from previous investigations include:

- EI Australia (2025) – 3×10^{-7} m/sec for combined soil and rock;
- EI Australia (2025) – 9.3×10^{-9} to 4.7×10^{-8} m/sec for the rock;
- Stantec (2024) – 2×10^{-6} to 5×10^{-6} m/sec for combined soil and rock.

4.4 Laboratory Test Results

The moisture content test results correlated well with the field logging assessments of the moisture content in the clayey soils and rock strength in the augered portion of the boreholes, while the Atterberg limits and linear shrinkage test results confirm the clay and silt fill is of low plasticity with a low potential for shrink-swell movements with changes in moisture content.

The results of the Point Load Strength Index tests carried out on the recovered rock cores correlated well with our field assessment of bedrock strength. The estimated UCS's, based on the correlation provided in AS1726:2017 'Geotechnical Site Investigations' (ie. $UCS = 20 \times I_{s(50)}$), in several cases exceeded 100MPa, with many results in excess of 20MPa, and most results in excess of 6MPa; that is the rock has been shown to be of mostly medium and high strength with some very high strength seams or bands.

The soil and extremely weathered sandstone aggression tests results are tabulated below:

Borehole	Sample Depth (m)	Materials	pH	Chloride (mg/kg)	Sulphate (mg/kg)	Resistivity (ohm.m)
BH1	0.5-0.95	Silty Sand Fill	5.7	23	<10	260
BH2	2.2-2.5	Alluvial Clayey Sand	6.3	20	39	140
BH3	3.0-3.45	Alluvial Silty Clay	6.0	<10	65	190
BH3	6.0-6.3	Extremely Weathered Sandstone	6.4	<10	10	450
BH4	4.5-4.95	Alluvial Silty Clay	6.9	10	20	220

5 COMMENTS AND RECOMMENDATIONS

From the results of this and previous investigations, the site is considered geotechnically suitable to support the proposed development, provided the following comments and recommendations for the design and construction are followed in their entirety.

At the time of preparing this report, the long-term groundwater level monitoring program was in its early stage. From the results of the testing and groundwater level monitoring, we will complete a seepage analysis for the proposed basement excavation. The results will be presented, as well as our updated advice (if appropriate), in a future update of this report. Further, in order to ascertain a more accurate rock surface level and quality near the Coffey (2018) BH2, another cored borehole should be drilled to confirm the assumptions made in the below comments and recommendations that the rock level would be at about RL-6mAHD at that location.

5.1 Primary Geotechnical Issues

Based on the results of our investigation and the previous investigations by others, we consider the following to be the primary geotechnical issues for the proposed mixed-use development:

1. Inherent Movement Behind the Basement Walls

Detailed dilapidation surveys will need to be completed on all neighbouring structures that fall within the zone of influence of the basement excavation. For simplicity, this zone of influence can be taken as twice the excavation depth when measured from the basement walls. This would therefore include portions of the structures to the north of the site and possibly the structures on the eastern side of Mann Street.

During the initial stages of retention design, finite element modelling (FEM) should be carried out to assess the magnitude of movement and the deformations occurring behind the basement walls, particularly if movement sensitive buried services are located within the roadway reserves.

2. Groundwater Seepage Inflows into the Proposed Basement Excavation

Based on the available groundwater level monitoring results, the proposed basement excavation will extend approximately 12.5m to 17.5m below existing surface levels and in the order of 12m below the recently measured groundwater levels. We note the initial groundwater modelling completed by EI-Australia advised dewatering volumes for the first year and in the long term being approximately 24.6ML/year and 11.5ML/year respectively; we also note though that these were for a previous lowest proposed basement level of RL-3.0mAHD. The currently proposed basement to RL-9.5mAHD would be expected to have significantly higher dewatering rates if the basement were to be 'drained'. This is well beyond the limit of 3ML/year often quoted by the Natural Resources Access Regulator (NRAR) and so we do not believe a fully drained basement would be approved. We therefore strongly recommend that the basement walls comprise water-resistant forms such as either diaphragm walls or secant pile walls, tentatively cut-off at least 2m to 2.5m below bulk excavation level (BEL).

3. Basement Structure

Following completion of our future groundwater seepage analysis, it may be found that a drained lowest basement slab is feasible provided the embedded diaphragm/secant pile walls below BEL provide sufficient cut-off of the groundwater inflows to less than 3ML/annum can be achieved. For the purpose of this report, we have assumed that a drained lowest basement floor slab can be justified and will be permitted. This would reduce the thickness of the slab, but would also result in the need for long-term treatment of drained water for disposal and annual reporting to the Department of Primary Industries on the water take.

The retention system will need to be designed to withstand lateral hydrostatic pressures in addition to the lateral earth pressures. Given the proximity of the currently measured groundwater levels being so close to the surface, the design head of water should be tentatively be taken at the ground surface. This will be confirmed following completion of the groundwater level monitoring and seepage analysis. Internal dewatering will be required during basement excavation and construction. A dewatering license will need to be obtained from the relevant authorities (ie. Council and/or NRAR) to allow temporary dewatering and discharge. In order to obtain the dewatering licence, a Site Hydrology Report (SHR) and Dewatering Management Plan (DMP) will need to be prepared.

4. Rock Excavation

The proposed basement levels will require excavation into medium and high strength sandstone bedrock with possibly very high strength seams and bands. Ripping by dozers, and rock hammers fitted to excavators, will be required for effective removal.

5. Variability in Sandstone Bedrock

The bedrock conditions in several of the boreholes are relatively uniform, however the rock conditions in BH4, just below BEL in BH1 and just above BEL in BH2 are quite poor with lower rock strength, greater fracturing and continuous near vertical joints.

6. Neighbouring Buildings

There are two buildings to the north of the proposed CCQ2 basement. The effect of the proposed basement on these buildings must be determined by completing finite element analysis to assess potential movements, and the loading from these buildings will need to be accounted for in the design of the shoring.

The effects of the above geotechnical issues on design and construction are detailed in the sections which follow.

5.2 Rock Classification

An indicative engineering classification of the bedrock has been carried out in accordance with Pells et al. (2019) and is tabulated below:

Borehole	Approx. Surface RL (mAHD)	Indicative Engineering Classification of Bedrock			
		Depths (m) [RL at top of Unit (mAHD)]			
Note: Rock is classified as sandstone unless shown otherwise					
		Class V	Class IV	Class III	Class II
Current Investigation by JK Geotechnics					
BH1	2.7	-	9.8-18.7 [-7.1]	-	18.7-21.1 [76.5] Siltstone 21.1-25.1 [-18.4]
BH2	2.7	-	9.8-12.0 [-7.1]	-	12.0-16.4 [-9.3]
BH3	2.5	-	7.1-8.5 [-5.1]	-	8.5-16.2 [-6.5]
BH4	2.7	5.1-12.4 [-2.4]	-	12.4-16.0 [-9.7]	-
BH5	3.1	-	4.8-6.9 [-1.7]	12.6-14.0 [-9.5]	6.9-12.6 [-3.8] 14.0-16.3 [-10.9]
Stantec (2024)					
MW01	2.7	-	12.5-14.0 [-9.8]	-	7.2-12.5 [-4.5] siltstone 14.0-14.9 [-11.3]
MW02	2.6	10.7-12.1 [-8.1]	-	-	-
Cardno (2022)					
Bh6	2.7	-	11.9-14.9 [-9.2]	-	-
BH7	2.7	11.2-12.0 [-8.5]	12.0-13.3 [-9.3]	-	-
Coffey (2018)					
BH3	4.0	6.7-8.0 [-2.7]	13.3-15.1 [-9.3]	8.0-11.3 [-4.0] 11.3-13.3 [-7.3] siltstone	-
BH5	2.7	9.4-15.0 [-6.7]	-	-	-
BH6	4.0	13-14.1 [-9.0]	9.0-13.0 [-5.0]	8.0-9.0 [-4.0] siltstone 14.1-16.0 [-10.1]	-
BH7	2.5	-	8.6-11.8 [-6.1]	-	11.8-15.2 [-9.3]

We note the rock classification for the previous investigation by others is based upon an interpretation of their logging. In some instances, it appears that the logging may be overly conservative, including the logging of drilling and handling breaks as in-situ defects. As a result, the rock classifications above for the previous investigations may be conservative. We expect that the bedrock below the proposed basement will range between Class IV and Class II quality.

5.3 Site Preparation

5.3.1 Dilapidation Surveys

Prior to commencement of any site works, we recommend that detailed internal and external dilapidation reports be completed on all neighbouring structures, or parts thereof, located within the zone of influence of the basement excavation; that is, within a distance equivalent to twice the excavation depth when measured from the basement walls.

For example, for a 12m deep BEL, the horizontal zone of influence is 24m. For the surrounding neighbouring structures, only those portions within the zone of influence need be inspected. If, however, the dilapidation reports of these portions reveal substantial existing damage, then it may be prudent to extend the surveys to include more of these structures. Dilapidation surveys of the surrounding roadways and footpaths may also be required by Council.

Dilapidation reports provide a record of existing conditions prior to commencement of any site works. The dilapidation reports would therefore be used as a benchmark against which to set vibration limits during rock excavation, and for assessing possible future claims for damage arising from the works.

The respective owners of the neighbouring structures should be asked to confirm in writing that the dilapidation reports present a fair assessment of existing conditions. As dilapidation reports are relied upon for the assessment of potential damage claims, they must be carried out thoroughly by reputable companies with all defects rigorously described (ie. defect type, defect location, crack width, crack length etc.) and photographed.

The dilapidation reports should be reviewed by JK Geotechnics and the structural engineer prior to commencement of any site works.

5.3.2 Vibration Monitoring

We recommend that full-time quantitative vibration monitoring be carried out on the neighbouring buildings to the north from the commencement of shoring wall installation until the completion of excavation, to check vibrations are below acceptable limits.

The vibration monitoring should include geophones affixed onto the neighbouring buildings and a warning system (eg. flashing lights, audible alarm, etc.) which is set to trigger when the permissible vibration limit has been recorded. The locations of the geophones should be assessed following review of the dilapidation survey reports, and should be jointly nominated by JK Geotechnics and the acoustic consultant. The vibrations on the neighbouring buildings to the north should be tentatively limited to a peak particle velocity of 5mm/s, subject to review of the dilapidation survey reports and confirmation by the structural engineer.

If higher vibrations are recorded, then they should be assessed against the attached Vibration Emission Design Goals as higher vibrations may be acceptable depending on the associated vibration frequency.

Reference should be made to Section 5.4.2 below if it is confirmed that transmitted vibrations are excessive during rock excavation.

5.3.3 Early Works

The early works will include demolition of the existing slabs/pavements, removal of existing vegetation, and excavation of topsoil, root affected soils and any deleterious or contaminated fill. Reference should be made to Section 6 for guidance on the offsite disposal of excavated soil and rock.

Care must be taken during these works and subsequent bulk excavation not to undermine or remove support from the site boundaries, electricity substation to the east or the adjoining buildings to the north. As part of these early works, the extent of the neighbouring basements to the north, as well as the footing details of those structures must be determined. This may require searching the records of the current construction for Central Coast Quarter, and a freedom of information search of Council records for the building to the north-east to determine its design footing details.

It is expected to be necessary to construct a working platform to support the rigs which will be used to install the diaphragm walls or secant pile walls. The design of the working platform can only be completed when the loading details of the shoring plant are available, though it would likely be in excess of 0.8m thick, possibly with a high strength geogrid at its base. For the shoring along the high/eastern side of the site, it will likely be necessary to provide temporary ramps to allow access for the shoring installation plant.

5.4 Excavation

Prior to any excavation commencing, we recommend that reference be made to the NSW Government 'Code of Practice, Excavation Work' dated January 2020.

5.4.1 Excavation Conditions

The proposed basement levels will require excavation to depths of approximately 12m generally and up to about 17m along the high-eastern side of the site. The proposed lift core and any detention tanks below the lowest basement will likely require localised excavation to about 2.5m depth below BEL. Based on the borehole information, the excavation will extend into medium and high strength sandstone bedrock, in places with rock strengths of 30MPa to 60MPa.

Excavation of the soil and extremely weathered material, and much of the very low and low strength bedrock could be carried out using a 'digging bucket' fitted to a large hydraulic excavator (say, at least 30 tonnes), using a ripping tyne where necessary, and/or by using a dozer.

'Hard ripping' or 'hard rock' excavation conditions should be expected for the medium and high strength sandstone bedrock. Through the high strength bedrock, ripping is unlikely to be possible, and allowance would need to be made for hydraulic rock hammer excavation. Rock hammers will also need to be used for

detailed footing, lift core and trench excavations. Prospective contractors must review the attached borehole logs and rock core photographs and make their own assessment on what plant and equipment will be required for effective excavation.

Grid rock sawing the bedrock would facilitate excavation and would also assist in dampening the transmission of ground borne vibrations to the surrounding neighbouring structures (ie. would reduce vibrations) provided the base of the saw slot is maintained below excavation level. Dust suppression by spraying with water should be carried out whenever rock saws are being used.

5.4.2 Potential Vibration Risks

Rock excavations using hydraulic rock hammers will need to be strictly controlled as there may be direct transmission of ground vibrations to surrounding neighbouring structures. As discussed in Section 5.3.2 above, we recommend that quantitative vibration monitoring be carried during rock excavation to check vibrations are below acceptable limits. If it is confirmed that transmitted vibrations are excessive, then it would be necessary to change to alternative rock excavation methods such as a smaller rock hammer.

The following procedures are recommended to reduce vibrations if rock hammers are used:

- Maintain the rock hammer oriented towards the face and enlarge the excavation by breaking small wedges off the face;
- Operate the hammer in short bursts only, to reduce amplification of vibrations;
- Use excavation contractors with appropriate experience and a competent supervisor who is aware of vibration damage risks, etc. The contractor must have all appropriate statutory and public liability insurances and must be provided with a full copy of this and all future geotechnical reports.

5.4.3 Drainage

During excavation, the groundwater 'dammed' by the basement walls will need to be progressively pumped out as levels deepen. Conventional sump and pump discharge systems will be required for the removal of the groundwater.

Groundwater inflows into the excavation are also expected to occur as localised seepage flows through the basement walls (eg. between secant piles or diaphragm wall joints, from penetrations through the basement walls for anchor installations, etc.), but mainly from the base of the excavation, particularly after heavy and/or prolonged rain. Any leakage from the basement walls may need to be rectified (eg. by chemical or resin injection). If it is found that there is a loss of interlock between adjacent secant piles, then rectification may need to include jet grouting and/or rock grouting.

Seepage volumes into the excavation are expected to be controllable by conventional sump and pump discharge systems. Piped discharge from the drainage system into the stormwater system can only be

completed once the approvals have been obtained. The excavation should be monitored as it progresses by the builders, JK Geotechnics and the hydraulic engineer to confirm the drainage requirements.

5.5 Basement Retention

5.5.1 Retention Systems

Due to the presence of relatively shallow groundwater, and the numerous defects in the bedrock (including large ironstained near vertical joints) we recommend that the proposed vertical cuts in the soil and bedrock profiles be supported by diaphragm walls or secant pile walls. The diaphragm/secant pile walls must be installed prior to excavation commencing and must be progressively anchored, or internally propped, as the excavation proceeds (ie. once the restraining point has been uncovered). Consideration must be given to providing access along the eastern basement wall for the piling or diaphragm wall installation plant.

The primary geotechnical issues in relation to the design of the retention system include the presence of groundwater and the potentially permeable nature of the alluvial soil and sandstone bedrock. For these reasons we tentatively recommend that the diaphragm/secant pile walls be cut-off at least 2.0m below BEL; this will be confirmed following completion of our seepage analysis for the SHR.

For diaphragm wall construction, trench cutters will need to be used to penetrate the medium and high strength sandstone bedrock.

For secant pile wall construction, verticality of piles to maintain interlock between hard and soft piles is paramount. For the four to five basement levels plus a cut-off depth below BEL, we expect that a competent piling contractor will require minimum 0.9m diameter piles (or possibly 0.9m diameter piles) to maintain interlock. Due to the presence of medium and high strength sandstone bedrock, as well as shallow groundwater with some sands in the upper profile, we consider it would be necessary to use cased secant piling techniques. These piles are constructed by installing steel casing down to the bedrock surface by rotary and/or oscillating techniques. Once the toe of the casing is sealed into competent bedrock, the soil and weathered bedrock profiles within the casing and the underlying rock are drilled out using an auger. Cleaning buckets must be used to remove debris and sludge from the base of each pile hole. During the final concreting stage, the casing is withdrawn. Only specialist contractors with considerable experience in constructing secant pile walls with temporary casing for at least five basement levels should be considered for this work.

For the secant pile wall option, only high torque piling rigs must be brought to site. Piles should only be cleaned out when concrete is ready to be poured. All cased secant piles must be tremie poured due to the expected depths of the pile holes and groundwater seepage inflows. The prospective contractors must be provided with a full copy of this and all future geotechnical reports so that appropriate plant and equipment are brought to site.

Construction of the basement walls must be of high quality. The construction sequence must be fully specified and carefully controlled to reduce potential movements.

Along the southern side of the site, the lower 4m or so of the bedrock above BEL appears to be of much better quality than elsewhere on the site. Provided additional investigation is undertaken along the southern shoring wall and this confirms this better rock is consistent along the line, it may be possible to terminate that shoring wall above the proposed basement level, with the pile toes being anchored in the short term and supported by a basement floor slab in the long term. The Class II sandstone below the pile toes could then be tentatively cut vertically. The exposed rock faces must be progressively inspected by an experienced geotechnical engineer as the excavation proceeds at no more than 1.5m depth intervals and then on completion, so that any wedges that could detach are identified and appropriate support measures implemented (eg. rock bolts, shotcrete and mesh, etc.). Provision must be made in the construction program and budget for the inspections and stabilisation works.

5.5.2 Retention Design Parameters

The major consideration in the selection of earth pressures for the design of the retention system is the need to limit deformations occurring outside the excavation. The characteristic earth pressure coefficients and parameters provided below may be adopted for the design of the retention systems.

For progressively anchored or propped diaphragm/secant pile walls, we recommend the use of a trapezoidal earth pressure distribution, and a lateral earth pressure of $8H$ (kPa) for the soil and extremely weathered sandstone profile as well as for Class IV or V bedrock, where H is the retained height in metres (ie. between ground surface level and the surface of the Class II or III sandstone). The maximum lateral earth pressure should apply over the central 50% of the height of the retention system, tapering to zero at the crest and at the surface level of the Class II or Class III sandstone. This lateral earth pressure assumes a horizontal retained surface.

For the underlying Class II and III sandstone, a nominal lateral pressure of 10kPa should be allowed for in design to account for small wedges pushing behind the basement walls.

Any surcharge affecting the walls (eg. traffic loading, nearby footings, inclined retained surfaces, mobile crane loads, etc.) should be allowed in the design using a K_0 value of 0.5. An average bulk unit weight of 21kN/m^3 should be adopted for the soil and weathered rock profiles.

The diaphragm/secant pile walls should be tentatively designed to withstand lateral hydrostatic pressures with a head of water at a level no lower than the ground surface level in the lower part of the site, this is about RL3m.

The passive toe resistance for diaphragm/secant pile walls embedded at least 2m below BEL may be tentatively estimated based on an allowable lateral resistance of 500kPa for the Class IV or better sandstone bedrock. In the vicinity of BH1 from the current investigation, the initial stages of shoring wall installation must be completed in the presence of a geotechnical engineer to assess the material causing the core loss at

approximately RL-11mAHD, and if this is soil or extremely weathered rock, it would be necessary to deepen the shoring wall locally to socket below that zone. The passive resistance should be ignored to at least 0.5m below BEL, including footing and service trench excavations due to the potential for fracturing of the sandstone during bulk excavation.

As an alternative and more advanced approach, the diaphragm/secant pile walls can be designed using appropriate FEM software, such as PLAXIS or similar. These programs also predict the movements behind the basement walls. The more frequently used retaining wall analysis program, WALLAP, is considering inappropriate for the design of the diaphragm/secant pile walls as it can only accurately model the soil and extremely weathered rock profiles, not the Class V and Class II rock profiles, and cannot predict movements behind the basement walls (only of the wall itself). Due to the numerous geotechnical engineering inputs required to drive and rationalise FEM programs, the analyses should only be carried out by engineers with a good understanding of retaining wall design, and soil and rock mechanics. We are not in favour of software which treats the soil and bedrock profiles as 'equivalent springs' as these are not geotechnical parameters.

As a starting point, the possibly slightly conservative parameters tabulated below may be adopted for the FEM analyses:

Material Description	Effective Cohesion, c' , (kPa)	Effective Angle of Friction, ϕ'	Active Earth Pressure Coefficient	At-Rest Earth Pressure Coefficient	Passive Earth Pressure Coefficient	Elastic Modulus, E , (MPa)	Poisson's Ratio, ν	Bulk Unit Weight, γ (kN/m ³)
Fill, silt and loose sand	0	28°	0.36	0.47	2.8	5	0.3	18
Alluvial Silty Clay of Very Stiff to Hard Strength	4	26°	0.39	0.44	2.56	25	0.3	20
Extremely Weathered Sandstone	8	30°	0.33	0.5	3.0	50	0.3	21
Class V Sandstone Bedrock	100	35°	0.27	0.57	3.7	100	0.3	22
Class IV Sandstone Bedrock	100	35°	0.27	0.57	3.7	300	0.3	22
Class III or Better Sandstone Bedrock	250	35°	0.27	0.57	3.7	1,000	0.2	23

If the diaphragm/secant pile wall design is completed as part of a design and construct contract, then it should be jointly peer reviewed by JK Geotechnics and the structural engineer, and amended as appropriate.

5.5.3 Temporary Rock Anchors

For rock anchors, permission must be sought from the neighbouring property owners, including Council prior to installation. We recommend that requests for permission commence early in the design process as our

experience has shown that it can take significant time for such permission to be granted. If permission is not forthcoming, then the alternative is to provide lateral support by internal bracing or propping.

Rock anchors bonded at least 3m into Class IV sandstone bedrock, beyond a 45° line inclined up from BEL (including nearby footings and service trenches), may be tentatively designed for an allowable bond stress of 200kPa. Rock anchors bonded at least 3m into Class V sandstone bedrock, beyond a 45° line inclined up from BEL (including nearby footings and service trenches), may be tentatively designed for an allowable bond stress of 100kPa. It may be possible to increase the design bond value of the anchors by installing trial anchors and testing them to failure. Each anchor must have a minimum free length of 4m.

All anchors must be proof loaded to at least 1.3 times their design working load before locking off at about 85% of the working load. Lift-off tests should be carried out on at least 10% of the anchors about 4 days following locking off to confirm that the anchors are holding their load. The testing may allow an upgrading of the above bond stress. We recommend that only experienced contractors be considered for the anchor installations. We have assumed that permanent lateral support of the basement walls will be provided by the proposed structure, after which time the rock anchors can be de-stressed.

5.5.4 Excavation Induced Ground Movements

Ground movements outside the basement perimeter are expected to occur due to the proposed excavation. The magnitude of adjacent ground movements within the retained soil and bedrock profiles will depend on the ground conditions, design lateral pressures, construction sequence and workmanship. Lateral movements of the adjacent ground surface for an anchored or internally propped retention system supporting the soil, extremely weathered sandstone and upper Class V bedrock profiles are expected to be in the order of 0.3% to 0.5% of the retained height. Any construction related soil movements (eg. settlement due to soil mining during piling) would be in addition.

Through the underlying Class IV or better sandstone, additional lateral movements may occur due to relief of insitu horizontal stresses. We expect that typical lateral movements due to stress relief are in the order of 0.5mm to 2mm per metre depth of excavation through such rock, depending on rock quality and presence of joints and bedding partings. Based on the potential magnitude of these insitu horizontal stresses, likely changes in hydrostatic pressures arising from the works, and the structures/pavements surrounding the site, the FEM analyses should be completed not only for the retention design, but to also assess induced movements surrounding the proposed excavation and the potential damage to the nearby structures and pavements.

The shoring designer must assess the movements associated with their shoring design, such as by using finite element analysis using the parameters provided in Section 5.5.2. The shoring designer or structural engineer must then use these movement predictions to comment on the effect of the excavation on the neighbouring structures.

5.6 Footings

5.6.1 Geotechnical Design

The primary geotechnical issue for the footing design is the presence of deep Class IV sandstone below BEL in several of the boreholes. The allowable and ultimate bearing pressure for footings founded on the Class IV sandstone are limited to 3MPa and 8MPa, respectively. Where additional investigation and/or proving of footings defines areas where the sandstone in the zone of influence of the footings, defined as 1.5 times the footing width, is of at least Class III quality, allowable and ultimate bearing pressures of 6MPa and 20MPa could be adopted. An allowable shaft adhesion in compression for the length of pile socket in excess of 0.5m below the BEL would be 300kPa for the Class IV sandstone or 600kPa for the Class III or better sandstone; these values must be halved for tensile design of the piles. Limit state design of the tensile capacity should be based upon ultimate values of 500kPa for Class IV sandstone or 1,000kPa for the Class III or better sandstone, with these values being halved for design in tension.

For these high design bearing pressures, significant additional rock proving during construction will be required to confirm the lateral continuity of the Classes of sandstone.

In lieu of completing significant rock proving to confirm the sandstone bedrock quality across the site, consideration could be given to designing the footings using more conservative parameters; that is, an allowable bearing pressure of 2MPa or an ultimate bearing pressure of 5MPa, provided the footings are founded in at least Class IV bedrock.

The allowable bearing pressures provided above are based upon serviceability criteria of deflections at the footing/pile base of less than 1% of the minimum footing dimension/pile diameter. We note that these footing settlements will be of an elastic nature and are expected to occur as construction proceeds.

For ultimate limit state design, settlement limitations to the structure will still need to be satisfied and can be estimated using the formula below.

$$\text{Settlement (mm)} = \text{footing dimension (m)} \times 10 \times (\phi_g \times \text{ultimate pile capacity}) / (\text{serviceability capacity})$$

Where the footing dimension is the pile diameter of width of the strip or pad footing

It should be noted that the ultimate bearing pressures must be used in conjunction with an appropriate 'Basic Geotechnical Strength Reduction Factor' (ϕ_{gb}), as defined in Clause 4.3.2 of AS2159-2009 'Piling – Design and Installation'. Based on our assessment, which assumes that the foundation material at each footing/pile location will be inspected and tested by JK Geotechnics, we tentatively recommend a ϕ_{gb} value of 0.56 for a low redundancy system.

Any footings founded above and close to excavations below the basement level, such as for lift cores, detention tanks etc, must be considered on a case by case basis. Numerous inclined joints, which could potentially isolate unstable rock wedges, were encountered in the cored boreholes. As such, pad or strip footings close to these excavations must be tentatively founded below a 45° line inclined up from the base.

However, if flatter, problematic joints are observed during our inspection of the pit excavations, then the nearby pad and strip footings may need to be appropriately deepened.

All pad and strip footings must be cleaned out and inspected by a geotechnical engineer, prior to the installation of reinforcement cages. As part of the inspection process, tentatively for footings designed to be founded in Class III sandstone, at least one third of all pad and strip footings will need to be spoon tested. Spoon testing includes drilling a minimum 50mm diameter hole from the base of the footing excavation to a depth of at least 1.5 times the minimum footing width, but to a depth of no less than 1.5m. The hole is then filled with water (to soften any seams) and then scraped with a grooving tool to assess the location and thickness of any defects below the base of the footing.

All secant piles and internal piles should be cleaned out, inspected and poured on the same day as drilling. All pile holes should be cleaned out using a cleaning bucket (for all pile diameters) for effective removal of sludge and loose material. Due to the expected groundwater seepage, the piles should only be cleaned out when concrete is ready to be tremie poured. All internal piles must be inspected by a geotechnical engineer, and compared to the borehole information to confirm that a satisfactory bearing stratum has been achieved. We recommend that the pile drilling for the secant pile walls be inspected by a geotechnical engineer during the initial stages and then periodically during the works; in particular, the initial piling in the vicinity of the current investigation BH1 must be inspected to assess the strata causing the core loss just below the proposed BEL.

5.6.2 Earthquake Design Parameters

The following parameters should be tentatively adopted for earthquake design in accordance with AS1170.4-2007 'Structural Design Actions, Part 4: Earthquake Actions in Australia' (including Amendments 1 & 2):

- Hazard Factor (Z) = 0.09
- Site Subsoil Class (Retention Design) = Class C_e
- Site Subsoil Class (Footing Design) = Class B_e

5.6.3 Exposure Classification

The soil and extremely weathered sandstone aggression test results have indicated moderately acidic conditions, low chloride and sulphate contents, and high (favourable) resistivity values. In accordance with Table 4.8.1 of AS3600:2018 'Concrete Structures' and Table 6.4.2(C) of AS2159-2009, the exposure classification to concrete footings and concrete piles is 'A2' and 'mild', respectively.

5.7 On-Site Disposal of Stormwater

We do not consider on-site disposal of stormwater to be feasible on this site as the groundwater level measured during this investigation is relatively close to the ground surface level

5.8 Lowest Basement Floor Slabs

If a slab on grade infill slab is proposed for the proposed lowest basement level, then drainage provisions will need to be provided below the slab to alleviate hydrostatic uplift pressures. Such a slab should be constructed independent of the building footings and walls (ie. designed as a 'floating' slab). Slab joints should be designed to resist shear forces but not bending moments by providing dowelled or keyed joints. The 'floating' slab should be provided with at least a 100mm thick sub-base of good quality, durable, single size, crushed rock (free of fines) such as 'Blue Metal' gravel or crushed concrete aggregate (free of fines), which will also act as underfloor drainage. It would be necessary to obtain permission for a drained basement slab from NRAR, and this would be subject to the SHR showing the expected seepage through the base of the excavation is of a sufficiently low flowrate, that is less than 3ML/year.

The underfloor drainage must include a sump and pump dewatering system. Groundwater seepage monitoring should be carried out during basement excavation prior to finalising the design of the pump out facility. In order to avoid flooding of the proposed lowest basement, appropriately sized sumps each with an automatic level control pump will be required to intermittently discharge the seepage water to the stormwater system. Outlets into the stormwater system will require approval from the relevant authorities.

If the basement is to be designed as a tanked structure (either to avoid issues of monitoring and treatment of seepage prior to disposal, or if mandated by NRAR) the basement slab must be designed to withstand the design head of water based upon a tentative groundwater surface at RL3mAHD. In order to resist the uplift pressures, the hydrostatic basement slab could be restrained by using the deadweight of the building, tension piles (conventional bored piles), micro-piles and/or permanent rock anchors. Further advice should be sought from JK Geotechnics with respect to the design parameters once the method of resisting the uplift pressures has been finalised.

5.9 Geotechnical Monitoring

It will be necessary to prepare a Geotechnical Inspection and Test Plan (ITP) for this project. While the details of this ITP can only be determined following the completion of the seepage modelling and decisions are made on the type of shoring system, whether the basement will be tanked or drained etc, we expect the following will be required:

- Installation of inclinometers on the northern side of the proposed basement and monitoring these to assess deflections of the shoring wall during the excavation and anchoring stages of the construction;
- Installation and monitoring of survey points on the capping beam and progressively at 3m height increments on the shoring walls to monitor the deflections of the shoring walls during the excavation.
- Review of vibration monitoring reports;
- Witnessing proof loading of selected rock anchors;
- Witnessing the installation of selected piles or diaphragm wall panels; and
- Inspection and spoon testing of pad and strip footing excavations.



5.10 Development Approval Conditions

5.10.1 Condition B3

This report has addressed the requirements of Condition B3 of the Development Approval.

- B3(a) is covered in Section 5.
- B3(b) is covered in Sections 5.5 and 5.5.
- B3(c) is covered in Sections 5.4 and 5.5.
- B3(d) is covered in Sections 5.4 and 5.5.
- B3(e) is referenced in Section 5.5.3.

5.10.2 Condition B5

We consider the recommendations in this report are generally similar to those provided in the Stantec (2024) report. We note, however, that the Stantec report was for basements extending down to RL-3mAHD, while the current proposal is for basements to RL-9mAHD, which obviously has implications for the design and construction. There are also additional comments and recommendations in this report covering aspects not included in the Stantec report, such as footing design, and relating to details required by Condition B3 discussed above.

6 GENERAL COMMENTS

The recommendations presented in this report include specific issues to be addressed during the design and construction phases of the project. In the event that any of the advice presented in this report is not implemented, the general advice may become inapplicable and JK Geotechnics accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

Occasionally, the subsurface conditions between the completed boreholes may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides preliminary advice on geotechnical aspects for the proposed civil and structural design. Contract Documents and Specifications should not be prepared based on this report, until it has been updated following the completion of the groundwater monitoring and seepage analysis.

A waste classification is required for any soil and/or bedrock excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM), General Solid, Restricted Solid or Hazardous Waste. Analysis can take up to seven to ten working days to complete, therefore, an adequate allowance should be included in the



construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) could be expected. We strongly recommend that this requirement is addressed prior to the commencement of excavation on site.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. If there is any change in the proposed development described in this report then all recommendations should be reviewed. Copyright in this report is the property of JK Geotechnics. We have used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report. The report shall not be reproduced except in full.

Reference

1. Pells, P. J. N., Mostyn, G., Bertuzzi, R. and Wong, P. K. (2019) Classification of Sandstones and Shales in the Sydney Region: A Forty Year Review. Australian Geomechanics, Volume 54, No. 2, June 2019.

TABLE A
MOISTURE CONTENT, ATTERBERG LIMITS AND LINEAR SHRINKAGE TEST
REPORT

Client: JK Geotechnics
Project: Proposed CCQ2 Residential Development
Location: 26-30 Mann Street, Gosford, NSW

Report No.: 37790P - A
Report Date: 19/08/2025
Page 1 of 1

AS 1289	TEST METHOD	2.1.1	3.1.2	3.2.1	3.3.1	3.4.1
BOREHOLE NUMBER	DEPTH m	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	LINEAR SHRINKAGE %
1	1.60 - 1.95	24.0	-	-	-	-
1	3.10 - 3.45	14.8	-	-	-	-
1	4.50 - 4.95	19.7	-	-	-	-
1	7.50 - 7.95	12.3	-	-	-	-
2	0.50 - 0.95	14.6	28	16	12	6.0*
2	1.65 - 1.95	21.9	-	-	-	-
2	3.00 - 3.45	19.3	-	-	-	-
2	4.65 - 4.95	21.6	-	-	-	-
2	6.00 - 6.45	18.8	-	-	-	-
3	1.20 - 1.30	26.2	-	-	-	-
3	3.00 - 3.45	16.7	-	-	-	-
3	4.50 - 4.95	18.8	-	-	-	-
3	6.00 - 6.30	13.2	-	-	-	-
4	3.00 - 3.45	16.2	-	-	-	-
4	4.50 - 4.95	14.4	-	-	-	-
4	5.10 - 5.80	12.5	-	-	-	-
5	0.50 - 0.95	26.2	26	14	12	5.5
5	1.60 - 1.95	20.0	-	-	-	-
5	2.00 - 2.50	17.7	-	-	-	-
5	3.00 - 3.45	18.2	-	-	-	-

Notes:

- The test sample for liquid and plastic limit was air-dried & dry-sieved
- The linear shrinkage mould was 125mm
- Refer to appropriate notes for soil descriptions
- Date of receipt of sample and date tested: 11/08/2025 & 15/08/2025.
- Sampled and supplied by client. Samples tested as received.
- * Denotes Linear Shrinkage cracked.

TABLE B
POINT LOAD STRENGTH INDEX TEST REPORT



Client: URBAN PROPERTY GROUP

Ref No: 37790P

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

Report: B

Location: 26-30 MANN STREET, GOSFORD, NSW

Report Date: 13/08/25

Page 1 of 5

BOREHOLE NUMBER	DEPTH (m)	$I_{s(50)}$ (MPa)	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)	TEST DIRECTION
1	9.95 - 9.98	0.8	16	A
	10.40 - 10.42	0.2	4	A
	10.93 - 10.96	0.4	8	A
	11.10 - 11.12	0.2	4	A
	11.44 - 11.47	0.9	18	A
	11.80 - 11.83	0.5	10	A
	11.97 - 11.99	0.1	2	A
	12.06 - 12.09	0.8	16	A
	12.32 - 12.36	1.3	26	A
	12.90 - 12.93	3.8	76	A
	14.18 - 14.21	0.3	6	A
	14.82 - 14.86	0.4	8	A
	15.11 - 15.14	0.3	6	A
	15.82 - 15.85	0.6	12	A
	16.12 - 16.14	0.2	4	A
	16.30 - 16.33	0.3	6	A
	16.88 - 16.91	0.04	1	A
	17.32 - 17.36	3	60	A
	17.43 - 17.47	0.8	16	A
	18.29 - 18.31	1.5	30	A
	18.79 - 18.83	2.4	48	A
	19.17 - 19.19	1	20	A
	19.70 - 19.73	2.5	50	A
	20.05 - 20.08	3.3	66	A
	20.89 - 20.91	2.2	44	A

NOTE: SEE PAGE 5

TABLE B
POINT LOAD STRENGTH INDEX TEST REPORT



Client: URBAN PROPERTY GROUP

Ref No: 37790P

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

Report: B

Location: 26-30 MANN STREET, GOSFORD, NSW

Report Date: 13/08/25

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BOREHOLE NUMBER	DEPTH (m)	$I_{s(50)}$ (MPa)	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)	TEST DIRECTION
1	21.46 - 21.48	5.2	104	A
	22.05 - 22.08	3.5	70	A
	22.77 - 22.80	3.7	74	A
	23.08 - 23.11	3.5	70	A
	23.40 - 23.43	2.1	42	A
	23.66 - 23.71	1	20	A
	24.07 - 24.11	5	100	A
	24.83 - 24.87	5.1	102	A
	25.10 - 25.13	1.6	32	A
2	9.90 - 9.95	1.1	22	A
	10.20 - 10.25	1.2	24	A
	10.96 - 10.98	2.1	42	A
	11.10 - 11.14	2.6	52	A
	11.71 - 11.75	1.3	26	A
	12.24 - 12.28	1	20	A
	12.77 - 12.80	0.9	18	A
	13.08 - 13.10	1.2	24	A
	13.65 - 13.68	1.4	28	A
	14.18 - 14.21	1.4	28	A
	14.91 - 14.94	1.6	32	A
	15.36 - 15.38	1.4	28	A
	15.74 - 15.78	1.3	26	A
16.15 - 16.18	1.7	34	A	
16.38 - 16.41	1.7	34	A	
3	7.38 - 7.42	0.08	2	A

NOTE: SEE PAGE 5

TABLE B
POINT LOAD STRENGTH INDEX TEST REPORT



Client: URBAN PROPERTY GROUP

Ref No: 37790P

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

Report: B

Location: 26-30 MANN STREET, GOSFORD, NSW

Report Date: 13/08/25

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BOREHOLE NUMBER	DEPTH (m)	$I_{s(50)}$ (MPa)	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)	TEST DIRECTION
3	7.60 - 7.63	1.5	30	A
	7.71 - 7.75	1.6	32	A
	8.26 - 8.29	1.2	24	A
	8.68 - 8.71	0.9	18	A
	9.09 - 9.13	2	40	A
	9.50 - 9.54	1.8	36	A
	10.11 - 10.14	2	40	A
	10.72 - 10.76	1.5	30	A
	11.42 - 11.45	0.9	18	A
	11.90 - 11.93	0.9	18	A
	12.16 - 12.19	1.4	28	A
	12.78 - 12.81	1.2	24	A
	13.34 - 13.38	0.9	18	A
	13.80 - 13.83	1.5	30	A
	14.15 - 14.19	1.3	26	A
	14.70 - 14.73	1.1	22	A
4	15.20 - 15.23	0.9	18	A
	15.95 - 15.99	1	20	A
	16.17 - 16.20	0.9	18	A
	4.58 - 4.62	0.05	1	A
	6.56 - 6.59	0.1	2	A
	6.77 - 6.79	0.07	1	A
	7.10 - 7.13	0.3	6	A
7.57 - 7.60	0.3	6	A	
	8.00 - 8.04	0.6	12	A

NOTE: SEE PAGE 5

TABLE B
POINT LOAD STRENGTH INDEX TEST REPORT



Client: URBAN PROPERTY GROUP **Ref No:** 37790P

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT **Report:** B

Location: 26-30 MANN STREET, GOSFORD, NSW **Report Date:** 13/08/25

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BOREHOLE NUMBER	DEPTH (m)	$I_{s(50)}$ (MPa)	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)	TEST DIRECTION
4	8.83 - 8.86	1.7	34	A
	9.55 - 9.58	0.04	1	A
	9.68 - 9.72	0.1	2	A
	10.79 - 10.83	0.04	1	A
	11.23 - 11.26	0.9	18	A
	11.86 - 11.89	1.4	28	A
	12.00 - 12.04	0.7	14	A
	12.95 - 12.97	0.3	6	A
	13.30 - 13.32	0.3	6	A
	13.68 - 13.71	0.4	8	A
	14.25 - 14.28	1.2	24	A
	14.81 - 14.84	1.4	28	A
	15.06 - 15.09	0.7	14	A
	15.76 - 15.79	0.9	18	A
5	5.27 - 5.30	0.08	2	A
	5.81 - 5.86	0.1	2	A
	6.15 - 6.19	0.5	10	A
	6.77 - 6.80	0.5	10	A
	7.19 - 7.23	1	20	A
	7.65 - 7.69	0.5	10	A
	8.19 - 8.23	1.5	30	A
	8.84 - 8.87	1.4	28	A
	9.24 - 9.27	1.7	34	A
	9.73 - 9.76	1.4	28	A
10.22 - 10.25	1.7	34	A	

NOTE: SEE PAGE 5

TABLE B
POINT LOAD STRENGTH INDEX TEST REPORT



Client: URBAN PROPERTY GROUP **Ref No:** 37790P

Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT **Report:** B

Location: 26-30 MANN STREET, GOSFORD, NSW **Report Date:** 13/08/25

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BOREHOLE NUMBER	DEPTH (m)	$I_{s(50)}$ (MPa)	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)	TEST DIRECTION
5	10.84 - 10.87	1.7	34	A
	11.20 - 11.24	1.4	28	A
	11.64 - 11.67	2.9	58	A
	12.11 - 12.15	1.7	34	A
	12.86 - 12.90	0.8	16	A
	13.31 - 13.34	1.6	32	A
	13.67 - 13.72	1.2	24	A
	14.32 - 14.35	1.3	26	A
	14.73 - 14.77	1.2	24	A
	15.27 - 15.31	1.3	26	A
	15.56 - 15.60	1.5	30	A
	16.20 - 16.25	1.8	36	A

NOTES

1. In the above table, testing was completed in test direction A for the axial direction, D for the diametral direction, B for the block test and L for the lump test.
2. The above strength tests were completed at the 'as received' moisture content.
3. Test Method: RMS T223.
4. For reporting purposes, the $I_{s(50)}$ has been rounded to the nearest 0.1MPa, or to one significant figure if less than 0.1MPa.
5. The estimated Unconfined Compressive Strength was calculated from the Point Load Strength Index based on the correlation provided in AS1726:2017 'Geotechnical Site Investigations' and rounded off to the nearest whole number: U.C.S. = 20 $I_{s(50)}$.

CERTIFICATE OF ANALYSIS 388075

Client Details

Client	JK Geotechnics
Attention	Christopher Rooke
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	<u>37790P, Proposed CCQ2, 26-30 Mann St, Gosford NSW</u>
Number of Samples	5 Soil
Date samples received	08/08/2025
Date completed instructions received	08/08/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	15/08/2025
Date of Issue	13/08/2025
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Nancy Zhang, Laboratory Manager, Sydney

Authorised By

Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		388075-1	388075-2	388075-3	388075-4	388075-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.95	2.2-2.5	3-3.45	6-6.3	4.5-4.95
Date Sampled		30/07/2025	30/07/2025	30/07/2025	30/07/2025	30/07/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2025	11/08/2025	11/08/2025	11/08/2025	11/08/2025
Date analysed	-	11/08/2025	11/08/2025	11/08/2025	11/08/2025	11/08/2025
pH 1:5 soil:water	pH Units	5.7	6.3	6.0	6.4	6.9
Chloride, Cl 1:5 soil:water	mg/kg	23	20	<10	<10	10
Sulphate, SO4 1:5 soil:water	mg/kg	<10	39	65	10	20
Resistivity in soil*	ohm m	260	140	190	450	220

Client Reference: 37790P, Proposed CCQ2, 26-30 Mann St, Gosford NSW

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity (non NATA). Resistivity (calculated) may not correlate with results otherwise obtained using Resistivity-Current method, depending on the nature of the soil being analysed.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

Client Reference: 37790P, Proposed CCQ2, 26-30 Mann St, Gosford NSW

QUALITY CONTROL: Misc Inorg - Soil				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			11/08/2025	1	11/08/2025	11/08/2025		11/08/2025	[NT]
Date analysed	-			11/08/2025	1	11/08/2025	11/08/2025		11/08/2025	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	5.7	5.4	5	99	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	23	22	4	89	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	<10	<10	0	97	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	<1	1	260	300	14	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Report Comments

Samples received in good order: Holding time exceedance

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 6 6,3,3	2			FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, clay fines and root fibres.	M			GRAVEL COVER APPEARS POORLY COMPACTED	
					N = 3 1,2,1	1			FILL: Silty clay, low plasticity, dark grey, trace of fine to medium grained sandstone gravel, and root fibres.	w>PL			POSSIBLY ALLUVIAL	
							0		SP SAND: fine to medium grained, grey, trace of clay fines and silt.	W	(L)		ALLUVIAL	
					N = 10 4,4,6	3		CL Sandy CLAY: low plasticity, grey, fine to medium grained sand, with silt, trace of root fibres.	w>PL	VSt	260 300 210			
					N = 15 4,7,8	-1		4	CI-CH Silty CLAY: medium to high plasticity, grey, trace of fine grained sand.		VSt - Hd			
							-2		CL-CI Sandy CLAY: low to medium plasticity, light grey and orange brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel, and root fibres.				360 400 410	
				N = 18 3,7,11	5	6						510 400 310		
						-3								
						-4								

JK 9.02.4.LB.GLB.Log_JK_AUGERHOLE - MASTER 37790P_GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:38 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib: JK 9.02.4.2019.05.31 Proj: JK 9.01.0.2018.03.20

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 25 6, 12, 13	-5		CL-CI	Sandy CLAY: low to medium plasticity, light grey and orange brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel, and root fibres.	w>PL	VSt - Hd		ALLUVIAL	
						8		CI	Silty CLAY: medium plasticity, light grey, with fine grained sand, trace of fine to medium grained ironstone gravel.		Hd	500 500 600		
						-6			as above, but orange brown, light grey and red brown, with fine to medium grained ironstone gravel.			>600 >600 550		
					N > 20 14, 20/ 150mm REFUSAL	-7			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 16.3m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 10.3m TO 16.3m. CASING 0.1m TO 10.3m. 2mm SAND FILTER PACK 10.1m TO 16.3m. BENTONITE SEAL 8.0m TO 10.1m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.	
						-8							SECONDARY GROUNDWATER MONITORING WELL INSTALLED TO 3.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0m TO 3.0m. 2mm SAND FILTER PACK 0.5m TO 3.0m. BENTONITE SEAL 0.5m TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.	
						-9								
						-10								
						-11								

JK 9.02.4.LB.GLB_Log_JK_AUGERHOLE_MASTER_37790P_GOSFORD.GPJ <-DrawingFiles> 22/08/2025 15:38 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib. JK 9.02.4.2019.05.31 Proj. JK 9.01.0.2018.03.20

CORED BOREHOLE LOG

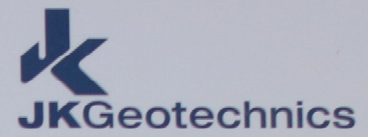
Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										Specific	General	
					START CORING AT 9.30m							
					NO CORE 0.46m							
			-7									
			10		SANDSTONE: fine to medium grained, orange brown and red brown, with iron indurated bands.	HW	L - M	0.80			(9.80m) J, 90°, Ir, R, Fe Ct (9.90m) Jh, 80°, St	
			-8		SANDSTONE: fine to medium grained, light brown, grey and red brown, bedded at 0-10°.	MW		0.20			(10.10m) J, 90°, Ir, R, Cn (10.19m) Be, 0°, P, R, Fe Ct (10.30m) XWS, 0°, 30 mm.t	
			11					0.40			(10.49m) Be, 5°, P, R, Fe Vn (10.58m) Be, 5°, P, R, Fe Ct (10.60m) Be, 0°, P, R, Fe Ct (10.68m) J, 40°, P, R, Cn (10.77m) J, 90°, C, R, Cn (10.85m) J, 30°, Ir, R, Cn	
			-9					0.20			(11.18m) XWS, 0°, 15 mm.t (11.26m) Be, 15°, P, R, Clay Ct (11.34m) Be, 0°, P, R, Fe Sn	
			12					0.90			(11.48m) Be, 0°, P, R, Clay Ct (11.54m) Be, 0°, P, R, Clay Ct	
			-10			HW	H	0.50			(12.02m) Be, 5°, P, R, Clay Ct (12.10m) Be, 10°, P, R, Clay Ct	
			13					1.3			(12.24m) Be, 10°, P, R, Clay Ct (12.32m) Be, 10°, P, R, Clay Ct (12.36m) Be, 10°, P, R, Clay Ct	
			-11		NO CORE 0.65m			3.8			(12.39-13.15m) J x 2, 90°, P/Ir, R, Fe Ct	
			14					0.30			(13.95m) Jh, 80°, P (14.07m) Be, 0°, P, R	
			-12		SANDSTONE: fine to medium grained, light brown, red brown and grey, bedded at 5-15°.	SW	M	0.40			(14.53m) J, 30°, P, R, Cn	
			15					0.30			(15.33m) J, 35°, C, R, Fe Ct (15.42m) J, 70°, C, R, Fe Ct	
			-13					0.60				

JK 9.024.LB.GLB_Log_JK_CORED_BOREHOLE - MASTER - 37790P_GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab\and\In Situ\Tool - DGD | Lib: JK 9.024.2019-05-31 Proj: JK 9.01.0.2018-03-20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

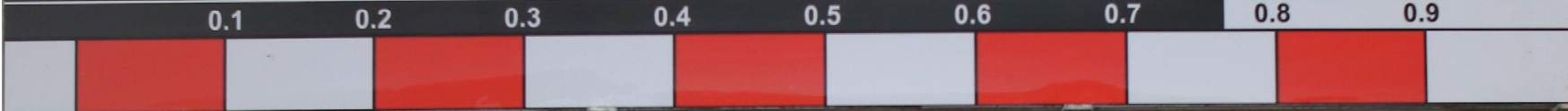
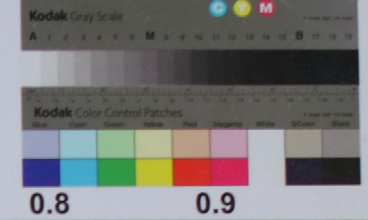


PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 9.30-16.00m



37790P BH1 START CORING AT 9.30m

9 → CORE LOSS 0.46m



13 CORE LOSS 0.65m



CORED BOREHOLE LOG

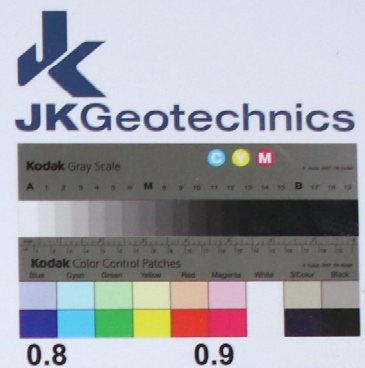
Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _p (50)	SPACING (mm)	DEFECT DETAILS		Formation
										Specific	General	
		-14	17		SANDSTONE: fine to medium grained, light grey, bedded at 0-10°.	FR	M	0.20				
		-14	17		SILTSTONE: dark grey, with fine grained sandstone bands, bedded at 0-10°.			0.30			(16.50m) CS, 0°, 70 mm.t (16.62m) J, 60°, P, S, Cn	
		-15	18		SANDSTONE: fine grained, light grey, with siltstone bands and lenses, bedded at 0-10°.		M - H	0.040			(16.95m) J, 90°, P, R, Fe Ct	
		-15	18				H	3.0			(17.74m) J, 90°, C, R, Fe Sn	
		-16	19					0.80			(18.59m) Be, 0°, P, S, Clay Ct (18.63m) Ji, 60°, St	
		-16	19					1.5				
		-17	20					2.4				
		-17	20					1.0			(19.26m) Be, 0°, P, S, Clay Ct	
		-18	21					2.5				
		-18	21					3.3				
		-19	22					2.2				
		-19	22		SANDSTONE: fine grained, light grey, with grey siltstone and carbonaceous laminae.		VH	5.2				
		-20	22					3.5				
		-20	22					3.7				

JK 9.024.LB.GLB_Log_JK_CORED_BOREHOLE_MASTER_37790P_GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\geot\lab\and\in\Site\Tool-DGD\Lab\JK 9.024 2019-05-31 Proj_JK 9.01.0 2018-03-20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

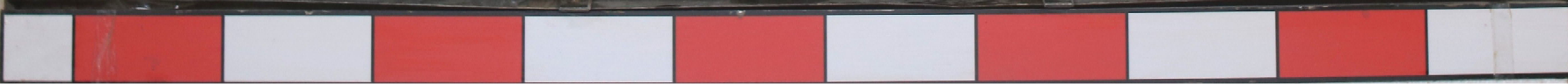


PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 16.00 - 24.00 m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss Level Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
									Specific	General	
00% RETURN	-21	24	[Dotted pattern]	SANDSTONE: fine grained, light grey, with grey siltstone and carbonaceous laminae. (continued)	FR	VH	3.5	600 200 60 20			Terrigal Formation
						H	2.1				
	-22	25				H - VH	1.0				
	-25	25		END OF BOREHOLE AT 25.12 m			5.0				
	-22	25					5.1				
	-25	25					1.6				

JK 9.02.4.LB.GLB Log JK CORED BOREHOLE - MASTER - 37790P GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib: JK 9.02.4.2019.05-31 Proj: JK 9.01.0.2018.03-20

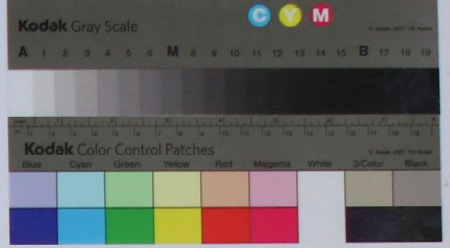
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 1

DEPTH: 24.00 - 25.12 m



0.1 0.2 0.3 0.4 0.5 0.6 0.7

0.8 0.9

24

25

← END OF BOREHOLE AT 25.12m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK400 **Logged/Checked By:** J.L.O./P.W.

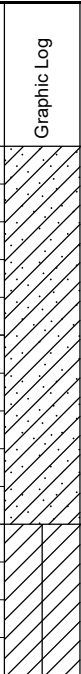
Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 11 4,5,6	2				FILL: Clayey silty sand, fine to medium grained, brown, trace of fine to coarse grained igneous gravel, and slag.	M			GRAVEL COVER APPEARS WELL COMPACTED
						1			FILL: Sandy clay, low plasticity, brown and grey brown, fine to medium grained sand, trace of fine to medium grained ironstone and sandstone gravel, and root fibres.	w<PL		400 380 320		
					N = 2 2,1,1	1			ML	FILL: Silty sandy clay, low plasticity, dark grey and brown, fine to medium grained sand, trace of root fibres.	w>PL	S	110 90 70	POSSIBLY ALLUVIAL ALLUVIAL
						2			SC	Sandy SILT: low plasticity, dark grey, with clay fines. Clayey SAND: fine to medium grained, grey, trace of silt fines.	W	(L)		TOO FRIABLE FOR HP TESTING
					N = 12 3,4,8	3			CL	Sandy CLAY: low plasticity, grey, fine to medium grained sand, trace of silt fines.	w>PL	VSt	340 320 390	COMMENCE WASHBORING AT 3.0m AFTER SPT
						4			CI-CH	Silty CLAY: medium to high plasticity, light grey and brown. Silty CLAY: medium to high plasticity, light grey.		Hd	390 400 370 470 480 520	
					N = 16 18,10,6	6			CL	Sandy CLAY: low plasticity, light grey and red brown, fine to medium grained sand, trace of fine to coarse grained ironstone gravel.		VSt - Hd	430 370 360	

JK 9.02.4.LB.GLB Log JK AUGERHOLE - MASTER 37790P GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib. JK 9.02.4.2019.05.05.31 Proj. JK 9.01.0.2018.03.20

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER / CASING ADVANCER **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK400 **Logged/Checked By:** J.L.O./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N=SPT 10/ 10mm REFUSAL	-5		CL	Sandy CLAY: low plasticity, light grey and red brown, fine to medium grained sand, trace of fine to coarse grained ironstone gravel. (<i>continued</i>) Sandy CLAY: low plasticity, light brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel.	w>PL	VSt - Hd		TOO FRIABLE FOR HP TESTING	
				N=SPT 10/ 100mm REFUSAL	-9	CL-CI		Silty CLAY: low to medium plasticity, grey and light brown, with extremely weathered fabric.	w~PL	Hd	>600 >600			
						-10			REFER TO CORED BOREHOLE LOG					
						-11								

JK 9.02.4.LB.GLB Log JK AUGERHOLE - MASTER 37790P GOSFORD.GPJ <-DrawingFiles> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib JK 9.02.4.2019.05.31 Proj JK 9.01.0.2018.03.20

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss/Level Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _p (50)	SPACING (mm)	DEFECT DETAILS		Formation
									Specific	General	
	-7			START CORING AT 9.80m							
0% RETURN		10		SANDSTONE: fine to medium grained, grey, with siltstone laminae, bedded at 0-5°.	MW	H	*1.1	600 200 60 20	(9.88m) Be, 0°, P, R, Clay Ct (9.95m) Be, 0°, P, R, Clay Ct (9.98m) Be, 0°, P, R, Clay Ct		
				NO CORE 0.11m	MW	H	*1.2		(10.20m) Be, 0°, P, R, Clay Ct (10.23m) J, 68°, P, R, Cn (10.25m) Be, 0°, P, R, Clay Vn		
		-8		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.					(10.50m) Be, 63 - 90°, C, R, Fe Ct, and Clay, Ct (10.52m) J, 75°, P, R, Fe Vn, and Clay, Ct (10.57m) J, 50°, P, R, Fe Sh (10.65m) J, 90°, P, R, Clay Ct (10.71m) Be, 5°, P, R, Clay Ct (10.86m) Be, 0°, P, R, Clay Ct		
		11		SANDSTONE: fine to coarse grained, light grey, with occasional siltstone lenses, bands and laminae, bedded at 0-5°.			*2.1 *2.6				
		-9		SANDSTONE: fine to coarse grained, light brown, bedded at 0-5°.			*1.3		(11.29m) CS, 5°, 7 mm.t (11.36m) Be, 0°, P, R, Clay, 3 mm.t (11.49m) CS, 0°, 21 mm.t		
		12		SANDSTONE: fine to medium grained, light grey, with occasional carbonaceous laminae, bedded at 0-5°.	FR		*1.0		(11.64m) J, 20°, P, R, Fe Vn (11.67m) Be, 0°, P, R, Fe Vn (11.68m) Be, 0°, P, R, Cn (11.77m) J, 30°, P, R, Cn (11.83m) Be, 0°, P, R, Cn (11.86m) J, 35°, P, R, Cn (11.87m) J, 40°, P, R, Fe Vn (11.89m) Be, 0°, P, R, Fe Vn (11.90m) J, 40°, P, R, Fe Vn (11.94m) J x 2, 58°, P, R, Fe Ct (12.00m) J, 72°, P, R, Fe Ct		
100% RETURN		-10					*0.90				
		13		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.			*1.2				
		-11					*1.4		(13.80m) J, 30°, P, R, Cn (13.82m) J, 40°, P, R, Cn (13.85m) J, 40°, P, R, Clay Vn (13.87m) Be, 5°, P, R, Clay Vn		
		14					*1.4				
		-12					*1.6				
		15					*1.4				
		-13					*1.3		(15.47m) Be, 0°, P, R, Clay Ct		

JK 9.024.LB.GLB Log JK CORED BOREHOLE - MASTER_37790P_GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 DwgGetLabAreaIn Situ Tool - DGD | Lib: JK 9.024.2019.05-31 Proj: JK 9.01.0.2018.03-20

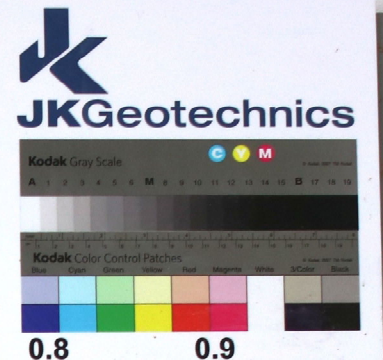
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH2


DEPTH: 9.80m to 16.00m



37790P BH2 START CORING AT 9.80m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP		Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT		Location: 26-30 MANN STREET, GOSFORD, NSW								
Job No.: 37790P		Core Size: NMLC		R.L. Surface: ~2.7 m								
Date: 30/7/25		Inclination: VERTICAL		Datum: AHD								
Plant Type: JK400		Bearing: N/A		Logged/Checked By: J.L.O./P.W.								
Water Loss Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$		DEFECT DETAILS		Formation
								SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	Specific	General	
100% RETURN					SANDSTONE: fine to medium grained, light grey, with occasional carbonaceous laminae, bedded at 0-5°.	FR	H	VL-0.1 L M T VH-10 EH	600 200 60 20			
					END OF BOREHOLE AT 16.42 m							
		-14										
			17									
		-15										
			18									
		-16										
			19									
		-17										
			20									
		-18										
			21									
		-19										
			22									
		-20										

JK 9.02.4.LB.GLB Log JK CORED BOREHOLE - MASTER - 37790P GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Proj: JK 9.01.0 2018-03-20

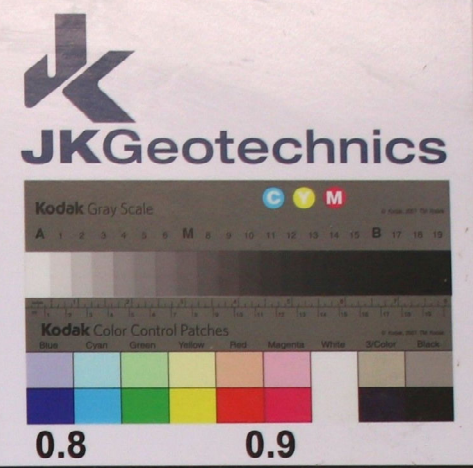
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 11/08/2025

LOCATION ID: BH2

DEPTH: 16.00m - 16.42m



0.1 0.2 0.3 0.4 0.5 0.6 0.7

0.8 0.9

16

EOH AT 16.42m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25					N = 10 4,6,4	2			-	CONCRETE: 200mm.t				8mm DIA. REINFORCEMENT, 70mm TOP COVER
						1				FILL: Clayey gravel, fine to medium grained, sub-angular igneous gravel, grey, trace of fine to medium grained sand.	M			APPEARS POORLY COMPACTED
						1				FILL: Clayey silty sand, fine to medium grained, grey brown and brown, trace of fine to medium grained sandstone gravel, roots and root fibres.				
					N = 2 1,1,1					FILL: Sandy silt, low plasticity, dark grey, trace of root fibres.	w>PL			POSSIBLY ALLUVIAL
						2			CL	Sandy CLAY: low plasticity, grey and yellow brown.	w>PL	S - F	30 40 50	NO SPT SAMPLE RETURN
						0			CL-CI	Silty CLAY: low to medium plasticity, light grey mottled red brown and light brown, with fine to medium grained sand.		VSt		ALLUVIAL
					N = 10 3,4,6	3							310 330 330	HP TESTING ON REMOULDED SAMPLE
						-1								
					N = 18 5,8,10	2			CI	Silty CLAY: medium plasticity, red brown mottled grey and light brown, with fine to medium grained ironstone gravel, trace of fine to medium grained sand.		Hd	400 410 420	
						5								
				N > 22 11,22/ 150mm REFUSAL	-3			-	Extremely Weathered sandstone: silty CLAY, medium plasticity, light grey and light brown, trace of fine to medium grained sand, and ironstone bands.	XW	Hd	>600 >600 >600	TERRIGAL FORMATION	
					6									
					-4									

JK 9.02.4.LB.GLB Log_JK_AUGERHOLE - MASTER 37790P_GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In-Situ Tool - DGD | Lib. JK 9.02.4.2019.05-31 Proj. JK 9.01.0.2018.03.20

BOREHOLE LOG

Client: URBAN PROPERTY GROUP		
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT		
Location: 26-30 MANN STREET, GOSFORD, NSW		
Job No.: 37790P	Method: SPIRAL AUGER	R.L. Surface: ~2.5 m
Date: 31/7/25	Datum: AHD	
Plant Type: JK500	Logged/Checked By: C.A.R./P.W.	

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										Extremely Weathered sandstone: silty CLAY, medium plasticity, light grey and light brown, trace of fine to medium grained sand, and ironstone bands. REFER TO CORED BOREHOLE LOG	XW	Hd		GROUNDWATER MONITORING WELL INSTALLED TO 16.23m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.23m TO 16.23m. CASING 0.10m TO 9.23m. 2mm SAND FILTER PACK 8.70m TO 16.23m. BENTONITE SEAL 7.30m TO 8.70m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						-5								
							8							
						-6								
							9							
						-7								
							10							
						-8								
							11							
						-9								
							12							
						-10								
							13							
						-11								

JK 9.02.4.LB.GLB_Log_JK_AUGERHOLE_MASTER_37790P_GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:37 10.01.00.01 Dargit Luth and In Situ Tool - DGD | Lib. JK.9.02.4.2019.05-31 Proj. JK.9.01.0.2018.03-20

CORED BOREHOLE LOG

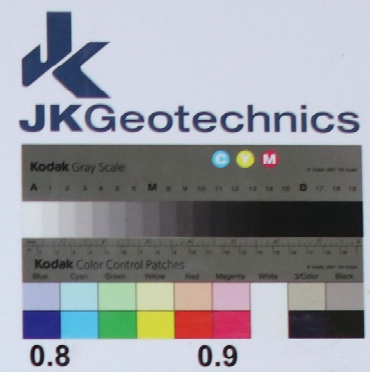
Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	SPACING (mm)	DEFECT DETAILS		Formation
										Specific	General	
					START CORING AT 7.07m							
		-5			SANDSTONE: fine to medium grained, light brown, bedded at 0-10°.	MW	L	0.080			(7.14m) J, 90°, Ir, R, Clay Ct (7.27m) J, 80°, C, R, Fe Ct	
		8					M - H	1.5 1.6			(7.48m) Be, 5°, P, S, Clay FILLED, 4 mm.t (7.52m) Ji, 90°, St	
		-6			SANDSTONE: fine to medium grained, grey, with siltstone bands and lenses, and occasional quartz gravel, bedded at 0-15°.	FR		1.2			(7.94m) J, 70°, P, R, Fe Sn (8.21m) Be, 10°, P, R, Fe Sn	
		9						0.90			(8.55m) Be, 10°, P, R, Clay Ct	
		-7						2.0				
		10						1.8			(9.80m) J, 70°, Ir, R, Fe Ct	
		-8						2.0				
		11						1.5			(10.82m) J, 25°, P, R, Cn (11.11m) J/Ji, 90°, Ir, S, Cn	
		-9						0.90				
		12			SANDSTONE: fine to coarse grained, light grey, occasional quartz gravel, bedded at 0-5°.			0.90			(11.85m) CS, 0°, 25 mm.t	
		-10						1.4			(12.58m) J, 30°, P, R, Cn	
		13						1.2				
		-11			SANDSTONE: fine to medium grained, light grey and grey, bedded at 0-10°.			0.90			(13.23m) Be, 0°, P, R, Cn	

JK 9.024.LB.GLB.Log _JK CORED BOREHOLE - MASTER- 37790P GOSFORD.GPJ <-DrawingFile> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib: JK 9.024 2019-05-31 Proj: JK 9.01.0 2018-03-20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

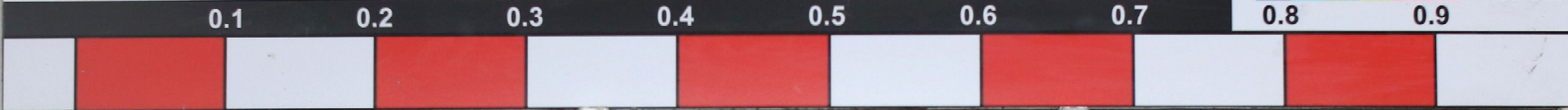


PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH3

DEPTH: 7.07m - 14.00m



37790P BH3 START CORING AT 7.07m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.5 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation			
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness				
								600	200	60	20	Specific	General	
			-12		SANDSTONE: fine to medium grained, light grey and grey, with occasional dark grey laminae, bedded at 0-10°.	FR	H	1.3						Terrigal Formation
			15					1.1						
			-13					0.90						
			16					1.0						
			-14		END OF BOREHOLE AT 16.23 m			0.90						
			17											
			-15											
			18											
			-16											
			19											
			-17											
			20											
			-18											

JK 9.02.4.LB.GLB.Log JK CORED BOREHOLE - MASTER - 37790P GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib: JK 9.02.4.2019.05-31 Proj: JK 9.01.0.2018.03.20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH3

DEPTH: 14.00 to 16.23 m



0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

14

15

16

← END OF BOREHOLE AT 16.23m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~2.7 m
Date: 31/7/25 **Datum:** AHD
Plant Type: JK500 **Logged/Checked By:** C.A.R./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
ON 15/8/25					N = 14 5,7,7	2	[Cross-hatched pattern]	-	CONCRETE: 100mm.t FILL: Sandy gravel, fine to medium grained, sub-angular igneous gravel, grey, fine to medium grained sand. FILL: Silty sand, fine to medium grained, brown grey, trace of fine to medium grained igneous gravel.	M			NO REINFORCEMENT OBSERVED APPEARS MODERATELY COMPACTED	
						1			FILL: Sandy silt, low plasticity, dark grey, fine to medium grained sand, trace of root fibres.	w>PL			POSSIBLY ALLUVIAL	
					N = 5 2,3,2	1	[Diagonal lines pattern]	CL	Sandy CLAY: low plasticity, grey, fine to medium grained sand.	w>PL	St	160 160 180	ALLUVIAL GROUNDWATER MONITORING WELL INSTALLED TO 16.05m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 10.05m TO 16.05m. CASING 0.10m TO 10.05m. 2mm SAND FILTER PACK 9.40m TO 16.05m. BENTONITE SEAL 7.40m TO 9.40m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.	
						2		CI	Silty CLAY: medium plasticity, grey and yellow brown, trace of fine to medium grained ironstone gravel, fine grained sand, and root fibres.		St - VSt			
					N = 9 4,3,6	3	[Diagonal lines pattern]						180 210 190	SECONDARY GROUNDWATER MONITORING WELL INSTALLED TO 4.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.5m TO 4.5m. CASING 0.1m-1.5m. 2mm SAND FILTER PACK 4.5m TO 0.8m. BENTONITE SEAL 0.8m TO 0.1m. COMPLETED WITH A CONCRETED GATIC COVER.
					4						Hd			
				N = 30 7,13,17	2	[Diagonal lines pattern]						500 >600 520		
					5				SANDSTONE: fine to medium grained, grey, with extremely weathered bands and ironstone gravel.	DW	VL		TERRIGAL FORMATION	
						6								
						4				REFER TO CORED BOREHOLE LOG				

JK 9.02.4.LB.GLB Log_JK_AUGERHOLE - MASTER 37790P_GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:37 10.01.00.01 Dargit Lab and In Situ Tool - DGD | Lib: JK 9.02.4.2019.05-31 Proj: JK 9.01.0.2018.03-20

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components START CORING AT 6.10m	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation					
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness						
								600	200	60	20	Specific	General			
					NO CORE 0.17m											
			4		SANDSTONE: fine to medium grained, light brown, orange brown and light grey, bedded at 0-10°.	HW	VL - L	+0.10								
			7	L - M			+0.30									
			8	M - H			+0.60									
			9		SANDSTONE: fine grained, grey, with siltstone lenses and occasional quartz gravel, bedded at 0-10°.	SW	L - M	+1.7								
			10				+0.040									
			11				+0.10									
			12				+0.040									
			13				+0.90									
			14				+0.040									
			15				+1.4									
			16				+0.70									
			17													
			18													
			19		NO CORE 0.13m	MW	M									
			20		SANDSTONE: fine to medium grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°.											
			21		NO CORE 0.15m	MW	M									
			22		SANDSTONE: fine grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°.											

JK 9.024.LB.GLB Log_JK_CORED BOREHOLE - MASTER_37790P_GOSFORD.GPJ -<DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\get\Lab\and\In Situ\Tool_DGD\Lab\JK 9.024.2019-05-31 Proj_JK 9.01.0.2018-03-20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

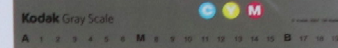


PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 4

DEPTH: 6.10 - 13.00 m



37790P BH4 START CORING AT 6.10m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** NMLC **R.L. Surface:** ~2.7 m
Date: 31/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK500 **Bearing:** N/A **Logged/Checked By:** C.A.R./P.W.

Water Loss Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation	
									SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness		
								600 200 60 20	Specific	General		
0% RETURN		-11	14		SANDSTONE: fine grained, light brown and light grey, with occasional quartz gravel, bedded at 0-10°. <i>(continued)</i>	MW	M	0.30 0.40 1.2 1.4 0.70 0.90		(13.10m) XWS, 5°, 15 mm.t (13.47m) Be, 5 - 10°, P, R, Fe Ct (13.77m) Be, 10°, P, R, Fe Sn (13.98m) J, 80°, P, R, Fe Ct (14.30m) Be, 5 - 10°, P, R, Fe Ct (14.43m) Be, 5 - 10°, P, R, Fe Ct (14.55m) Be, 5 - 10°, P, R, Fe Ct (14.92m) Be, 10°, P, R, Fe Ct (15.35m) Be, 5°, P, R, Fe Ct		Terrigal Formation
70% RETURN		-13	16		END OF BOREHOLE AT 16.06 m							
		-14	17									
		-15	18									
		-16	19									
		-17										

JK 9.02.4.LB.GLB Log JK CORED BOREHOLE - MASTER - 37790P GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab\area\In Situ\Tool - DGD | Lib: JK 9.02.4.2019.05-31 Proj: JK 9.01.0.2018.03.20

PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPEMENT

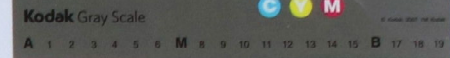


PROJECT No: 37790P

DATE: 13/08/2025

LOCATION ID: 4

DEPTH: 13.00 - 16.06 m



0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

13

14

15

16

← END OF BOREHOLE AT 16.06m

BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Method:** SPIRAL AUGER **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Datum:** AHD
Plant Type: JK400 **Logged/Checked By:** J.L.O./P.W.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 2 1,0,2	3				FILL: Silty sand, fine to medium grained, brown and grey brown, with clay fines, trace of fine to medium grained igneous and ironstone gravel, organics and root fibres. FILL: Sandy silt, low plasticity, dark grey, fine to medium grained sand, trace of clay fines.	W w>PL		50 40 40	GRASS COVER APPEARS POORLY COMPACTED POSSIBLY ALLUVIAL
					N = 9 3,4,5	2			CL	Silty CLAY: low to medium plasticity, light grey, trace of fine grained sand.	w>PL	St	100 200 170	ALLUVIAL
					N = 28 6,11,17	1			CL-CI	Silty CLAY: low to medium plasticity, light grey mottled light brown, trace of fine to medium grained sand.				
					N=SPT 6/50mm REFUSAL	0				as above, but with fine to coarse grained ironstone gravel and fine to medium grained sand.		Hd	>600 >600 >600	
						-1						Vst	250 260	SPT REFUSAL ON IRONSTONE GRAVEL
						-2				REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 16.3m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 9.3m TO 16.3m. CASING 0.1m TO 9.3m. 2mm SAND FILTER PACK 8.8m TO 16.3m. BENTONITE SEAL 6.7m TO 8.8m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						-3								

JK 9.02.4.LB.GLB Log JK AUGERHOLE - MASTER 37790P GOSFORD.GPJ <<DrawingFiles>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab and In Situ Tool - DGD | Lib JK 9.02.4.2019\05-31 Proj JK 9.01.0.2018-03-20

CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** HQ **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX I _p (50)	SPACING (mm)	DEFECT DETAILS		Formation
										Specific	General	
		-1			START CORING AT 4.70m							
0% RETURN					NO CORE 0.11m							
		-2	5		SANDSTONE: fine to medium grained, grey and light brown, bedded at 0-5°.	HW MW	VL VL - L	0.080 0.10	600 200 60 20	(4.88m) Ji, 75°, P, R, Cn (4.95m) Be, 0°, P, R, Fe Ct (4.97m) J, 40°, P, R, Fe Ct (4.98m) J, 70°, P, R, Fe Ct (5.01m) J, 22°, Ir, R, Fe Ct (5.05m) J, 60 - 90°, Un, R, Fe Ct (5.12m) J, 69°, P, R, Fe Vn (5.34m) Be, 0°, P, R, Fe Sn		
		-3	6				M	0.50		(5.64m) J, 65 - 90°, C, R, Fe Ct (5.70m) Be, 10°, P, R, Fe Sn (5.86m) J, 40°, P, R, Fe Ct (5.91m) Be, 0°, P, R, Clay Vn (5.98m) J, 25°, P, R, Fe Vn, and Clay, Vn (6.06m) Be, 0°, P, R, Fe Ct (6.15m) Be, 10°, P, R, Fe Ct		
		-4	7		as above, but light grey, bedded at 0-5°.	FR		0.50 1.0		(6.40m) J, 80°, P, R, Cn (6.63m) Ji, 66°, P, R, Cn (6.70m) J, 60°, P, R, Fe Ct (6.86m) J, 70°, P, R, Fe Ct		
100% RETURN		-5	8				H	0.50 1.5		(7.94m) Be, 8°, P, R, Clay Vn (7.96m) CS, 0°, 26 mm.t		
		-6	9					1.4 1.7				
		-7	10		SANDSTONE: fine grained, light grey, with siltstone seams and laminae, bedded at 0-10°.			1.4 1.7		(9.76m) Be, 0°, P, R		Terrigal Formation

JK 9.024.LB.GLB_Log_JK_CORED_BOREHOLE_MASTER_37790P_GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab\and\In Situ\Tool - DGD | Lib: JK 9.024.2019.05-31 Proj: JK 9.01.0.2018.03-20

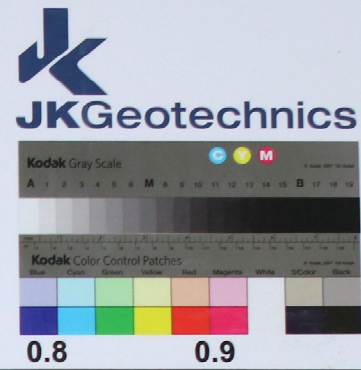
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

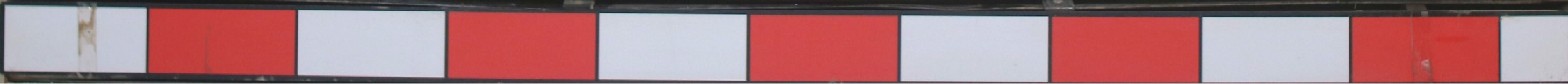
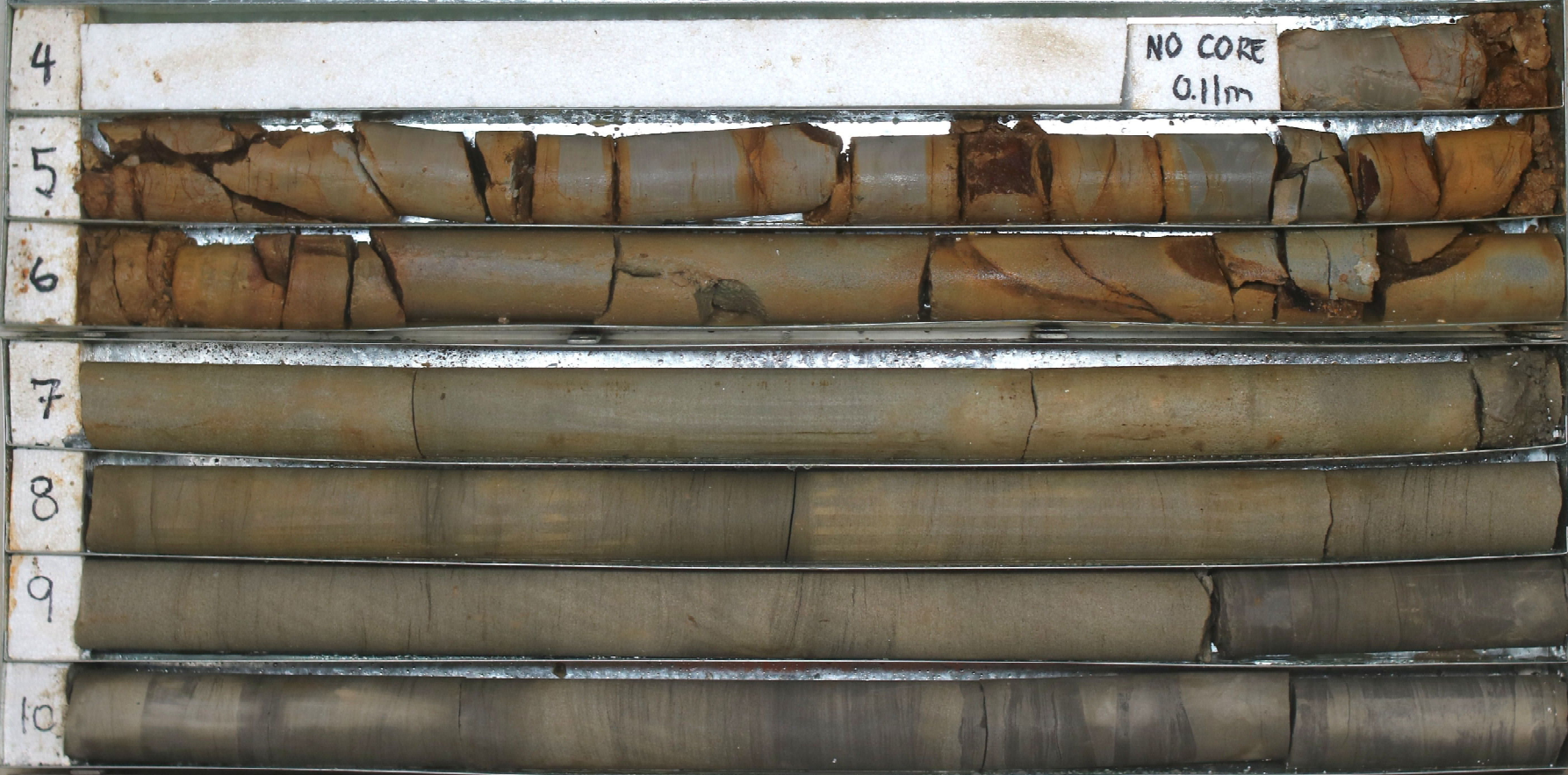
DATE: 08/08/2025

LOCATION ID: BH5

DEPTH: 4.70m - 11.00m



37790P BH5 START CORING AT 4.7m



CORED BOREHOLE LOG

Client: URBAN PROPERTY GROUP
Project: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT
Location: 26-30 MANN STREET, GOSFORD, NSW

Job No.: 37790P **Core Size:** HQ **R.L. Surface:** ~3.1 m
Date: 30/7/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK400 **Bearing:** N/A **Logged/Checked By:** J.L.O./P.W.

Water Loss Level Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS		Formation
								SPACING (mm)	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness	
	-8			SANDSTONE: fine grained, light grey, with siltstone seams and laminae, bedded at 0-10°. (continued)	FR	H	1.4 2.9 1.7	600 200 60 20		Terrigal Formation
	-9	12		SANDSTONE: fine to coarse grained, light grey and light brown, with occasional quartz gravel, bedded at 5-15°.	SW		0.80 1.6 1.2	600 200 60 20	(12.56m) CS, 5°, 4 mm.t (12.67m) XWS, 0°, 13 mm.t (12.70m) XWS, 0°, 5 mm.t (12.77m) Be, 0°, P, R, Clay, 4 mm.t (13.29m) CS, 10°, 9 mm.t (13.58m) J, 60°, P, R, Fe Ct	
	-10	13		SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.	FR		1.3 1.2 1.3 1.5	600 200 60 20	(13.87m) J, 36°, P, R, Fe Vn	
	-11	14		as above, but brown.	SW		1.8	600 200 60 20		
	-13	16		END OF BOREHOLE AT 16.30 m						
	-14	17								

JK 9.02.4.LB.GLB_Log_JK_CORED_BOREHOLE_MASTER_37790P_GOSFORD.GPJ <-DrawingFile>> 22/08/2025 15:37 10.01.00.01 D:\git\Lab\and\In Situ\Tool-DGD | Lib: JK 9.02.4 2019-05-31 Proj: JK 9.01.0 2018-03-20

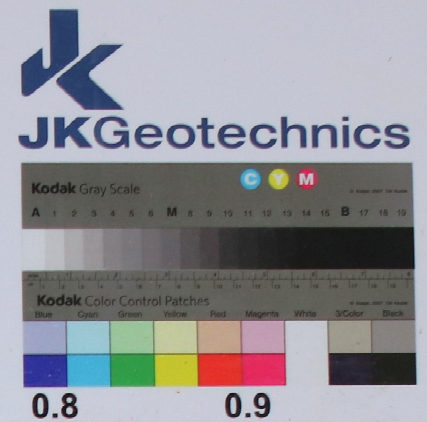
PROJECT: PROPOSED CCQ2 RESIDENTIAL DEVELOPMENT

PROJECT No: 37790P

DATE: 08/08/2025

LOCATION ID: BH5

DEPTH: 11.00m to 16.30m



0.1

0.2

0.3

0.4

0.5

0.6

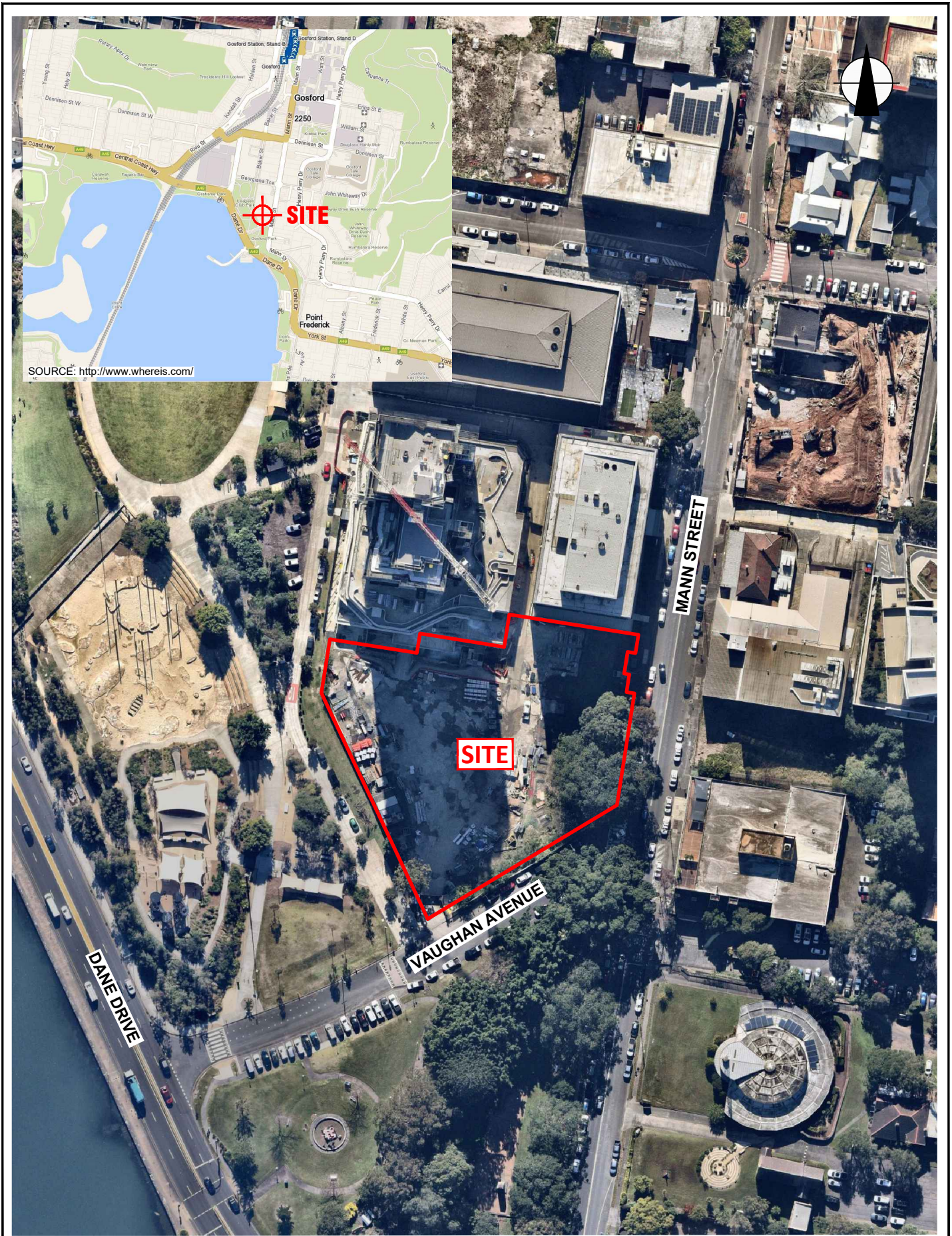
0.7

0.8

0.9



← END OF BOREHOLE AT 16.30m



SOURCE: <http://www.whereis.com/>

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

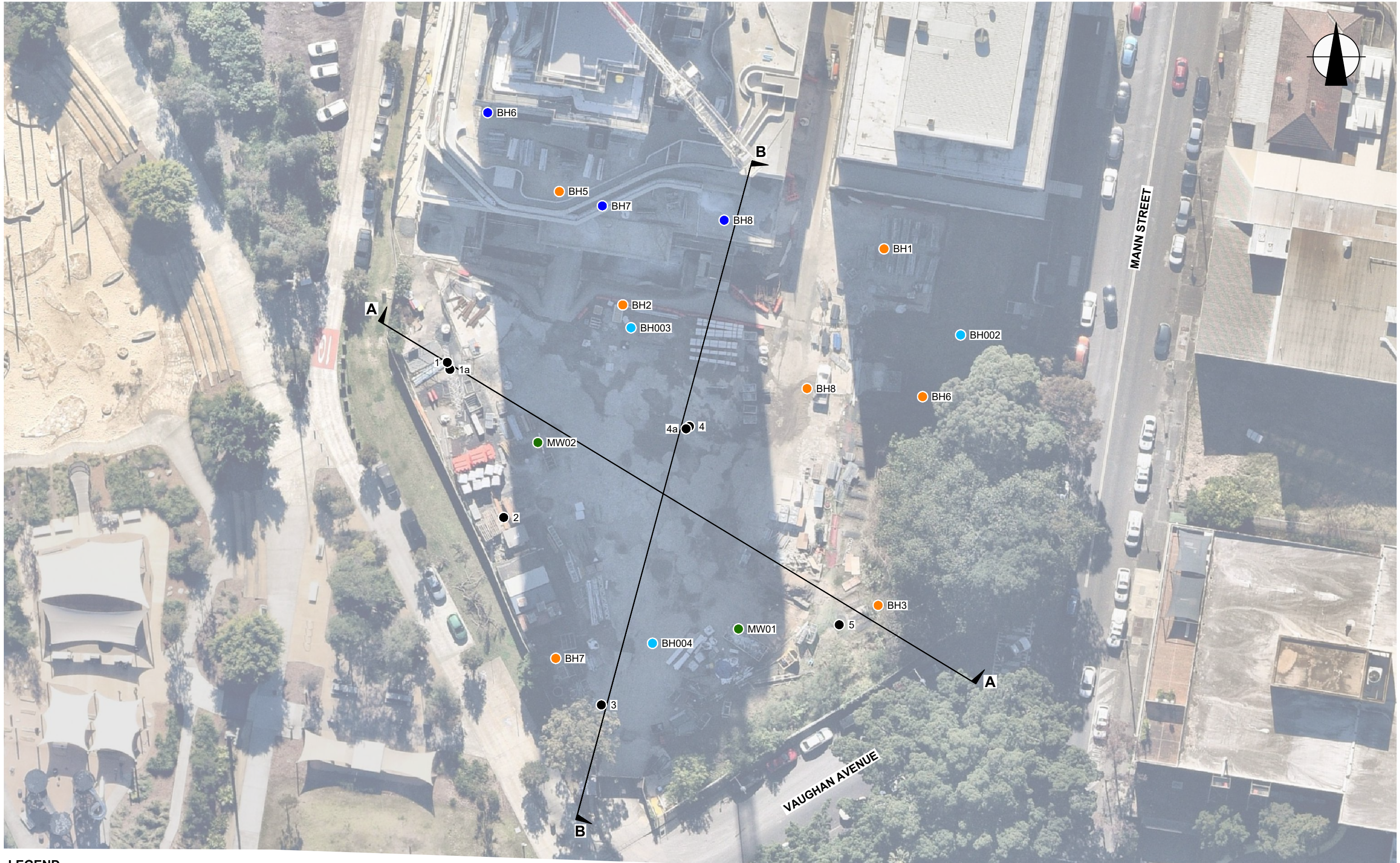
Title:	SITE LOCATION PLAN	
Location:	26-30 MANN STREET, GOSFORD, NSW	
Report No:	37790P	Figure No: 1



This plan should be read in conjunction with the JK Geotechnics report.

JK Geotechnics

PLOT DATE: 22/08/2025 3:35:26 PM DWG FILE: \\8F\GEO\TECHNICAL\JOBS\3700\37790P\GOSFORD\CAD\37790P.DWG

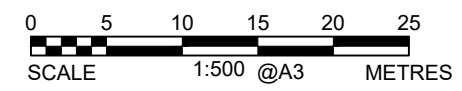


LEGEND

- JK GEOTECHNICS
- CARDNO (2016)
- COFFEY (2019)
- CARDNO (2022)
- STANTEC (2024)

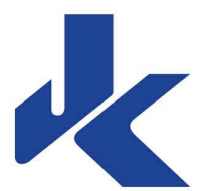
NOTES:
 1. REFER TO FIGURE 5 FOR CROSS SECTION A-A.
 2. REFER TO FIGURE 6 FOR CROSS SECTION B-B.

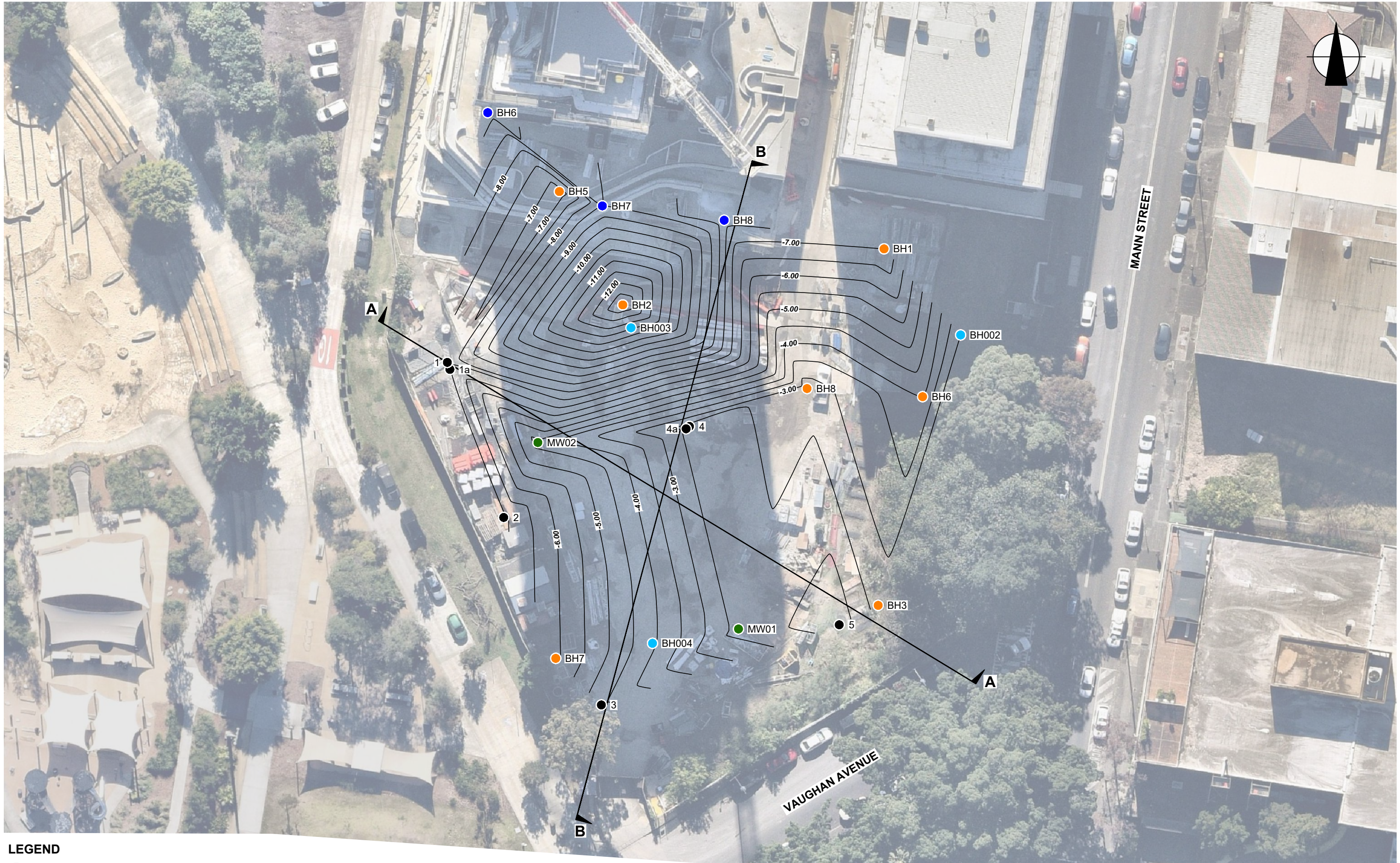
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM



This plan should be read in conjunction with the JK Geotechnics report.

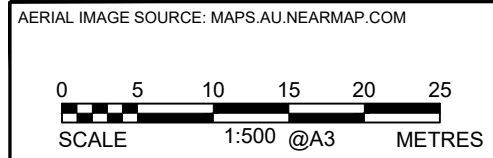
Title: BOREHOLE LOCATION PLAN	
Location: 26-30 MANN STREET, GOSFORD, NSW	
Report No: 37790P	Figure No: 2
JKGeotechnics	





- LEGEND**
- JK GEOTECHNICS
 - CARDNO (2016)
 - COFFEY (2019)
 - CARDNO (2022)
 - STANTEC (2024)
 - ROCK SURFACE LEVEL CONTOURS (mAHD)

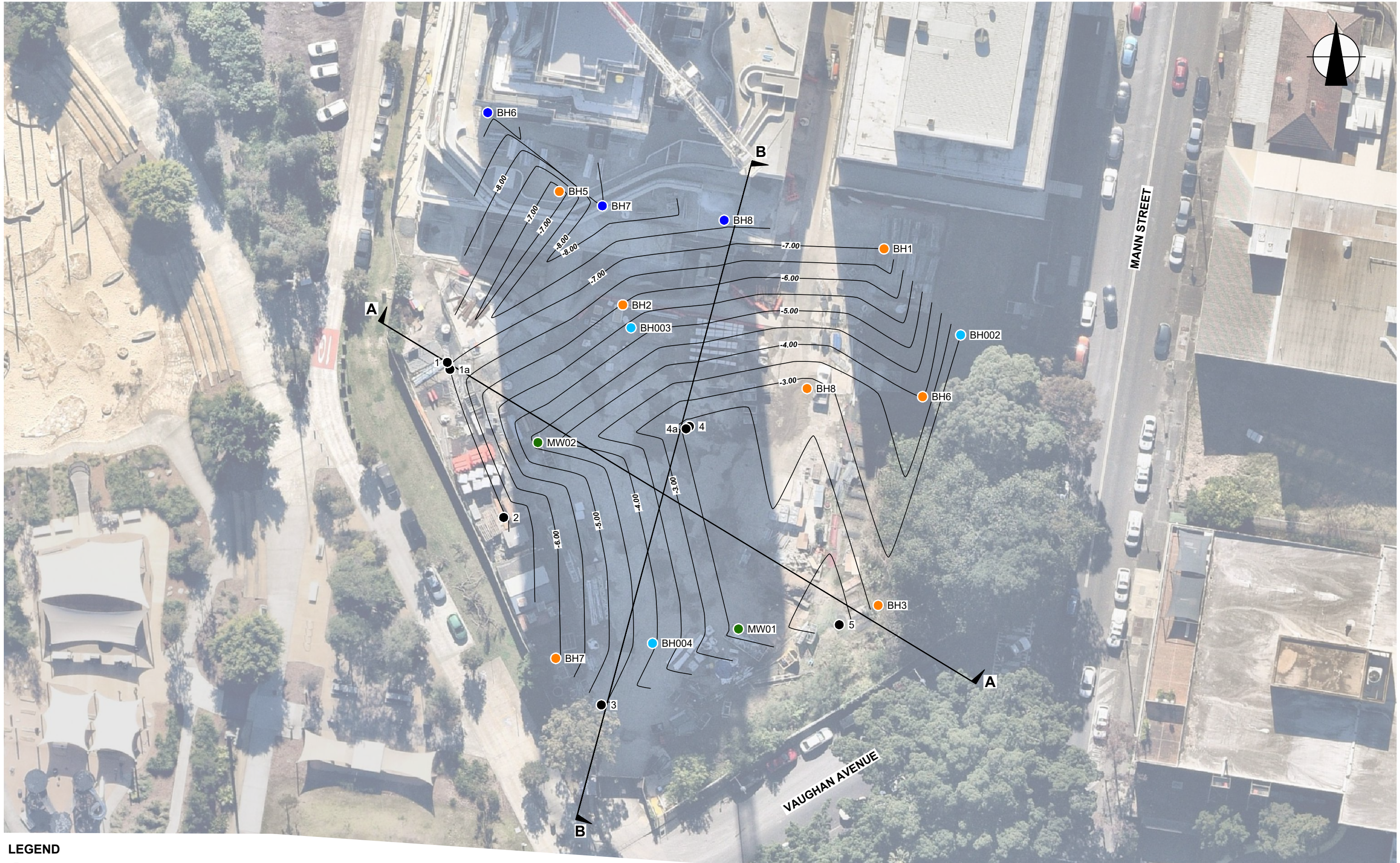
NOTES:
 1. REFER TO FIGURE 5 FOR CROSS SECTION A-A.
 2. REFER TO FIGURE 6 FOR CROSS SECTION B-B.



This plan should be read in conjunction with the JK Geotechnics report.

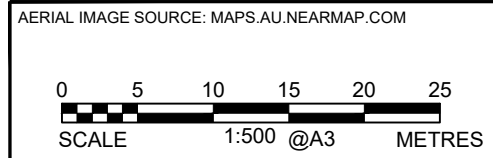
Title: INTERPRETED ROCK SURFACE LEVEL CONTOUR PLAN	
Location: 26-30 MANN STREET, GOSFORD, NSW	
Report No: 37790P	Figure No: 3
JKGeotechnics	





- LEGEND**
- JK GEOTECHNICS
 - CARDNO (2016)
 - COFFEY (2019)
 - CARDNO (2022)
 - STANTEC (2024)
 - ROCK SURFACE LEVEL CONTOURS (mAHD)

NOTES:
 1. REFER TO FIGURE 5 FOR CROSS SECTION A-A.
 2. REFER TO FIGURE 6 FOR CROSS SECTION B-B.

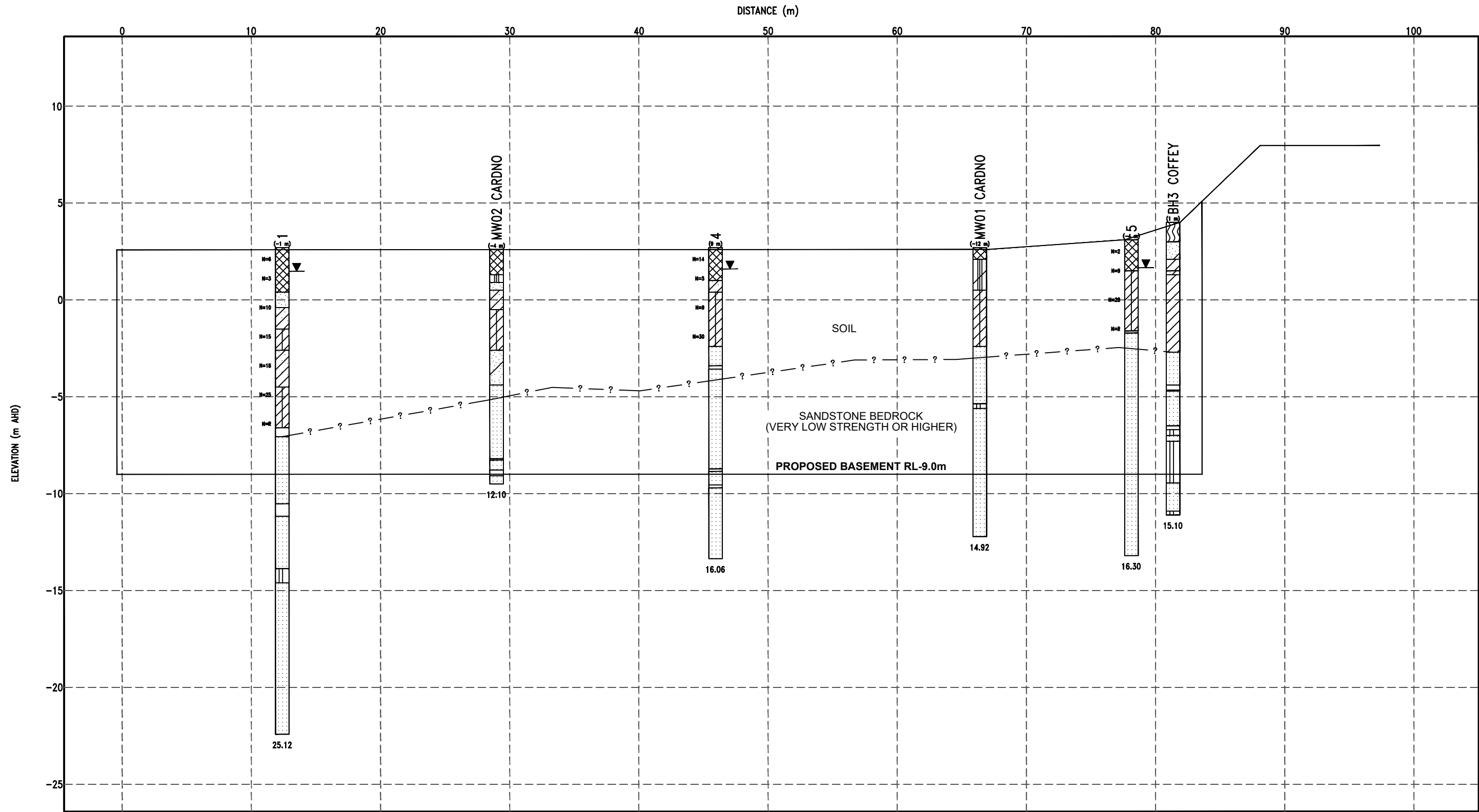


This plan should be read in conjunction with the JK Geotechnics report.

Title: INTERPRETED ROCK SURFACE LEVEL CONTOUR PLAN - AMENDED	
Location: 26-30 MANN STREET, GOSFORD, NSW	
Report No: 37790P	Figure No: 4
JKGeotechnics	

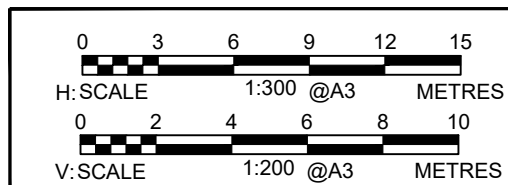


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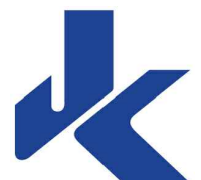
MATERIAL GRAPHIC

- | | | | | |
|----------------------|-------------------------|-------------------------|-----------|---------|
| CLAY (C, CI, CH) | NO CORE | SILTY CLAY (CL, CI, CH) | FILL | TOPSOIL |
| CLAYEY SAND (SC) | SAND (SP, SW) | CLAYSTONE | SANDSTONE | |
| CLAYEY SILT (ML, MH) | SANDY CLAY (CL, CI, CH) | CONCRETE | SILTSTONE | |

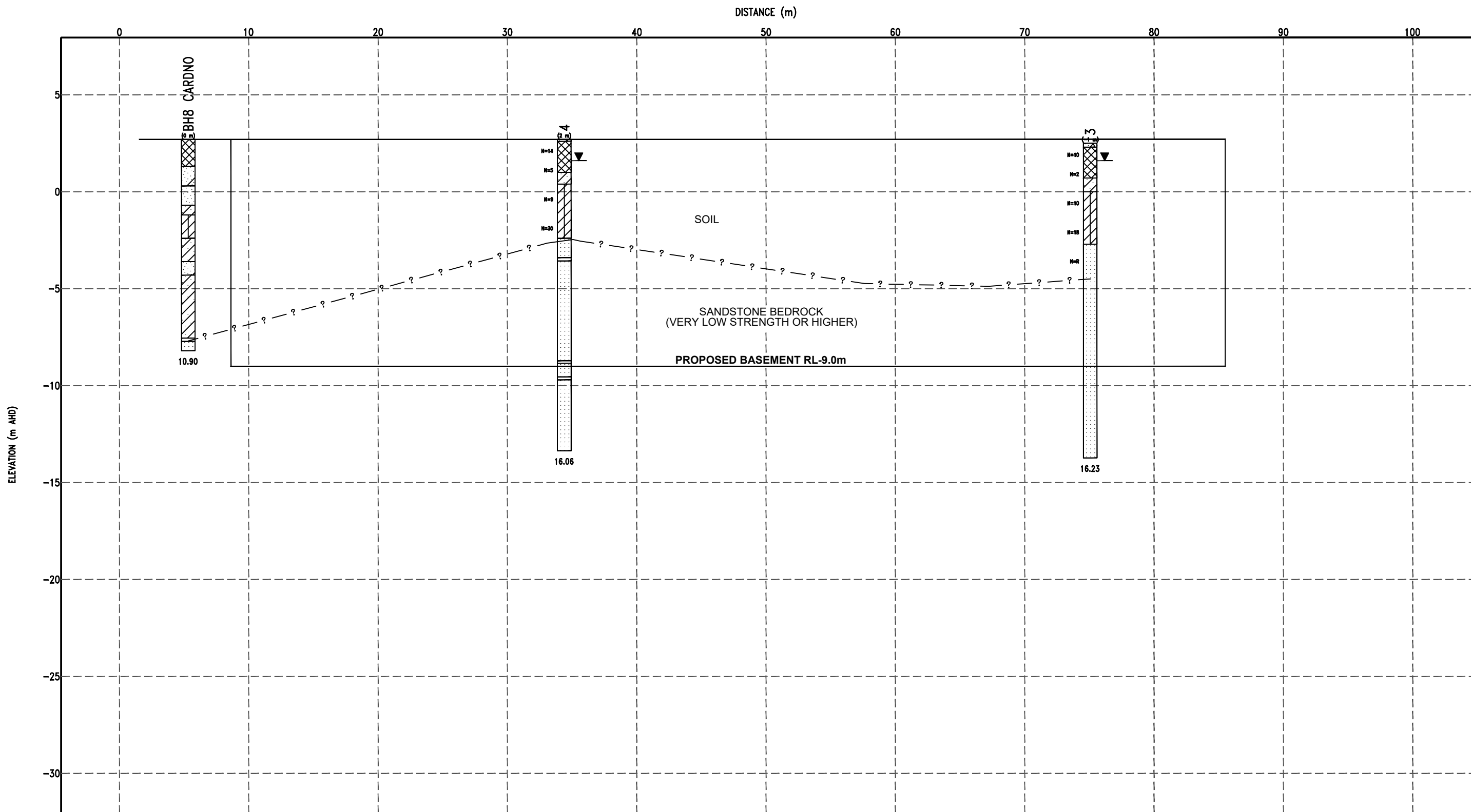


This plan should be read in conjunction with the JK Geotechnics report.

Title: INFERRED GEOTECHNICAL SECTION A-A	
Location: 26-30 MANN STREET, GOSFORD, NSW	
Report No: 37790P	Figure No: 5
JKGeotechnics	

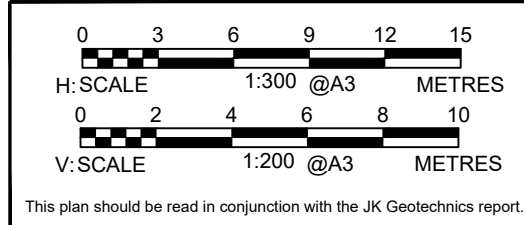


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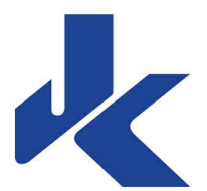


MATERIAL GRAPHIC

- | | | |
|------------------|-------------------------|-----------|
| CLAYEY SAND (SC) | SANDY CLAY (CL, CI, CH) | FILL |
| NO CORE | SILTY CLAY (CL, CI, CH) | SANDSTONE |
| SAND (SP, SW) | CONCRETE | |



Title: INFERRED GEOTECHNICAL SECTION B-B	
Location: 26-30 MANN STREET, GOSFORD, NSW	
Report No: 37790P	Figure No: 6
JKGeotechnics	





VIBRATION EMISSION DESIGN GOALS

German Standard DIN 4150 – Part 3: 1999 provides guideline levels of vibration velocity for evaluating the effects of vibration in structures. The limits presented in this standard are generally recognised to be conservative.

The DIN 4150 values (maximum levels measured in any direction at the foundation, OR, maximum levels measured in (x) or (y) horizontal directions, in the plane of the uppermost floor), are summarised in Table 1 below.

It should be noted that peak vibration velocities higher than the minimum figures in Table 1 for low frequencies may be quite ‘safe’, depending on the frequency content of the vibration and the actual condition of the structure.

It should also be noted that these levels are ‘safe limits’, up to which no damage due to vibration effects has been observed for the particular class of building. ‘Damage’ is defined by DIN 4150 to include even minor non-structural effects such as superficial cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls. Should damage be observed at vibration levels lower than the ‘safe limits’, then it may be attributed to other causes. DIN 4150 also states that when vibration levels higher than the ‘safe limits’ are present, it does not necessarily follow that damage will occur. Values given are only a broad guide.

Table 1: DIN 4150 – Structural Damage – Safe Limits for Building Vibration

Group	Type of Structure	Peak Vibration Velocity in mm/s			
		At Foundation Level at a Frequency of:			Plane of Floor of Uppermost Storey
		Less than 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design.	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use.	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 and 2 and have intrinsic value (eg. buildings that are under a preservation order).	3	3 to 8	8 to 10	8

Note: For frequencies above 100Hz, the higher values in the 50Hz to 100Hz column should be used.

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 'Geotechnical Site Investigations'. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) is referred to as 'laminite'.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shrink-swell behaviour, strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm 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 150mm of, say, 4, 6 and 7 blows, as

N = 13
4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

N > 30
15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

Cone Penetrometer Testing (CPT) and Interpretation:

The cone penetrometer is sometimes referred to as a Dutch Cone. The test is described in Australian Standard 1289.6.5.1–1999 (R2013) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Static Cone Penetration Resistance of a Soil – Field Test using a Mechanical and Electrical Cone or Friction-Cone Penetrometer'*.

In the tests, a 35mm or 44mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm or 165mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck. The CPT does not provide soil sample recovery.

As penetration occurs (at a rate of approximately 20mm per second), the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa. There are two scales presented for the cone resistance. The lower scale has a range of 0 to 5MPa and the main scale has a range of 0 to 50MPa. For cone resistance values less than 5MPa, the plot will appear on both scales.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between CPT and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of CPT values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

There are limitations when using the CPT in that it may not penetrate obstructions within any fill, thick layers of hard clay and very dense sand, gravel and weathered bedrock. Normally a 'dummy' cone is pushed through fill to protect the equipment. No information is recorded by the 'dummy' probe.

Flat Dilatometer Test: The flat dilatometer (DMT), also known as the Marchetti Dilometer comprises a stainless steel blade having a flat, circular steel membrane mounted flush on one side.

The blade is connected to a control unit at ground surface by a pneumatic-electrical tube running through the insertion rods. A gas tank, connected to the control unit by a pneumatic cable, supplies the gas pressure required to expand the membrane. The control unit is equipped with a pressure regulator, pressure gauges, an audio-visual signal and vent valves.

The blade is advanced into the ground using our CPT rig or one of our drilling rigs, and can be driven into the ground using an SPT hammer. As soon as the blade is in place, the membrane is inflated, and the pressure required to lift the membrane (approximately 0.1mm) is recorded. The pressure then required to lift the centre of the membrane by an additional 1mm is recorded. The membrane is then deflated before pushing to the next depth increment, usually 200mm down. The pressure readings are corrected for membrane stiffness.

The DMT is used to measure material index (I_b), horizontal stress index (K_0), and dilatometer modulus (E_D). Using established correlations, the DMT results can also be used to assess the 'at rest' earth pressure coefficient (K_0), over-consolidation ratio (OCR), undrained shear strength (C_u), friction angle (ϕ), coefficient of consolidation (C_h), coefficient of permeability (K_h), unit weight (γ), and vertical drained constrained modulus (M).

The seismic dilatometer (SDMT) is the combination of the DMT with an add-on seismic module for the measurement of shear wave velocity (V_s). Using established correlations, the SDMT results can also be used to assess the small strain modulus (G_0).

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a 16mm diameter rod with a 20mm diameter cone end with a 9kg hammer dropping 510mm. The test is described in Australian Standard 1289.6.3.2–1997 (R2013) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – 9kg Dynamic Cone Penetrometer Test'*.

The results are used to assess the relative compaction of fill, the relative density of granular soils, and the strength of cohesive soils. Using established correlations, the DCP test results can also be used to assess California Bearing Ratio (CBR).

Refusal of the DCP can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Vane Shear Test: The vane shear test is used to measure the undrained shear strength (C_u) of typically very soft to firm fine grained cohesive soils. The vane shear is normally performed in the bottom of a borehole, but can be completed from surface level, the bottom and sides of test pits, and on recovered undisturbed tube samples (when using a hand vane).

The vane comprises four rectangular blades arranged in the form of a cross on the end of a thin rod, which is coupled to the bottom of a drill rod string when used in a borehole. The size of the vane is dependent on the strength of the fine grained cohesive soils; that is, larger vanes are normally used for very low strength soils. For borehole testing, the size of the vane can be limited by the size of the casing that is used.

For testing inside a borehole, a device is used at the top of the casing, which suspends the vane and rods so that they do not sink under self-weight into the 'soft' soils beyond the depth at which the test is to be carried out. A calibrated torque head is used to rotate the rods and vane and to measure the resistance of the vane to rotation.

With the vane in position, torque is applied to cause rotation of the vane at a constant rate. A rate of 6° per minute is the common rotation rate. Rotation is continued until the soil is sheared and the maximum torque has been recorded. This value is then used to calculate the undrained shear strength. The vane is then rotated rapidly a number of times and the operation repeated until a constant torque reading is obtained. This torque value is used to calculate the remoulded shear strength. Where appropriate, friction on the vane rods is measured and taken into account in the shear strength calculation.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- 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 be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soils for Engineering Purposes'* or appropriate NSW Government Roads & Maritime Services (RMS) test methods. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.



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

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.
- Details of the development that the Company could not reasonably be expected to anticipate.

If these occur, the Company will be pleased to assist with investigation or advice to resolve any problems occurring.

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, the Company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Where information obtained from this investigation 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. The Company would

be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. Licence to use the documents may be revoked without notice if the Client is in breach of any obligation to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/constraints are quite complex, it is prudent to have a joint design review which involves an experienced geotechnical engineer/engineering geologist.

SITE INSPECTION

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

- i) a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types and appropriate footing or pile founding depths, or
- iii) full time engineering presence on site.

SYMBOL LEGENDS

SOIL



FILL



TOPSOIL



CLAY (CL, CI, CH)



SILT (ML, MH)



SAND (SP, SW)



GRAVEL (GP, GW)



SANDY CLAY (CL, CI, CH)



SILTY CLAY (CL, CI, CH)



CLAYEY SAND (SC)



SILTY SAND (SM)



GRAVELLY CLAY (CL, CI, CH)



CLAYEY GRAVEL (GC)



SANDY SILT (ML, MH)



PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK



CONGLOMERATE



SANDSTONE



SHALE/MUDSTONE



SILTSTONE



CLAYSTONE



COAL



LAMINITE



LIMESTONE



PHYLLITE, SCHIST



TUFF



GRANITE GABBRO



DOLERITE DIORITE



BASALT, ANDESITE



QUARTZITE

OTHER MATERIALS



BRICKS OR PAVERS



CONCRETE



ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 68% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm)	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $C_u > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_u = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_c = \frac{(D_{30})^2}{D_{10} D_{60}}$$

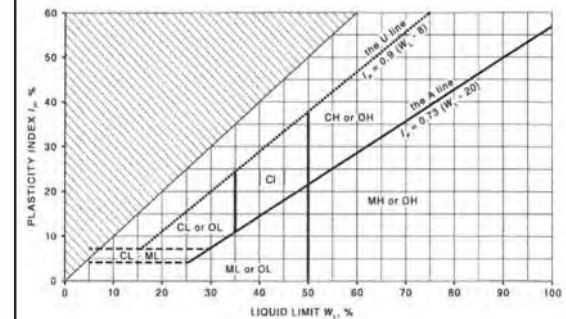
Where D_{10} , D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:




- For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.
- Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.
- Clay soils with liquid limits $> 35\%$ and $\leq 50\%$ may be classified as being of medium plasticity.
- The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	
fine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition																							
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.																							
		Extent of borehole/test pit collapse shortly after drilling/excavation.																							
		Groundwater seepage into borehole or test pit noted during drilling or excavation.																							
Samples	ES	Sample taken over depth indicated, for environmental analysis.																							
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.																							
	DB	Bulk disturbed sample taken over depth indicated.																							
	DS	Small disturbed bag sample taken over depth indicated.																							
	ASB	Soil sample taken over depth indicated, for asbestos analysis.																							
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.																							
	SAL	Soil sample taken over depth indicated, for salinity analysis.																							
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.																							
	N _c =	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">5</td> </tr> <tr> <td style="width: 20px; text-align: center;">7</td> </tr> <tr> <td style="width: 20px; text-align: center;">3R</td> </tr> </table>	5	7	3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.																			
	5																								
	7																								
3R																									
VNS = 25	Vane shear reading in kPa of undrained shear strength.																								
PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).																								
Moisture Condition (Fine Grained Soils) (Coarse Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.																							
	w ≈ PL	Moisture content estimated to be approximately equal to plastic limit.																							
	w < PL	Moisture content estimated to be less than plastic limit.																							
	w ≈ LL	Moisture content estimated to be near liquid limit.																							
	w > LL	Moisture content estimated to be wet of liquid limit.																							
	D	DRY – runs freely through fingers.																							
	M	MOIST – does not run freely but no free water visible on soil surface.																							
	W	WET – free water visible on soil surface.																							
	Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.																						
		S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.																						
F		FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.																							
St		STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.																							
VSt		VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.																							
Hd		HARD – unconfined compressive strength > 400kPa.																							
Fr		FRIABLE – strength not attainable, soil crumbles.																							
()		Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.																							
Density Index/ Relative Density (Cohesionless Soils)		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Density Index (I_D) Range (%)</th> <th>SPT 'N' Value Range (Blows/300mm)</th> </tr> </thead> <tbody> <tr> <td>VL</td> <td>VERY LOOSE</td> <td>≤ 15</td> <td>0 – 4</td> </tr> <tr> <td>L</td> <td>LOOSE</td> <td>> 15 and ≤ 35</td> <td>4 – 10</td> </tr> <tr> <td>MD</td> <td>MEDIUM DENSE</td> <td>> 35 and ≤ 65</td> <td>10 – 30</td> </tr> <tr> <td>D</td> <td>DENSE</td> <td>> 65 and ≤ 85</td> <td>30 – 50</td> </tr> <tr> <td>VD</td> <td>VERY DENSE</td> <td>> 85</td> <td>> 50</td> </tr> </tbody> </table>		Density Index (I _D) Range (%)	SPT 'N' Value Range (Blows/300mm)	VL	VERY LOOSE	≤ 15	0 – 4	L	LOOSE	> 15 and ≤ 35	4 – 10	MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30	D	DENSE	> 65 and ≤ 85	30 – 50	VD	VERY DENSE	> 85	> 50
		Density Index (I _D) Range (%)	SPT 'N' Value Range (Blows/300mm)																						
	VL	VERY LOOSE	≤ 15	0 – 4																					
	L	LOOSE	> 15 and ≤ 35	4 – 10																					
	MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30																					
	D	DENSE	> 65 and ≤ 85	30 – 50																					
	VD	VERY DENSE	> 85	> 50																					
VL	VERY LOOSE	≤ 15	0 – 4																						
L	LOOSE	> 15 and ≤ 35	4 – 10																						
MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30																						
D	DENSE	> 65 and ≤ 85	30 – 50																						
VD	VERY DENSE	> 85	> 50																						
()	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.																								
Hand Penetrometer Readings	300	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.																							
	250																								



Log Column	Symbol	Definition	
Remarks	'V' bit	Hardened steel 'V' shaped bit.	
	'TC' bit	Twin pronged tungsten carbide bit.	
	T ₆₀	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.	
	Soil Origin	The geological origin of the soil can generally be described as:	
		RESIDUAL	– soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock.
		EXTREMELY WEATHERED	– soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock.
		ALLUVIAL	– soil deposited by creeks and rivers.
		ESTUARINE	– soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents.
MARINE		– soil deposited in a marine environment.	
AEOLIAN		– soil carried and deposited by wind.	
COLLUVIAL	– soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits.		
LITTORAL	– beach deposited soil.		

Classification of Material Weathering

Term	Abbreviation	Definition
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered	MW	
Distinctly Weathered (Note 1)		
Slightly Weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $I_{s(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Abbreviations Used in Defect Description

Cored Borehole Log Column	Symbol Abbreviation	Description	
Point Load Strength Index	• 0.6	Axial point load strength index test result (MPa)	
	x 0.6	Diametral point load strength index test result (MPa)	
Defect Details	– Type	Be	Parting – bedding or cleavage
		CS	Clay seam
		Cr	Crushed/sheared seam or zone
		J	Joint
		Jh	Healed joint
		Ji	Incipient joint
		XWS	Extremely weathered seam
	– Orientation	Degrees	Defect orientation is measured relative to normal to the core axis (ie. relative to the horizontal for a vertical borehole)
	– Shape	P	Planar
		C	Curved
		Un	Undulating
		St	Stepped
		Ir	Irregular
	– Roughness	Vr	Very rough
		R	Rough
		S	Smooth
		Po	Polished
		Sl	Slickensided
	– Infill Material	Ca	Calcite
		Cb	Carbonaceous
		Clay	Clay
		Fe	Iron
		Qz	Quartz
		Py	Pyrite
	– Coatings	Cn	Clean
		Sn	Stained – no visible coating, surface is discoloured
		Vn	Veneer – visible, too thin to measure, may be patchy
		Ct	Coating ≤ 1mm thick
		Filled	Coating > 1mm thick
	– Thickness	mm.t	Defect thickness measured in millimetres



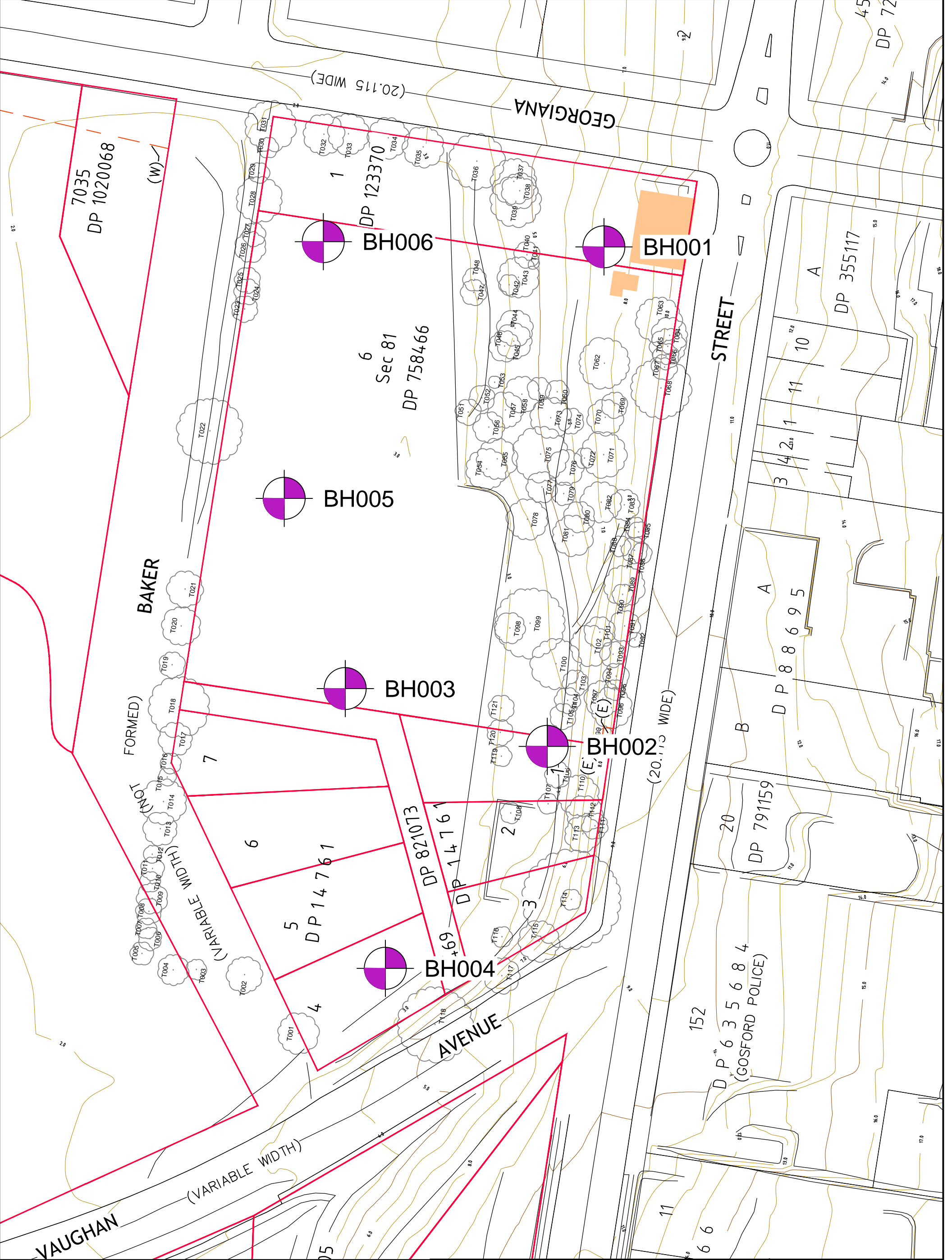
APPENDIX A



APPENDIX A1

CARDNO (2016)

XREFS: 190055P-SUR-002-C CAD File: N:\Projects\8055F16860_20 Mann St Gosford - NSW Gov\012_Geotech\Drawings\Complete\Site Plan Drawing AM (2).dwg DATE PLOTTED: 7 October 2015 1:53 PM BY: AUREZA MOHTI



DRAWING ADAPTED FROM ADW Johnson site survey plan, Ref No. 190055P-SUR-002-B, dated 31/01/2014

 **BOREHOLE ID AND LOCATION**



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Cardno
Shaping the Future
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Gosford, NSW 2250
Tel: 02 4323 2558 Fax: 02 4324 3251
Web: www.cardno.com.au

GOVERNMENT PROPERTY NSW PRELIMINARY GEOTECHNICAL ASSESSMENT			
BOREHOLE LOCATION PLAN FORMER SCHOOL SITE, 20 MANN ST, GOSFORD			
Datum	Date	Scale	Size
	07/10/2015	NTS	A3
Drawing Number	Revision		
80516860-GE-001	0		

BOREHOLE LOG

CLIENT : Government Property NSW
 PROJECT : Preliminary Geotechnical Assessment
 LOCATION : 20 Mann Street, Gosford

HOLE NO : BH002
 PROJECT REF : 80516860
 SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
 DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
 LOCATION : See Drawing for location EASTING : 345767 NORTHING : 6299805 RL : 3m

DRILLING				MATERIAL					
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / CEMENTATION / ROCK STRENGTH	STRUCTURE & Other Observations	
ADV	free standing water level	0.50m	0.0	U	0.20m TOPSOIL; Silty SAND, fine to coarse grained, dark brown-black, with organics, trace root fibre	M		Alluvial	
		B	0.50m	U	Silty SAND, fine to coarse grained, dark brown	M	MD		
		0.80m	1.0	U	Silty SAND, fine to coarse grained, brown-black, highly organic			free standing water level @ 0.85m observed on 22/09/2015	
		1.00m	1.0	U					
		SPT 1, 0, 0 N=0	1.45m	2.0	U		MC > PL	S	
		2.50m	2.30m	2.0	U	Sandy CLAY, medium to high plasticity, pale grey	MC > PL	VSt - H	free standing water level @ 2.2m observed on 21/09/2015 Residual
		SPT 5, 6, 10 N=16	2.95m	3.0	U	as above, but low to medium plasticity, trace gravel			
		4.00m	4.00m	-1	U		MC = PL	VSt - H	
		SPT 8, 12, 14 N=26	4.45m	-2	U				
		5.50m	5.00m	-2	U	CLAY, medium to high plasticity, pale grey, trace silt	MC < PL	H	
SPT 7, 15, 21 N=36	5.95m	-3	U						
		-3	U	6.00m SANDSTONE, fine to medium grained, pale grey mottled red	XW	VL			
		-4	U	6.40m Borehole BH002 terminated at 6.40 m Refusal on sandstone					

GEOTECH.GLB Log_CARDNO_BOREHOLE_LOG_80516860_20 MANN STREET_GOSFORD.GPJ_13/10/2015 10:25 8.30.003

MOISTURE & GROUNDWATER
 D - Dry
 M - Moist
 W - Wet
 OMC - Optimum MC
 PL - Plastic Limit
 ▲ - Water seepage/inflow
 ▼ - Water level

SAMPLES & FIELD TESTS
 U - Undisturbed Sample
 D - Disturbed Sample
 ES - Environmental sample
 B - Bulk Disturbed Sample
 SPT - Standard Penetration Test
 HP - Hand/Pocket Penetrometer

CONSISTENCY
 VS - Very Soft
 S - Soft
 F - Firm
 St - Stiff
 VSt - Very Stiff
 H - Hard

RELATIVE DENSITY
 VL - Very Loose
 L - Loose
 MD - Medium Dense
 D - Dense
 VD - Very Dense

ROCK STRENGTH
 EL - Extremely low
 VL - Very low
 L - Low
 M - Medium
 H - High
 VH - Very high
 EH - Extremely high

ROCK WEATHERING
 RS - Residual soil
 XW - Extremely weathered
 DW - Distinctly weathered
 SW - Slightly weathered
 FR - Fresh rock

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

CARDNO LTD

BOREHOLE LOG

CLIENT : Government Property NSW
 PROJECT : Preliminary Geotechnical Assessment
 LOCATION : 20 Mann Street, Gosford

HOLE NO : BH003
 PROJECT REF : 80516860
 SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
 DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
 LOCATION : See Drawing for location EASTING : 345721 NORTHING : 6299806 RL : 3m

DRILLING				MATERIAL					
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / COHESIVENESS / ROCK STRENGTH	STRUCTURE & Other Observations	WELL
ADV	free standing water level	1.00m SPT 3, 2, 1 N=3	0.0	[Symbol]	FILL; Clayey SAND, fine to coarse grained, brown, with gravel, trace ceramics and bricks fragment	M		Alluvium	[Symbol]
		1.45m	0.50m	[Symbol]	Clayey SAND, fine to coarse grained, brown-dark brown	M - W	MD		
			1.0	[Symbol]				free standing water level @ 1.28m observed on 22/09/2015	[Symbol]
			1.30m	[Symbol]	Silty CLAY, medium to high plasticity, highly organic, dark brown-black, with organics	W	VL		
			2.0	[Symbol]				Residual	[Symbol]
			1.80m	[Symbol]	Silty SAND, fine to coarse grained, pale grey, with clay	W	VL - MD		
			3.0	[Symbol]					[Symbol]
			2.50m	[Symbol]	Sandy CLAY, medium to high plasticity, pale grey-grey, trace gravel	MC > PL	VSt		
			4.0	[Symbol]					[Symbol]
			3.50m SPT 5, 8, 12 N=20 3.95m	[Symbol]	as above, but colour change to red mottled orange	MC = PL	VSt		
			6.00m SPT 16/70mm HB N=R 6.07m	[Symbol]				Borehole BH003 terminated at 6.00 m Refusal on sandstone	[Symbol]
			6.00m	[Symbol]					

MOISTURE & GROUNDWATER
 D - Dry
 M - Moist
 W - Wet
 OMC - Optimum MC
 PL - Plastic Limit
 Water seepage/inflow
 Water level

SAMPLES & FIELD TESTS
 U - Undisturbed Sample
 D - Disturbed Sample
 ES - Environmental sample
 B - Bulk Disturbed Sample
 SPT - Standard Penetration Test
 HP - Hand/Pocket Penetrometer

CONSISTENCY
 VS - Very Soft
 S - Soft
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 St - Stiff
 VSt - Very Stiff
 H - Hard

RELATIVE DENSITY
 VL - Very Loose
 L - Loose
 MD - Medium Dense
 D - Dense
 VD - Very Dense

ROCK STRENGTH
 EL - Extremely low
 VL - Very low
 L - Low
 M - Medium
 H - High
 VH - Very high
 EH - Extremely high

ROCK WEATHERING
 RS - Residual soil
 XW - Extremely weathered
 DW - Distinctly weathered
 SW - Slightly weathered
 FR - Fresh rock

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

CARDNO LTD

BOREHOLE LOG

CLIENT : Government Property NSW
 PROJECT : Preliminary Geotechnical Assessment
 LOCATION : 20 Mann Street, Gosford

HOLE NO : BH004
 PROJECT REF : 80516860
 SHEET : 1 OF 1

RIG TYPE : 4WD mounted drill rig METHOD : Solid Flight Auger CONTRACTOR : Fico Group DRILLER :
 DATE STARTED : 21/9/15 DATE COMPLETED : 21/9/15 DATE LOGGED : 21/9/15 LOGGED BY : AM CHECKED BY : AM
 LOCATION : See Drawing for location EASTING : 345724 NORTHING : 6299762 RL : 3m

DRILLING				MATERIAL				
METHOD	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / RELATIVE DENSITY / ROCK STRENGTH	STRUCTURE & Other Observations
ADIV	free standing water level	1.00m SPT 2, 2, 1 N=3	0.0	[Cross-hatched]	0.04m SPRAYED SEAL FILL; Gravelly Clayey SAND, dark grey-green, angular gravel, with clay.	M		Fill
		1.45m	1.0	[Diagonal lines /]	0.80m Silty CLAY, medium to high plasticity, dark brown-black, high organic content	MC > PL	S - F	Alluvium
		2.50m B	2.0	[Dotted]	1.70m Clayey SAND, fine to coarse grained, green-grey	W	L - MD	free standing water level @ 2.2m observed on 21/09/2015
		3.40m 3.50m SPT 5, 9, 12 N=21	3.0	[Diagonal lines \]	2.50m Sandy CLAY, medium to high plasticity, pale grey mottled red orange	MC > PL	St	Residual
		3.95m	4.0	[Dotted]	4.40m SANDSTONE, fine to medium grained, pale grey mottled orange-red	MC < PL	VSt - H	
			4.60m	[Dotted]	4.60m SANDSTONE, fine to medium grained, pale grey mottled orange-red Borehole BH004 terminated at 4.60 m Refusal on sandstone	XW	EL	
			5.0					
			6.0					
			7.0					
			8.0					
			9.0					
			10.0					

MOISTURE & GROUNDWATER
 D - Dry
 M - Moist
 W - Wet
 OMC - Optimum MC
 PL - Plastic Limit
 ▲ - Water seepage/inflow
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 VD - Very Dense

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 EL - Extremely low
 VL - Very low
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 H - High
 VH - Very high
 EH - Extremely high

ROCK WEATHERING
 RS - Residual soil
 XW - Extremely weathered
 DW - Distinctly weathered
 SW - Slightly weathered
 FR - Fresh rock

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

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APPENDIX A2

COFFEY (2019)

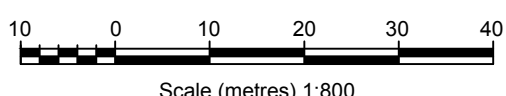


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no.	description	drawn	approved	date
A	ORIGINAL ISSUE	AM	AM	29/03/18

LEGEND

- SITE BOUNDARY - CURRENT STAGE
- SITE BOUNDARY - PREVIOUS STAGE
- SITE BOUNDARY - PREVIOUS STAGE
- ⊕ APPROXIMATE BOREHOLE LOCATION
- ⊕ APPROXIMATE TEST PIT LOCATION
- SECTION LINE



drawn	AM / AW
approved	AM
date	29 / 03 / 18
scale	AS SHOWN
original size	A3



client:	ST HILLIERS		
project:	GEOTECHNICAL AND ENVIRONMENTAL ASSESSMENT 32 MANN STREET, GOSFORD, NSW		
title:	BOREHOLE AND TEST PIT LOCATION PLAN		
project no:	754-SYD214942-AB	figure no:	FIGURE 1
			rev: A

IMAGE SOURCE: NEARMAPS

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH1**

sheet: 1 of 2

project no: **SYDGE214942**

date started: **22 Feb 2018**

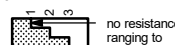
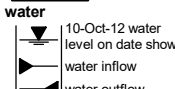
date completed: **22 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,756.31; N: 6,299,817.01 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance							
method & support	penetration	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
PT AD/T	1						FILL: Gravelly SAND: fine to medium grained, pale brown, with fine sub-angular gravels, trace of low plasticity clay.	D		100	FILL PID: 2.5ppm
	2	E		2.0			FILL: CLAY: medium to high plasticity, dark grey-black, trace of organics.	M		200	
	3	SPT 5, /50mm N*=R		1.0		SC	CLAYEY SAND: fine grained, dark brown mottled dark grey, with low to medium plasticity clay, trace of fine gravel.	L		300	ALLUVIUM
				2.0		CL	Sandy CLAY: medium to high plasticity, dark brown mottled dark grey, with fine grained sand, trace of fine gravel.	St		400	
		SPT 2, 4, 6 N*=10		3.0							RESIDUAL SOIL PID: 3.4ppm
		SPT 4, 5, 5 N*=10		4.0		CH	CLAY: medium to high plasticity, pale grey, trace of fine grained sand, trace of fine to medium sub-rounded gravel.				
		SPT 2, 4, 8 N*=12		5.0							
		22/02/18		6.0				5.2 m: harder ground conditions, red shade of soil appearing Sandy CLAY: medium to high plasticity, pale grey mottled orange, red, with very fine grained sand.	W	VSt	
		SPT 6, 13, 16 N*=29		7.0				6.5 m: harder ground conditions encountered		H	
				8.0							
	SPT 6, 19, 30 N*=49		9.0			CL	Sandy CLAY: medium plasticity, pale grey, spotted red, with fine grained sand, trace of extremely weathered rock.				

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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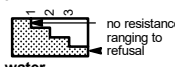
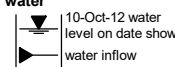
Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH1**
 sheet: 2 of 2
 project no: **SYDGE214942**
 date started: **22 Feb 2018**
 date completed: **22 Feb 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,756.31; N: 6,299,817.01 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance								
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T	1 2 3						CL	Sandy CLAY : medium plasticity, pale grey, spotted red, with fine grained sand, trace of extremely weathered rock. <i>(continued)</i>	W	H	100 200 300 400	RESIDUAL SOIL
			SPT 20 30/50mm N*=R	-6				Borehole BH1 terminated at 8.70 m				
					9.0							
					-7							
					10.0							
					-8							
					11.0							
					-9							
					12.0							
					-10							
					13.0							
					-11							
					14.0							
					-12							
					15.0							
					-13							

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  no resistance ranging to refusal water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Borehole


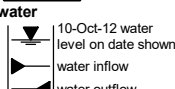
client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH2**
 sheet: 2 of 2
 project no: **SYDGE214942**
 date started: **22 Feb 2018**
 date completed: **23 Feb 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,719.85; N: 6,299,809.19 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance								
method & support	penetration	samples & field tests	water	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
							CL	Sandy CLAY: medium to high plasticity, orange-brown mottled red, pale grey, fine to medium grained sand.	M	H		RESIDUAL SOIL
		SPT 20, 30 N*=R		-6	9.0							
				-7	10.0		CH	CLAY: high plasticity, pale grey, spotted brown, trace of fine to coarse gravel.				
				-8	11.0			10.5 to 11.2 m: very soft spot encountered	F - St			
				-9	12.0		SC	CLAYEY SAND: fine to coarse grained, pale brown-orange mottled pale grey, with medium plasticity clay.		H		
				-10	13.0		CL	Silty CLAY: medium to high plasticity, pale grey mottled pale brown, with silt, trace of fine sub-rounded grey gravel, medium strength.	St - VS			
				-11	14.0		SC	CLAYEY SAND: fine to medium grained, pale grey, with medium plasticity clay, trace of sandstone.		H		
				-12	15.0		SC	13.05 to 13.4 m: soft material SAND: fine to coarse grained, pale brown-orange, trace of sandstone.				
				-13				Borehole BH2 terminated at 15.06 m				

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method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH3**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **23 Feb 2018**

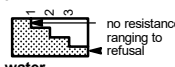
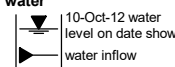
date completed: **23 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,755.46; N: 6,299,767.29 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance							
method & support	penetration	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
PT AD/T	1	E	0.0	0.0		ML	TOPSOIL: Silty CLAY: low to medium plasticity, brown, pale brown, trace of organics and root fibres.	D - M		100 200 300 400	TOPSOIL
	2	E	0.5	0.5			0.8 m: grading to brown-dark brown				
	3	SPT 4, 5, 7 N*=12	1.0	1.0		SC	CLAYEY SAND: fine to medium grained, dark brown, trace of fine grained sand.		MD		ALLUVIUM
	4	E	1.5	1.5							
	5	SPT 4, 6, 7 N*=13	2.0	2.0		CH	CLAY: medium to high plasticity, dark brown mottled red-dark grey.	M	St		RESIDUAL SOIL
	6	E	2.5	2.5							
	7	E	3.0	3.0		CL	Sandy CLAY: medium to high plasticity, dark brown, grading to brown, pale brown, fine to medium grained sand, trace of silt.				
	8	E	3.5	3.5		CH	CLAY: medium to high plasticity, pale grey, white, trace of silt, sand and root fibres.				
	9	SPT 3, 5, 6 N*=11	4.0	4.0		CH	CLAY: medium to high plasticity, pale grey, white, trace of tree root fibres. 3.2 m: colour changes to pale grey spotted red				
	10	SPT 2, 4, 6 N*=10	4.5	4.5				4.1 m: colour changes to pale, more tree root fibres present			
			5.0	5.0							
		SPT 5, 8, 13 N*=21	6.0	6.0					VSt		
			6.5	6.5							
			7.0	7.0					H		
			7.5	7.5			Borehole BH3 continued as cored hole				

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  no resistance ranging to refusal water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Cored Borehole

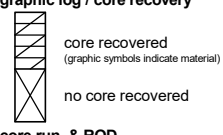
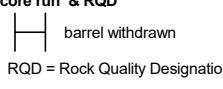
Borehole ID: **BH3**
 sheet: 2 of 3
 project no: **SYDGE214942**
 date started: **23 Feb 2018**
 date completed: **23 Feb 2018**
 logged by: **LP**
 checked by: **AM**

client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

position: E: 345,755.46; N: 6,299,767.29 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information		material substance				rock mass defects						
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 X = axial O = diametral a = axial d = diametral	samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)	
							VL L M H VH EH			30 100 300 1000 3000	particular	general
			3									
			2									
			1									
			0									
			-1									
			-2									
			-3		started coring at 6.70m SANDSTONE: fine grained, orange-red stained brown-grey, laminated, iron staining present. 7.00 m: colour changes to pale grey-white, with iron stains SANDSTONE: fine grained, pale grey-grey, bedded, trace of iron stains.	XW XW DW	X O X	a=0.47 d=0.05 a=1.62 d=1.56	13% 84%		JT, 45°, PL, RO, CO SM, PL, SO, CO, 30 mm JT, 85°, IR, RO, CO - Fe	

CDF_0_9_07_LIBRARY\GLB\rev\AU Log_COF_BOREHOLE: CORED 754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:29

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material) no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam planarity PL planar CU curved UN undulating ST stepped IR irregular roughness VR very rough RO rough SO smooth POL polished SL slickensided coating CN clean SN stained VN veneer CO coating
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Engineering Log - Cored Borehole

Borehole ID: **BH3**
 sheet: 3 of 3
 project no: **SYDGE214942**
 date started: **23 Feb 2018**
 date completed: **23 Feb 2018**
 logged by: **LP**
 checked by: **AM**

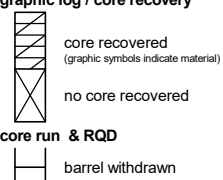
client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

position: E: 345,755.46; N: 6,299,767.29 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information		material substance				rock mass defects		
method & support	water	depth (m)	material description	weathering & alteration	estimated strength & Is50	samples, field tests & Is(50) (MPa)	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
RL (m)	depth (m)	graphic log	ROCK TYPE: grain characteristics, colour, structure, minor components	VL L M H VH EH	X = axial O = diametral a = axial d = diametral	core run & RQD	particular	general
			SANDSTONE: fine grained, pale grey-grey, bedded, trace of iron stains. (<i>continued</i>)	SW				
			CLAYSTONE: grey, laminated, with interbeds of sandstone.					PT, UN, RO, CN SM, PL, SO, CO SM, PL, SO, CO
	-5	9.0	SANDSTONE: fine grained, pale grey, interlaminated with grey siltstone.			a=2.22 d=1.86	84%	PT, UN, SO, CN PT, UN, SO, CN
	-6	10.0	SANDSTONE: fine grained, grey, bedded.			a=1.73 d=2.05		
	-7	11.0	10.44 to 10.49 m: claystone, dark grey laminated	SW - DW		a=2.10 d=1.50		
			CLAYSTONE: dark grey, interlaminated with siltstone.	SW		a=1.24 d=0.77		
			SILTSTONE: grey, interlaminated with claystone.			a=1.71 d=1.40		
			SANDSTONE: fine grained, pale grey-grey, bedded.			a=0.45 d=0.06	80%	PT, UN, SO, CN
	-8	12.0	SILTSTONE: grey-dark grey, interlaminated with claystone.					
	-9	13.0						PT, IR, SO, CN PT, UN, SO, CN
	-10	14.0	SANDSTONE: fine to medium grained, grey stained red-orange, bedded, trace of gravel.	DW - XW		a=0.84 d=0.50	52%	PT, UN, SO, CO SM, SO, CO PT, UN, RO, CO PT, CU, SO, CN
						a=1.37 d=0.94		PT, 0°, UN, SO - RO, CN PT, CU, SO - RO, CN PT, UN, SO - RO, CN
	-11	15.0	SILTSTONE: grey, thinly bedded.	SW				
Borehole BH3 terminated at 15.0 m								

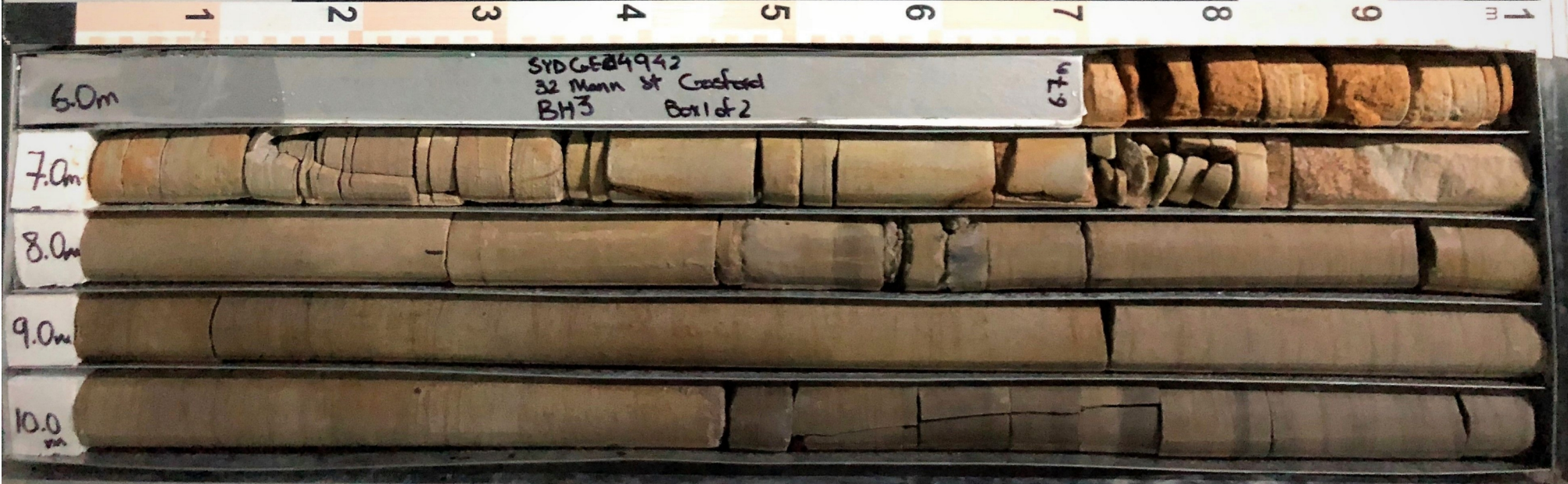
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Defects are: PT, 0°-5°, PL, RO, SO, CN - CO, unless otherwise described

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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PROJECT: 32 Mann St Gosford
 PROJECT No: 754 SYDGE214942
 BOREHOLE No: BH3
 DEPTH: 6.7-11.0m DATE: 23/02/2018

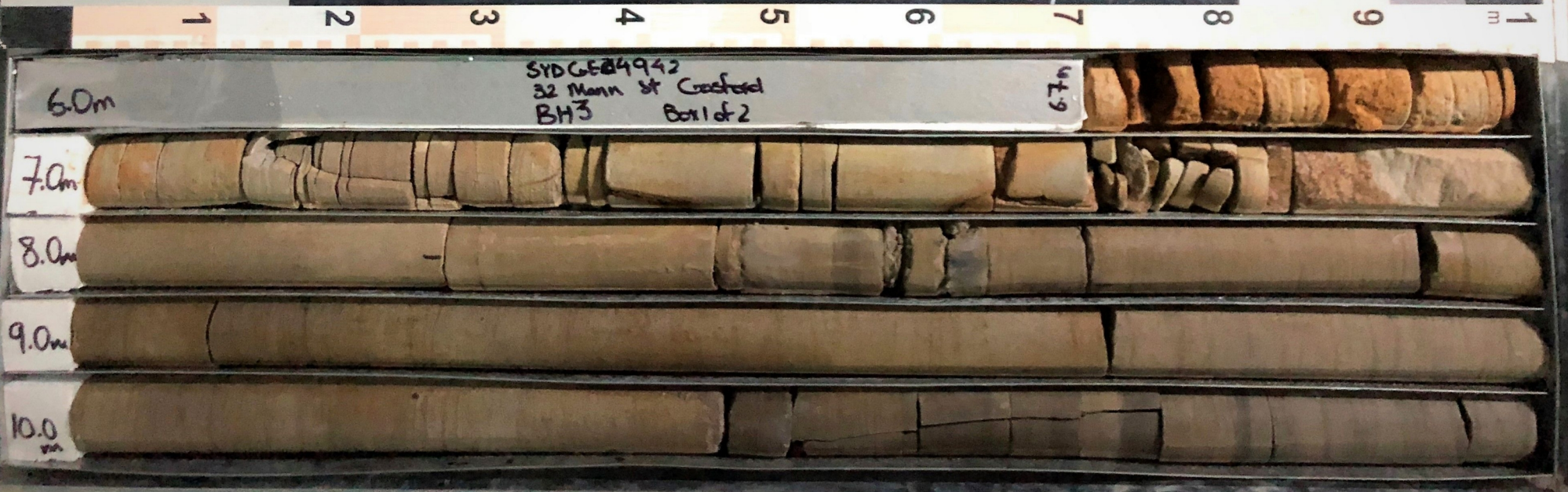


BH3 6.70 - 11.00 m

drawn	LP		client: St Hilliers		
approved	AM		project: Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title: CORE PHOTOGRAPH BH3		
scale	N.T.S.		project no: SYDGE214942	fig no: FIGURE 1	rev:
original size	A4				



PROJECT: 32 Mann St Gosford
 PROJECT No: 754 SYDGE214942
 BOREHOLE No: BH3
 DEPTH: 6.7-11.0m DATE: 23/02/2018



BH3 6.70 - 11.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH3		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4		rev:			

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH5**

sheet: 1 of 3

project no. **SYDGE214942**

date started: **28 Feb 2018**

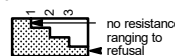
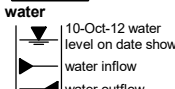
date completed: **28 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance								
method & support	penetration	samples & field tests	water	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
	1 2 3										100 200 300 400	
					0.0			FILL: Gravelly SILTY SAND: fine to coarse grained, brown-red, trace ceramics fragments.	M			FILL PID: 0.6ppm
		SPT 3, 2, 1 N*=3			1.0		CL	Sandy CLAY: medium to high plasticity, grey-brown, trace of organics with fine to coarse grained sand.	S			ALLUVIUM PID: 2.0ppm
					2.0		CH	Silty CLAY: medium to high plasticity, dark brown-black, trace of root fibres.				PID: 0.8ppm
		SPT 1, 2, 3 N*=5			3.0		SC	CLAYEY SAND: fine to coarse grained, pale grey, medium to high plasticity clay.	W	L		PID: 1.3ppm
		SPT 2, 5, 6 N*=11			4.0		CL	Sandy CLAY: medium to high plasticity, grey mottled orange.	St			RESIDUAL SOIL
		SPT 3, 3, 7 N*=10			5.4		CH	5.4 m: colour change to red mottled orange-grey CLAY: medium to high plasticity, grey-pale grey, spotted orange, trace of silt and fine grained sand.				
		SPT 6, 8, 10 N*=18			7.0					VSt		
					7.5					VSt		

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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CDF_0_9_07_LIBRARY\GLB\rev\AU_Log_COE_BOREHOLE_NON_CORED_754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:25

Engineering Log - Borehole


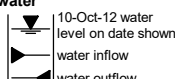
client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH5**
 sheet: 2 of 3
 project no: **SYDGE214942**
 date started: **28 Feb 2018**
 date completed: **28 Feb 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter : 100 mm

drilling information				material substance								
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
	1 2 3		SPT 6, 7, 13 N*=20	-6	9.0		CH	CLAY: medium to high plasticity, grey-pale grey, spotted orange, trace of silt and fine grained sand. (continued)	W	VSt - H	100 200 300 400	RESIDUAL SOIL
				-7	10.0			9.3 m: started getting really hard Borehole BH5 continued as cored hole				
				-8	11.0							
				-9	12.0							
				-10	13.0							
				-11	14.0							
				-12	15.0							
				-13								

CDF_0_9_07_LIBRARY\GLB\rev\AU Log_COF_BOREHOLE:NON_CORED_754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:25

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH5**

sheet: 3 of 3

project no. **SYDGE214942**

date started: **28 Feb 2018**

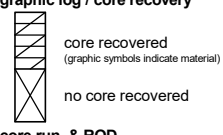
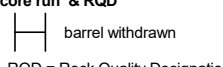
date completed: **28 Feb 2018**

logged by: **LP**

checked by: **AM**

position: E: 345,711.00; N: 6,299,825.00 (MGA94) surface elevation: 2.70 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information		material substance				rock mass defects					
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50) X = axial O = diametral a = axial, d = diametral	samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)
			9.0		started coring at 9.40m						
			10.0		SANDSTONE: fine to coarse grained, red, iron stained, bedded, trace of fine gravel (quartz).	XW		a=0.61 d=0.61	84%		PT, 0°, PL, RO, CN JT, 20°, UN, RO, CN SM, 0°, PL, SO, CO, 100 mm SM, 0°, PL, SO, CO, 30 mm PT, 0°, UN, RO, CN CS, 0°, PL, RO, CO PT, 5°, UN, RO, CN PT, 0°, CU, SO, CN PT, 0°, CU, SO, CN
			11.0		SANDSTONE: fine to medium grained, pale grey, laminated orange-red.	DW		a=0.65 d=0.95			
			12.0		SANDSTONE: fine to medium grained, grey, bedded.	SW		a=0.35 d=0.07	51%		PT, 0°, UN, SO, CN SM, 0°, PL, SO, CO, 20 mm SM, 5°, PL, SO, CO, 30 mm PT, 2°, IR, SO, CN JT, 70°, IR, RO, CN, 100 mm SM, 5°, PL, SO, CO, 30 mm SZ, IR, CN, 70 mm
			13.0		NO CORE: 0.35 m						
			14.0		SANDSTONE: fine to medium grained, red-orange.	XW		a=0.49 d=0.38			PT, 3°, UN, SO, SN JT, 60°, PL, RO, CN, 130 mm JT, 75°, UN, RO, CN, 120 mm Fractured zone JT, 75°, PL, SO, SN, 130 mm SM, 0°, PL, SO, CO, 60 mm
			15.0		SANDSTONE: fine grained, grey, bedded.	SW		a=0.58 d=0.10	12%		PT, 0 - 5°, UN - IR, RO, CN SM, 0°, PL, SO, CO, 20 mm
			15.0		SANDSTONE: dark grey, interbedded sandstone.			a=0.52 d=0.43			SM, 0°, PL, SO, CO, 30 mm
			15.0		Borehole BH5 terminated at 15.00 m						

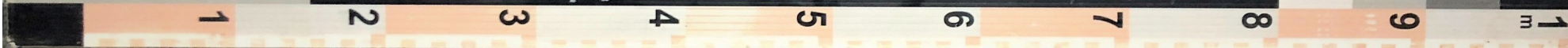
method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material) no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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CDF_0_9_07_LIBRARY\GLB\rev\AU Log_COF_BOREHOLE: CORED 754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:29

Defects are: PT, 0 - 5°, PL, SO, CN, unless otherwise described



PROJECT: 32 Mann St Gosford
 PROJECT No: 754 SYDGE214942
 BOREHOLE No: BH5
 DEPTH: 9.0-14.0m DATE: 01/03/2018




BH5 9.00 - 14.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH5		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4		rev:			

CDF_0_9_06_LIBRARY_GLB_Grictbl_COF_PHOTO_CORE_PHOTO_1.PER PAGE 754-SYDGE214942.GPJ <<DrawingFile>> 22/03/2018 08:56



BH5 14.00 - 15.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH5		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 2
original size	A4		rev:			

Engineering Log - Borehole


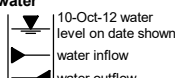
client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH6**
 sheet: 1 of 3
 project no. **SYDGE214942**
 date started: **01 Mar 2018**
 date completed: **01 Mar 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance						
method & support	penetration	samples & field tests	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
PT ADT W	1 2 3	E	0.0		SP	TOPSOIL: SILTY SAND: fine to medium grained, brown-pale brown, trace of organics (root fibres).	M	L	100 200 300 400	TOPSOIL PID: 0.0ppm
		E	0.5		SP	SILTY SAND: fine to medium grained, dark brown-black, trace of low plasticity clay and root fibres.	M	L		ALLUVIUM PID: 1.3ppm
		E	1.0	SPT 3, 3, 3 N*=6	CL	Sandy CLAY: medium to high plasticity, grey-brown, with fine grained sand, trace of silt.	W	VS		PID: 1.0ppm
		E	2.0		CH	2.6 m: clay to sand ratio increases CLAY: high plasticity, grey, with fine grained sand, trace of tree root fibres.	M	VSt		PID: 2.2ppm
		SPT 5, 8, 10 N*=18	3.0		CH	Silty CLAY: medium plasticity, pale grey-white mottled red-orange, trace of sand (iron stained).		H		RESIDUAL SOIL
		SPT 5, 7, 9 N*=16	4.0							
		SPT 5, 10, 15 N*=25	5.0							
			6.0							
			7.0			Borehole BH6 continued as cored hole				

CDF_0_9_07_LIBRARY\GLB\rev\AU_Log_COF_BOREHOLE:NON_CORED_754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:25

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH6**

sheet: 2 of 4

project no: **SYDGE214942**


date started: **01 Mar 2018**

date completed: **01 Mar 2018**









logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information			material substance				rock mass defects				
method & support	water	depth (m)	graphic log	material description	weathering & alteration	estimated strength & Is50	samples, field tests & Is(50) (MPa)	core run & RQD	defect spacing (mm)	additional observations and defect descriptions	
		RL (m)		ROCK TYPE: grain characteristics, colour, structure, minor components		X = axial O = diametral a = axial d = diametral	a = axial d = diametral			particular	general
		3									
		2									
		1									
		0									
		-1									
		-2									
		-3		started coring at 6.90m							
		7.0		Silty CLAY: medium to high plasticity, pale grey-white, with orange-red banding (XW sandstone/siltstone). 7.00 to 7.10 m: ironstone, fine to medium grained sand, red-dark red-black	XW			6%			

CDF_0_9_07_LIBRARY\GLB\rev\AU_Log_COF_BOREHOLE: CORED 754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:30

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water  10/10/12, water level on date shown  water inflow  complete drilling fluid loss  partial drilling fluid loss  water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material)  no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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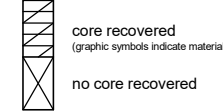
Engineering Log - Cored Borehole

Borehole ID: **BH6**
 sheet: 3 of 4
 project no: **SYDGE214942**
 date started: **01 Mar 2018**
 date completed: **01 Mar 2018**
 logged by: **LP**
 checked by: **AM**

client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information		material substance				rock mass defects		
method & support	water	material description	weathering & alteration	estimated strength & Is(50)	samples, field tests & Is(50) (MPa)	defect spacing (mm)	additional observations and defect descriptions	
RL (m)	depth (m)	ROCK TYPE: grain characteristics, colour, structure, minor components		X = axial O = diametral a = axial d = diametral	core run & RQD		particular	general
	9.0	SILTSTONE: dark grey, thinly bedded.	SW - FR			6%	JT, 80°, IR, RO, CN, 90 mm PT, 0°, PL, SO, CO - Clay, 5 mm JT, UN, SO, CN, 100 mm JT, IR, RO, CN, 100 mm JT, IR, RO, CN, 70 mm	
	10.0	SANDSTONE: fine to medium grained, grey, bedded.	SW		a=0.90 d=0.48	83%	PT, 0°, PL, SL, CN PT, 0°, PL, SL, CN JT, 75°, IR, SO, CN, 50 mm PT, 0°, PL, SL, CN	
	11.0	SANDSTONE: grey-dark grey, interlamination of fine grained, grey sandstone, with interbedded siltstone?.	SW - FR		a=1.69 d=1.47		PT, 0 - 3°, PL - IR, RO, CN SM, 0°, PL, SO, CO - Clay, 5 mm	
	12.0				a=1.33 d=0.13	41%	PT, 0°, PL, SO - SL, CN	
	13.0				a=2.07 d=2.25		PT, 0°, PL, SO - SL, CN	
	14.0	NO CORE: 0.09 m	SW - FR		a=1.39 d=0.92	92%	JT, 85°, PL, SO - SL, CN	
	14.0	SANDSTONE: fine to coarse grained, grey, stained orange.	SW - FR		a=3.62 d=0.85		PT, 0 - 2°, PL, SO - SL, CN	
	14.0	NO CORE: 0.09 m	SW - FR		a=1.73 d=1.29	92%	PT, 0°, CU, SO, CN	
	14.0	SANDSTONE: fine to coarse grained, grey, stained orange.	DW				PT, 0 - 2°, PL, RO, CN JT, 90°, UN, RO, CN PT, 0°, PL, RO, CO SM, 0°, PL, CO SM, 0°, PL, CO	
	14.0	NO CORE: 0.09 m	DW			92%	SM, 0°, PL, CO	
	14.0	SANDSTONE: fine to medium grained, grey.			a=1.75 d=1.16			
	14.0	NO CORE: 0.04 m				92%		
	14.0	SANDSTONE: fine to medium grained, grey.						
	15.0	14.95 to 15.01 m: laminated siltstone/sandstone 15.10 to 15.25 m: laminated siltstone/sandstone 15.25 to 16.00 m: fine to coarse grained, grey			a=1.00		PT, 0 - 7°, PL - UN, SO - RO, CN	

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLC/NMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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Defects are: PT, 0 - 5°, PL, SO, CN - CO, unless otherwise described

Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH6**

sheet: 4 of 4

project no. **SYDGE214942**

date started: **01 Mar 2018**

date completed: **01 Mar 2018**









logged by: **LP**

checked by: **AM**

position: E: 345,761.69; N: 6,299,796.39 (MGA94) surface elevation: 4.00 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

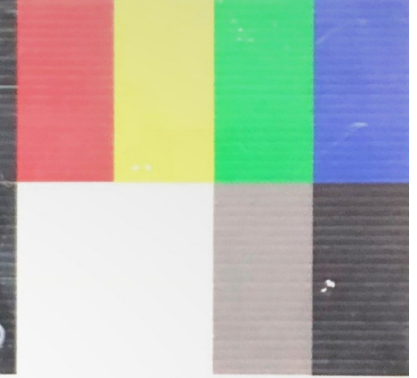
drilling information		material substance				rock mass defects					
method & support	water	depth (m)	material description	weathering & alteration	estimated strength & Is50	samples, field tests & Is(50) (MPa)	defect spacing (mm)	additional observations and defect descriptions			
RL (m)	depth (m)	ROCK TYPE: grain characteristics, colour, structure, minor components	VL	L	M	H	VH	EH	a = axial, d = diametral	particular	general
		17.0							d=0.28		SM, 7°, UN, SO, CO, 3 mm
		18.0									SM, 5°, UN, SO, CO, 1 mm
		19.0									
		20.0									
		21.0									
		22.0									
		23.0									

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED 754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:30

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLCNMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water  10/10/12, water level on date shown  water inflow  complete drilling fluid loss  partial drilling fluid loss  water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material)  no core recovered core run & RQD  barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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PROJECT: 32 Mann St Gosford
 PROJECT No: 754 SYDGE214942
 BOREHOLE No: BH6
 DEPTH: 6.9-11.0m DATE: 01/03/2018



BH6 6.90 - 11.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH6		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 1
original size	A4		rev:			



PROJECT: 32 Mann St Gosford
 PROJECT No: 754-SYDGE214942
 BOREHOLE No: BH6
 DEPTH: 11.0-16.0 m DATE: 01/03/18



BH6 11.00 - 16.00 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH6		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 2
original size	A4		rev:			

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH7**

sheet: 1 of 3

project no: **SYDGE214942**

date started: **02 Mar 2018**

date completed: **02 Mar 2018**

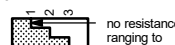
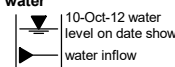
logged by: **LP**

checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance											
method & support	penetration	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations				
PT	1 2 3	E		2.0			FILL: Gravelly SAND: fine to coarse grained, dark brown, fine to medium angular gravel, trace of clay and ceramics.	M			FILL PID: 2.5ppm				
				1.0			FILL: Gravelly SAND: fine to coarse grained, pale brown-orange, medium to coarse angular gravel.								
				1.0			SPT 2, 1, 1 N*=2					CL	Sandy CLAY: medium to high plasticity, dark brown, with fine grained sand, trace of silt.	VS	ALLUVIUM
				2.0			E					SC	SAND: fine to medium grained, grey, trace of low to medium plasticity clay.	VL	RESIDUAL SOIL
				2.0			SPT 1, 1, 4 N*=5					CL	Sandy CLAY: medium to high plasticity, grey, with fine to medium grained sand, trace of silt, root fibres and organics. 2.5 m: colour change to grey mottled red-orange	F	
				3.0			E					CH	CLAY: medium to high plasticity, grey, mottled orange, red.	M	PID: 2.2ppm PID: 1.5ppm
				3.0			SPT 2, 3, 3 N*=6								
				4.0			E					CL	Sandy CLAY: low plasticity, pale grey-white mottled red-orange, fine to coarse grained sand, trace of extremely weathered ironstone gravel.	St - VS	H
				4.0			SPT 3, 3, 4 N*=7								
				5.0			E					CL	Sandy CLAY: low plasticity, pale grey-white mottled red-orange, fine to coarse grained sand, trace of extremely weathered ironstone gravel.	St - VS	H
5.0	SPT 9, 10, 16, N*=26														
6.0	E														
7.0	E														
AD/T															

CDF_0_9_07_LIBRARY\GLB\rev\AU Log COF BOREHOLE: NON CORED 754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:25


method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  no resistance ranging to refusal water  10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSst very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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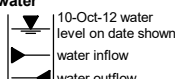
Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH7**
 sheet: 2 of 3
 project no: **SYDGE214942**
 date started: **02 Mar 2018**
 date completed: **02 Mar 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter : 100 mm

drilling information				material substance								
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T				-6			CL	Sandy CLAY: low plasticity, pale grey-white mottled red-orange, fine to coarse grained sand, trace of extremely weathered ironstone gravel. <i>(continued)</i>	M	H		RESIDUAL SOIL
					9.0			Borehole BH7 continued as cored hole				
					-7							
					-10.0							
					-8							
					-11.0							
					-9							
					-12.0							
					-10							
					-13.0							
					-11							
					-14.0							
					-12							
					-15.0							
					-13							

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering Log - Cored Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH7**

sheet: 3 of 3

project no. **SYDGE214942**

date started: **02 Mar 2018**

date completed: **02 Mar 2018**

logged by: **LP**

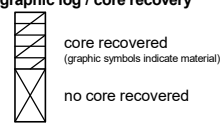
checked by: **AM**

position: E: 345,710.50; N: 6,299,759.90 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information		material substance				rock mass defects					
method & support	water	RL (m)	depth (m)	graphic log	material description ROCK TYPE: grain characteristics, colour, structure, minor components	weathering & alteration	estimated strength & Is(50) X = axial O = diametral a = axial d = diametral	samples, field tests & Is(50) (MPa) a = axial d = diametral	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)	
										particular	general
			-6		started coring at 8.60m						
			9.0		SANDSTONE: fine grained, pale grey, iron stained, interbedded with dark grey siltstone.	SW		a=0.63 d=0.61		PT, 0°, IR, RO, CN, 10 mm PT, 0°, PL, RO, CN PT, 0°, PL, SL, CN	
			-7		SILTSTONE: dark grey, iron stained, interbedded with dark grey sandstone.			a=2.32 d=1.66		PT, 0°, IR, RO, CO - Clay PT, 0°, PL, SL, CN	
			10.0		SANDSTONE: fine grained, pale grey, iron stained, bedded.				69%	JT, 87 - 90°, PL, SO, CN PT, 0 - 5°, PL - UN, SO - RO, CN CS, 0°, PL, SO, 20 mm	
			-8								
			11.0					a=0.56 d=0.59		PT, 0 - 5°, PL - UN, SO - SL, CN	
			-9		SANDSTONE: fine to coarse grained, pale grey, iron stained, massive, trace of gravel.			a=1.18 d=1.58		PT, 0 - 5°, PL - UN, SO, CN PT, 0 - 5°, PL - UN, SO, CN	
			12.0					a=1.49 d=1.53		SM, 0°, PL, SO, CO	
			-10								
			13.0		SILTSTONE: dark grey, interlaminated with fine grained sandstone.	FR		a=1.91 d=1.32	83%	JT, 75°, IR, SO - RO, CN	
			-11		SANDSTONE: fine to coarse grained, pale grey, highly iron stained bedded.						
			14.0					a=1.20 d=1.84			
			-12								
			15.0			HW		a=0.97 d=0.99 a=1.19 d=1.56	100%	PT, 0 - 7°, IR, SO - RO, CN	
			-13		Borehole BH7 terminated at 15.20 m						

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Defects are: PT, 0 - 5°, PL, SO, CN, unless otherwise described

method & support AS auger screwing AD auger drilling CB claw or blade bit W washbore RR rock roller NMLC/NMLC core (51.9 mm) NQ wireline core (47.6mm) HQ wireline core (63.5mm) PQ wireline core (85.0mm) PT push tube	support C casing M mud N none water 10/10/12, water level on date shown water inflow complete drilling fluid loss partial drilling fluid loss water pressure test result (lugeons) for depth interval shown	graphic log / core recovery  core recovered (graphic symbols indicate material) no core recovered core run & RQD barrel withdrawn RQD = Rock Quality Designation (%)	weathering & alteration* RS residual soil XW extremely weathered HW highly weathered MW moderately weathered SW slightly weathered FR fresh *W replaced with A for alteration strength VL very low L low M medium H high VH very high EH extremely high	defect type PT parting JT joint SS shear surface SZ shear zone CO contact CS crushed seam SM seam roughness VR very rough RO rough SO smooth POL polished SL slickensided	planarity PL planar CU curved UN undulating ST stepped IR irregular coating CN clean SN stained VN veneer CO coating
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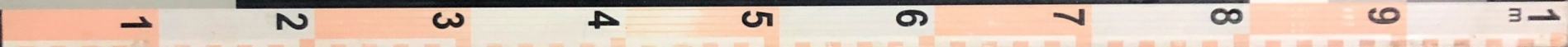
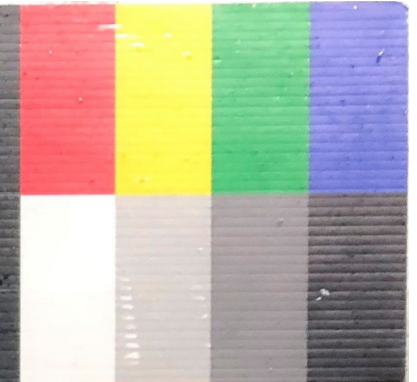


BH7 8.60 - 13.00 m

drawn	LP	 A TETRA TECH COMPANY	client: St Hilliers		
approved	AM		project: Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title: CORE PHOTOGRAPH BH7		
scale	N.T.S.		project no: SYDGE214942	fig no: FIGURE 1	rev:
original size	A4				



PROJECT: 32 Mann St Gosford
 PROJECT No: 754 SYDGE214942
 BOREHOLE No: BH7
 DEPTH: 13.0-15.2m DATE: 02/03/18



BH7 13.00 - 15.20 m

drawn	LP		client:	St Hilliers		
approved	AM		project:	Geotechnical and Environmental Assessment 32 Mann Street, Gosford, nsw		
date	22/03/2018		title:	CORE PHOTOGRAPH BH7		
scale	N.T.S.		project no:	SYDGE214942	fig no:	FIGURE 2
original size	A4		rev:			

Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**

principal:

project: **Geotechnical and Environmental Assessment**

location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH8**

sheet: 1 of 2

project no. **SYDGE214942**

date started: **06 Mar 2018**

date completed: **06 Mar 2018**


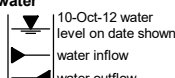
logged by: **LP**

checked by: **AM**

position: E: 345,745.57; N: 6,299,797.53 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter: 100 mm

drilling information				material substance								
method & support	penetration	samples & field tests	water	RL (m)	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
	1 2 3							SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components			100 200 300 400	
					2.0		CH	ASPHALT. FILL: Gravelly SAND: fine to coarse grained, dark brown, with fine to medium gravel, trace of ceramics. Silty CLAY: medium to high plasticity, dark brown, trace of sand and organics (root fibres).	M	L - MD		FILL PID: 1.5ppm
					1.0					F		ALLUVIUM
					0.0		SP	SILTY SAND: fine to coarse grained, grey, low to medium plasticity clay, trace of organics (root fibres).		L		PID: 0.3ppm
					2.0							PID: 0.6ppm
					0.0		CL	Sandy CLAY: medium to high plasticity, grey mottled dark red-orange, with fine to coarse grained sand, trace ironstone.	W	St		RESIDUAL SOIL
		SPT 2, 2, 7 N*=9			3.0							PID: 1.3ppm
					-1.0				M			
		SPT 4, 7, 9 N*=16			4.0		CL	Silty CLAY: medium plasticity, pale grey-white, trace of fine sun-rounded gravel.		VSt		
					-2.0							
					5.0							
		SPT 10, 16, 15 N*=31			-3.0		CL	Silty CLAY: medium to high plasticity, brown-orange, with fine sand.		H		
					-4.0			6.4 to 6.5 m: ground gets soft				
					7.0		SC	CLAYEY SAND: fine to medium grained, brown-orange, with low to medium plasticity clay, trace of weathered sandstone.				
		SPT 30, 30, N*=R			-5.0							

CDF_0_9_07_LIBRARY\GLB\rev\AU_Log_COF_BOREHOLE_NON_CORED_754-SYDGE214942.GPJ <<DrawingFile>> 16/08/2019 09:25


method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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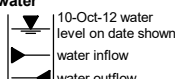
Engineering Log - Borehole

client: **SH Gosford Residential Pty Ltd**
 principal:
 project: **Geotechnical and Environmental Assessment**
 location: **32 Mann Street, Gosford, NSW**

Borehole ID: **BH8**
 sheet: 2 of 2
 project no: **SYDGE214942**
 date started: **06 Mar 2018**
 date completed: **06 Mar 2018**
 logged by: **LP**
 checked by: **AM**

position: E: 345,745.57; N: 6,299,797.53 (MGA94) surface elevation: 2.50 m (AHD) angle from horizontal: 90°
 drill model: Geoprobe 7822DT, Track mounted drilling fluid: Water hole diameter : 100 mm

drilling information				material substance								
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T				-6			CL	Sandy CLAY: medium to high plasticity, grey.	M	H	100 200 300 400	RESIDUAL SOIL
					9.0			Borehole BH8 terminated at 8.57 m Refusal				
					-7							
					-8							
					-9							
					-10							
					-11							
					-12							
					-13							

method AD auger drilling* AS auger screwing* HA hand auger W washbore PT push tube * bit shown by suffix e.g. AD/T B blank bit T TC bit V V bit	support M mud N nil C casing penetration  water 	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	soil group symbol & soil description based on AS 1726:2017 moisture condition D dry M moist W wet Wp plastic limit Wl liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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APPENDIX A3

CARDNO (2022)

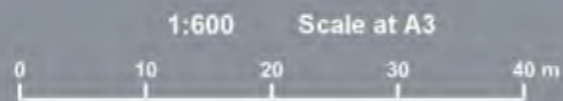


Legend

- Subject Site
- ⊕ Borehole Locations
- ⊕ Coffey Borehole Locations (2018)

Gosford-Lake Macquarie 1:100 000 Geological Map

- Alluvium (Qa)
- Terrigal Formation (Rnt)



Gosford North Tower

Geotechnical Investigation - Site Plan



Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
 Date: 2022-6-15 | Project: 304100748
 Coordinate System: MGA Zone 56
 Aerial imagery supplied by Mapbox (2022)

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH6
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 30/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING				MATERIAL							
DRILLING & CASING	WATER	DRILLING PENETRATION	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
↑				0.0			FILL: GRAVELLY CLAYEY SAND: dark grey, dark brown, fine to medium grained sand, low to medium plasticity clay, fine to coarse grained gravel				FILL
				0.27							
				0.40m			SAND: dark brown-yellow, dark grey, fine to medium grained sand, with low to medium plasticity clay				ALLUVIUM
				1.0				M			
				1.7		SP			VL		
			1.50m SPT 1, 1, 1 N=2	2.0							
			31/05/22	2.0							
			1.95m	2.0							
				2.20m			CLAYEY SAND: grey, fine to medium grained sand, low to medium plasticity clay				
				3.0							
			3.00m SPT 3, 4, 5 N=9	3.0		SC					3.00: PP = 250, 300 kPa
				3.30m							
				3.45m			SILTY CLAY: pale grey, medium to high plasticity, with fine to medium grained sand				
				4.0							
				4.10m		CI-CH		w > PL			St
				4.50m							
			4.50m SPT 4, 9, 9 N=18	4.50m		SP	SAND: pale grey, fine to medium grained sand, trace low to medium plasticity clay				4.50: PP = 300, 350 kPa
				4.70m							
				4.95m			SANDY CLAY: pale grey to grey, medium to high plasticity, fine to medium grained sand				RESIDUAL SOIL
				5.0							
				5.0		CI-CH		w > PL			VSt
				6.0							
			6.00m SPT 4, 6, 10 N=16	6.0							
				6.35m			SANDY CLAY: dark brown-red, mottled pale grey, medium to high plasticity, fine to medium grained sand				
				7.0							
				7.0		CI-CH		w > PL			St - VSt
				7.50m							
			7.50m SPT 2, 5, 8 N=13	7.50m		SC	CLAYEY SAND: pale grey, dark brown-red, fine to medium grained sand, medium to high plasticity clay, trace ironstone gravel				MD
				8.0							
				8.0							

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

CARDNO NSW/ACT PTY LTD



RMS.LIB.40.3.EXTERNAL.REV1.2.GLB.Log.RTA.NON-CORE.DRILL.HOLE.2.304100748.LOGS.GPJ <-DrawingFiles> 23/06/2022 10:57:10.02.00.04.Cardno.MBE

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH6
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrstie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 30/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
ADIT		F			8.0 -5.3	[Diagonal Hatching]	SC	CLAYEY SAND: pale grey, dark brown-red, fine to medium grained sand, medium to high plasticity clay, trace ironstone gravel (<i>continued</i>)	W	MD		RESIDUAL SOIL 9.00: PP = 500 kPa
				9.00m SPT 2, 4, 9 N=13	9.0 -6.3	[Diagonal Hatching]	SC		9.25m			
					9.45m	[Diagonal Hatching]	CI-CH	SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand, with ironstone gravel	w ~ PL	St		
		H			10.0 -7.3	[Diagonal Hatching]	CI-CH	10.52m				
					11.0 -8.3			Continued as Cored Drill Hole				
					12.0 -9.3							
					13.0 -10.3							
					14.0 -11.3							
					15.0 -12.3							
					16.0 -13.3							

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

CARDNO NSW/ACT PTY LTD



RMS:LIB-40.3 EXTERNAL REV1.2.GLB Log RTA NON-CORE DRILL HOLE 2.304100748 LOGS.GPJ <-DrawingFiles> 23/Jun/2022 10:57 10.02.00.04 Cardno.MBE

CORED DRILL HOLE LOG

HOLE NO : BH6
FILE / JOB NO : 304100748
SHEET : 3 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345701.000, N: 6299836.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrstite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 30/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH
CASING DIAMETER : BARREL (Length) : 3.00 m BIT : STEP BIT CONDITION : Fair

DRILLING		MATERIAL				FRACTURES	
PROGRESS	LOSS	DEPTH (m)	DESCRIPTION	WEATHERING	ESTIMATED STRENGTH (s(50))	NATURAL FRACTURE (mm)	ADDITIONAL DATA
DRILLING & CASING	WATER	(CORE LOSS DRILL RUN %)	ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	● Axial ○ Diametral EL -0.04 VL -0.12 L -0.35 M -1.18 H -3.83 VH -11.76 EH	20 40 100 300 1000	(joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
		8.0					
			10.52m START CORING AT 10.52m				
			10.77m SILTY CLAY: pale grey to grey, medium to high plasticity, with fine to medium grained sand				
			CORE LOSS 0.70m (10.77-11.47) CORE LOSS				
			11.47m				
			11.86m SILTY CLAY: pale grey, pale brown-red, medium to high plasticity				
			12.0m SANDSTONE: dark brown-red, medium to coarse grained, iron stained	HW			BP 0° CN IR RF
			12.45m SANDSTONE: pale grey, pale red, fine to medium grained, thinly laminated, iron stained	MW			IS Clayey Sand HB JT 70 - 80° CN IR RF JT 90° CN IR RF IS Clayey Sand
			13.0m SANDSTONE: pale grey, fine to medium grained, thinly laminated				BP 0° CN PR RF JT 70 - 80° CN IR RF BP 0° CN IR RF
			13.17m SANDSTONE: pale grey, fine to medium grained, thinly laminated				BP 0° CN PR RF
			13.64m SANDSTONE: pale grey, pale brown, fine to medium grained, iron stained				JT 45° CN PR RF
			14.0m				BP 0° CN IR RF BP 5 - 10° CN IR RF BP 0° CN PR RF BP 10° CN PR RF
			14.91m BOREHOLE BH6 TERMINATED AT 14.91 m Target depth	HW HW to MW			BP 0° CN IR RF DB
		15.0					
		16.0					

RMS.LIB.40.3 EXTERNAL REV1.2.GLB Log RTA CORED DRILL HOLE 304100748 LOGS.GPJ <-Drawing File>-> 23Jun2022 10:56 10.02.00.04 Cardno M&E

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

CARDNO NSW/ACT PTY LTD





TITLE:

Borehole Core Photographs – BH6
Geotechnical Investigation – St Hilliers - Gosford North Tower

now



PROJECT NO:

304100748

TEST DATE:

31/05/2022

INCLINATION:

-90 degree

CORED LENGTH: BOX 1 OF 1

10.52 m to 14.91 m

DRILL RIG:

Christie CE180

CONTRACTOR:

BG Drilling

LOGGED BY:

Ahmad Turani

CHECKED BY:

Bikesh Deoju



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH7
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM

DATE STARTED : 31/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING				MATERIAL							
PROGRESS		DRILLING PENETRATION	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER										
↑				0.0			FILL: GRAVELLY CLAYEY SAND: dark brown, dark grey, fine to medium grained sand, low to medium plasticity clay, fine to medium grained gravel				FILL
				2.7				M			
			1.50m SPT 2, 3, 4 N=7	1.60m			CLAYEY SAND: dark grey, fine to medium grained sand, low to medium plasticity clay				ALLUVIUM
			1.95m	2.0		SC		M	L		
				2.50m				W			
			3.00m SPT 2, 4, 5 N=9	3.0		SP	SAND: grey, fine to medium grained sand, trace low plasticity clay				
			3.45m	3.40m				W	L		
				4.0		CI-CH	SANDY CLAY: pale grey, medium to high plasticity, fine to medium grained sand 4.10m: colour becoming pale red, pale grey	w > LL	F - St		
			4.50m SPT 1, 6, 13 N=19	4.50m			SANDY CLAY: dark brown, dark grey, mottled brown-yellow, medium to high plasticity, fine to medium grained sand				4.50: PP = 200, 300 kPa
			4.95m	5.0		CI-CH		w > PL - w > LL	VSt		
				6.00m							
			6.00m SPT 3, 7, 12 N=19	6.00m			SANDY CLAY: pale grey, mottled pale brown, medium to high plasticity, fine to medium grained sand				RESIDUAL SOIL 6.00: PP = 200, 250 kPa
			6.45m	6.45m		CI-CH		w > PL - w > LL	VSt		
				7.0							
			7.50m SPT 5, 11, 12 N=23	7.0		SC	CLAYEY SAND: pale grey, pale red, fine to medium grained sand, low to medium plasticity clay				
			7.95m	7.70m				W	MD		7.50: PP = 400, 500 kPa
				8.0		CH	SANDY CLAY: pale grey, pale brown-red, high plasticity, fine to medium grained sand	w > PL	VSt - H		
				-5.3							

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

CARDNO NSW/ACT PTY LTD



RMS: LIB 40.3 EXTERNAL REV1.2 GLB Log RTA NON-CORE DRILL HOLE 2 304100748 LOGS.GPJ <DrawingFiles> 23/Jun/2022 10:57 10.02.00.04 Cardno.MBE

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH7
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrisite CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM

DATE STARTED : 31/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
AD/T		F		9.00m SPT 9, 18, 21 N=39	8.0 -5.3			SANDY CLAY: pale grey, pale brown-red, high plasticity, fine to medium grained sand (<i>continued</i>)				RESIDUAL SOIL
		H		9.45m	9.0 -6.3			CH	w > PL	Vst - H		
					10.0 -7.3			10.24m				Continued as Cored Drill Hole
					11.0 -8.3							
					12.0 -9.3							
					13.0 -10.3							
					14.0 -11.3							
					15.0 -12.3							
					16.0 -13.3							

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

CARDNO NSW/ACT PTY LTD



RMS.LIB.40.3.EXTERNAL.REV1.2.GLB.Log.RTA.NON-CORE.DRILL.HOLE.2.304100748.LOGS.GPJ <-DrawingFiles> 23/Jun/2022 10:57 10.02.00.04.Cardno.MBE

CORED DRILL HOLE LOG

HOLE NO : BH7
FILE / JOB NO : 304100748
SHEET : 3 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345717.000, N: 6299823.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrstie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 31/05/22 DATE COMPLETED : 31/05/22 DATE LOGGED : 31/05/22 LOGGED BY : AT CHECKED BY : TH
CASING DIAMETER : BARREL (Length) : 3.00 m BIT : STEP BIT CONDITION : Fair

DRILLING			MATERIAL				FRACTURES	
PROGRESS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	ADDITIONAL DATA	
DRILLING & CASING	DEPTH	LOG	ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)		● Axial ○ Diametral EL -0.04 VL -0.12 L -0.35 M -1.18 H -3.83 VH -11.76 EH	20 40 100 300 1000	(joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other	
	8.0							
			10.24m START CORING AT 10.24m					
			10.39m CORE LOSS 0.15m (10.24-10.39) CORE LOSS					
			SANDY CLAY: pale grey, medium to high plasticity, fine to medium grained sand					
	10.71		10.71m					
			CORE LOSS 0.52m (10.71-11.23) CORE LOSS					
			11.23m					
			SANDSTONE: brown to pale brown, grey, fine to medium grained, iron stained	HW				
	11.70		11.70m					
			CORE LOSS 0.07m (11.70-11.77) CORE LOSS					
			SANDSTONE: pale grey, pale brown, fine to medium grained, thinly laminated, iron stained	HW to MW				
	11.77m		11.77m					
	12.0							
	13.0							
	13.29		13.29m					
			BOREHOLE BH7 TERMINATED AT 13.29 m Target depth					
	14.0							
	15.0							
	16.0							

- BP 0° CN IR RF
- BP 0° CN IR RF
- DB
- EWS
- JT 70° CN IR RF
- FZ
- JT 40° CN CU RF
- FZ
- FZ
- BP 0 - 10° CN IR RF
- BP 0 - 5° CN IR RF
- BP 0 - 10° CN IR RF
- JT 80° CN IR RF
- BP 0° Clay PR S
- IS Sandy Clay

RMS.LIB.40.3.EXTERNAL.REV1.2.GLB.Log.RTA.CORED.DRILL.HOLE.304100748.LOGS.GPJ <-Drawing File> 23Jun2022 10:56 10.02.00.04 Cardno.M6E

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



TITLE:

Borehole Core Photographs – BH7
Geotechnical Investigation – St Hilliers - Gosford North Tower

now



PROJECT NO:
304100748

TEST DATE:
31/05/2022

INCLINATION:
-90 degree

CORED LENGTH: **BOX 1 OF 1**
10.24 m to 13.29 m

DRILL RIG:
Christie CE180

CONTRACTOR:
BG Driling

LOGGED BY:
Ahmad Turani

CHECKED BY:
Bikesh Deoju



Shaping the Future

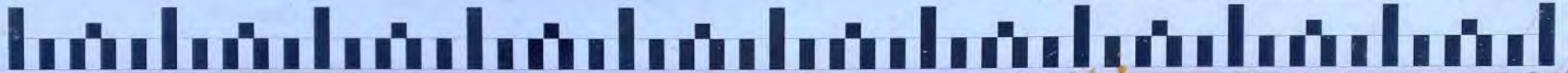
Project: **St Hilliers - Gosford North Tower**

Project Number: **304100748**

BH ID: **BH7**
Depth: **10.24 - 13.29 m**
Core Tray No.: **1**
Date: **06/01/22**



X Chalk marks denote handling or drilling breaks



10.	CORING BH7 STARTS AT 10.24 m	CORE LOSS 10.24 - 10.39 (150mm)		CORE LOSS 10.71 - 11.23 (520mm)
11.	CORELOSS 10.71 - 11.23 (520mm)		CORELOSS 11.70 - 11.77 (70mm)	
12.				
13.	END OF BH7 AT 13.29 m			

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH8
FILE / JOB NO : 304100748
SHEET : 1 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Chrisitie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM

DATE STARTED : 01/06/22 DATE COMPLETED : 01/06/22 DATE LOGGED : 01/06/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
↑			01/06/22		0.0			FILL: GRAVELLY CLAYEY SAND: dark brown, dark grey, fine to medium grained sand, low to medium plasticity clay, fine to coarse grained, sub-angular to angular gravel	M			FILL
					1.0							
					1.7							
					2.0		SC	CLAYEY SAND: dark grey, fine to medium grained sand, low to medium plasticity clay, trace fine to medium grained gravel	M	L		ALLUVIUM
					2.40m							
					2.7							
					3.00m		SP	SAND: grey to pale grey, fine to medium grained sand, with low to medium plasticity clay	W	F		
					3.0							
					3.45m							
					3.45m		CI-CH	SANDY CLAY: pale grey, medium to high plasticity, fine to medium grained sand	w > PL	F - St		
					3.90m							
					4.0		CI-CH	SILTY CLAY: pale grey to grey, pale brown-red, medium to high plasticity, with fine to medium grained sand	w > PL	St - VSt		RESIDUAL SOIL
					4.3							
					5.0							
					5.10m							
					5.23							
					6.00m		CI-CH	SANDY CLAY: pale grey, pale brown, medium to high plasticity, fine to medium grained sand	w > PL	St - VSt		
					6.0							
					6.30m							
					6.45m		SC	CLAYEY SAND: pale grey, fine to medium grained sand, medium to high plasticity clay	W	VSt		6.00: PP = 300,350 kPa
					7.0							
					7.00m		CI-CH	SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand	w > PL	VSt		
					7.43							
					8.0							
					8.0							

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

CARDNO NSW/ACT PTY LTD



RMS.LIB.40.3 EXTERNAL REV1.2.GLB Log RTA NON-CORE DRILL HOLE 2.304100748 LOGS.GPJ <-DrawingFiles> 23/Jun/2022 10:57:10.02.00.04 Cardno.MBE

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH8
FILE / JOB NO : 304100748
SHEET : 2 OF 3

PROJECT : Gosford North Tower
LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Chrisitie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
DATE STARTED : 01/06/22 DATE COMPLETED : 01/06/22 DATE LOGGED : 01/06/22 LOGGED BY : AT CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
AD/T		F			8.0 -5.3	CI-CH	8.20m	SANDY CLAY: pale grey, mottled pale brown-red, medium to high plasticity, fine to medium grained sand (continued)	w > PL	VSt		RESIDUAL SOIL
				9.00m SPT 1, 6, 24 HB N=R	9.0 -6.3	CI-CH		SANDY CLAY: dark brown-red, medium to high plasticity, fine to medium grained sand, with ironstone gravel				9.00: PP = 500 kPa
		H			9.45m			9.30m: colour becoming pale grey, pale brown, dark red	w > PL	VSt - H		
					10.0 -7.3		10.25m	Continued as Cored Drill Hole				
					11.0 -8.3							
					12.0 -9.3							
					13.0 -10.3							
					14.0 -11.3							
					15.0 -12.3							
					16.0 -13.3							

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

CARDNO NSW/ACT PTY LTD



RMS: LIB 40.3 EXTERNAL REV1.2.GLB Log RTA NON-CORE DRILL HOLE 2.304100748 LOGS.GPJ <-DrawingFiles> 23/Jun/2022 10:57 10.02.00.04 Cardno.MBE

CORED DRILL HOLE LOG

HOLE NO : BH8
 FILE / JOB NO : 304100748
 SHEET : 3 OF 3

PROJECT : Gosford North Tower
 LOCATION : 26 Mann st, Gosford

POSITION : E: 345734.000, N: 6299821.000 (56 MGA94) SURFACE ELEVATION : 2.700 (AHD) ANGLE FROM HORIZONTAL : 90°
 RIG TYPE : Chrstie CE180 MOUNTING : Track CONTRACTOR : BG Drilling DRILLER : DM
 DATE STARTED : 01/06/22 DATE COMPLETED : 01/06/22 DATE LOGGED : 01/06/22 LOGGED BY : AT CHECKED BY : TH
 CASING DIAMETER : BARREL (Length) : 3.00 m BIT : STEP BIT CONDITION : Fair



DRILLING				MATERIAL				FRACTURES							
PROGRESS		CORE LOSS (CORE LOSS DRILL RUN %)	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50)				NATURAL FRACTURE (mm)	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other	
DRILLING & CASING	WATER							Weathering	EL -0.04	VL -0.12	L -0.35				M -1.18
				8.0											
				10.0											
				10.25		10.25m START CORING AT 10.25m									
				10.42		10.42m CORE LOSS 0.17m (10.25-10.42)									
				10.90		10.90m									
				11.0		BOREHOLE BH8 TERMINATED AT 10.90 m Target depth									
				12.0											
				13.0											
				14.0											
				15.0											
				16.0											

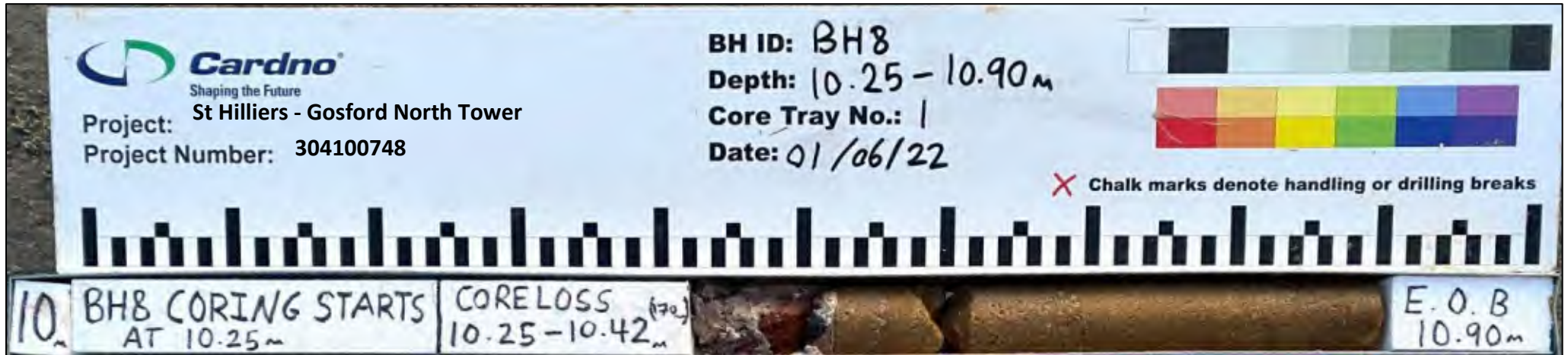
See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



RMS.LIB.40.3.EXTERNAL.REV1.2.GLB.Log.RTA.CORED.DRILL.HOLE.304100748.LOGS.GPJ <-Drawing File> 23Jun2022 10:56 10.02.00.04.Cardno.M&E

 now 	TITLE: Borehole Core Photographs – BH8 Geotechnical Investigation – St Hilliers - Gosford North Tower			
	PROJECT NO: 304100748	TEST DATE: 01/06/2022	INCLINATION: -90 degree	CORED LENGTH: BOX 1 OF 1 10.25 m to 10.90 m
DRILL RIG: Christie CE180	CONTRACTOR: BG Driling	LOGGED BY: Ahmad Turani	CHECKED BY: Bikesh Deoju	





APPENDIX A4






STANTEC (2024)

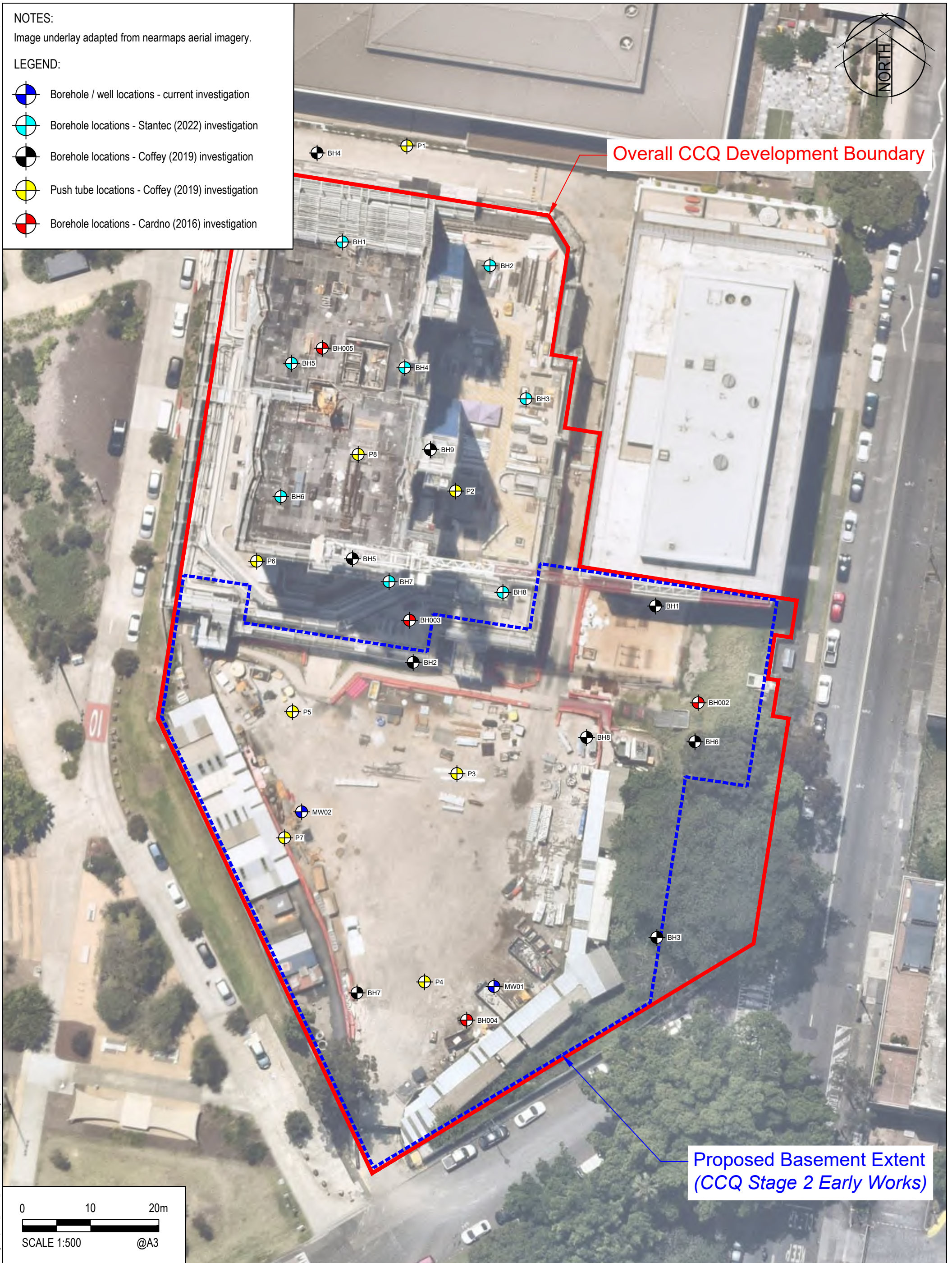
DATE PLOTTED: 6 December 2024 12:10 PM BY: BARTLETT, EDWARD

NOTES:

Image underlay adapted from nearmaps aerial imagery.

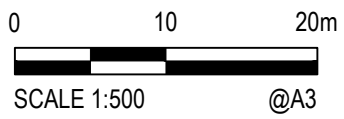
LEGEND:

-  Borehole / well locations - current investigation
-  Borehole locations - Stantec (2022) investigation
-  Borehole locations - Coffey (2019) investigation
-  Push tube locations - Coffey (2019) investigation
-  Borehole locations - Cardno (2016) investigation



Overall CCQ Development Boundary

**Proposed Basement Extent
(CCQ Stage 2 Early Works)**



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Web: www.stantec.com

Drawn	TB	Date	1/11/2024
Checked		Date	
Revised		Date	6/12/2024
Verified		Date	
Approved			

Client	URBAN PROPERTY GROUP
Project	GEOTECHNICAL INVESTIGATION CENTRAL COAST QUARTER - STAGE 2 EARLY WORKS 26-30 MANN STREET, GOSFORD, NSW
Title	TEST LOCATION SITE PLAN

Status	FOR INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
Project Number	304001328	Scale	1:500
Figure Number	Drawing 2	Size	A3
		Revision	02

XREFS: CAD File: U:\304001328\technical\drawings\site plans\2_as_drafted_minor_revisions\CCQ2_Site Plan_002.dwg

Client: Urban Property Project: Central Coast Quarter Stage 2 Location: 26-30 Mann Street, Gosford	Job No: 304001328	Hole No: MW01 Sheet: 1 of 5
---	--------------------------	--

Position: Refer to site plan	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Comacchio Geo 300	Driller: RM	
Casing Diameter: HQ	Contractor: Stratacore	
Date Started: 17/10/24	Date Completed: 17/10/24	Logged By: TB
		Checked By:

Drilling			Sampling & Testing		Material Description					Monitoring Well Details
Method	Resistance	Casing	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	
F							0.10m FILL: Sandy GRAVEL: fine to coarse, angular, grey-brown FILL: Clayey SAND: fine to medium grained, dark grey and brown, trace fine gravel	M		FILL
			SPT 0.50 - 0.95 m 2, 0, 2 N=2	0.5				M		
			SPT 1.00 - 1.45 m 0, 2, 2 N=4	1.0		ML	Clayey SILT: low to medium plasticity, dark grey-black, with fine grained sand, occasional sandier zones	M (<LL)	S - F	ALLUVIUM
			SPT 2.00 - 2.45 m 0, 1, 3 N=4	2.0				M (>PL)		RESIDUAL SOIL
			SPT 3.00 - 3.45 m 3, 5, 6 N=11	3.0		CI-CH	3.00m: occasional sandier zones with minor weathered sandstone fragments (nearing extremely weathered material)	M (≈PL)		
			SPT 4.00 - 4.45 m 8, 10, 15 N=25	4.0		CL-CI	Silty CLAY: low to medium plasticity, pale grey mottled orange, extremely weathered siltstone	M (<PL)	VSt	EXTREMELY WEATHERED 4.00 m: possible seepage during drilling

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
--	--	--	---	---

Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford
 Job No: 304001328
 Hole No: MW01
 Sheet: 2 of 5

Position: Refer to site plan
 Angle from Horizontal: 90°
 Surface Elevation:

Rig Type: Comacchio Geo 300
 Driller: RM

Casing Diameter: HQ
 Contractor: Stratacore

Date Started: 17/10/24
 Date Completed: 17/10/24
 Logged By: TB
 Checked By:

Drilling			Sampling & Testing		Material Description					Monitoring Well Details		
Method	Resistance	Casing	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density		STRUCTURE & Other Observations	
125mm AD/T F-H	F	HQ	4.8 m bgl . 18/10/24	SPT 5.00 - 5.15 m 10 HB N=R	5.0		CL-CI	Silty CLAY; low to medium plasticity, pale grey mottled orange, extremely weathered siltstone (continued)	M (<PL)	VST	EXTREMELY WEATHERED 4.80 m: groundwater measured after well install, following day	
				SPT 6.00 - 6.01 m 5/10mm HB N=R	6.0			SANDSTONE, fine to coarse grained, pale grey and brown, extremely to highly weathered, poorly cemented			WEATHERED ROCK	
					7.20m			Continued as Cored Drill Hole				
					7.5							
					8.0							
					8.5							

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford
 Job No: 304001328
 Hole No: **MW01**
 Sheet: 3 of 5

Position: Refer to site plan
 Angle from Horizontal: 90°
 Surface Elevation:
 Rig Type: Comacchio Geo 300
 Mounting: Track
 Driller: RM
 Casing Diameter: HQ
 Bit Type: TC-Bit
 Bit Condition:
 Contractor: Stratacore
 Date Started: 17/10/24
 Date Completed: 17/10/24
 Logged By: TB
 Checked By:

Coring					Depth (m)	Material Description				Defect Description			Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)		Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa	Average Natural Defect Spacing (mm)	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other	
					5.0								
					5.5								
					6.0								
					6.5								
					7.0								
					7.20m	START CORING AT 7.20m						7.20: TC-Bit refusal	
					7.5	SANDSTONE, fine to coarse grained, massive, pale grey minor orange-red about defects	SW - F					7.24 m: SM, 0°, FILLED, =10 mm	
					8.0	SILTSTONE, grey	SW - F					7.32 m: BP, 0°, PR, S, CN	
		100	84		8.06m							7.79 m: DB	
					8.30m							7.92 m: DB	
					8.5	SANDSTONE, fine to coarse grained, pale grey minor orange-red (in defects), massive	SW - F					7.97 m: BP, 0 - 5°, PR, RF, CN	
					8.80m	8.80m: becoming slightly bedded at 0-10°						8.00 m: HB	
		100	89									8.06 m: SZ, 0°, FILLED, >=10 mm	
												8.10 m: HB	
												8.31 m: DB	
												8.33 m: JT, 70°, UN, C	
												8.64 m: JT, 70°, PR, RF, CT	
												8.79 m: BP, 15°, PR, RF, VNR	
												8.85 m: BP, 5°, PR, RF, VNR	
												8.95 m: HB	

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property	Job No: 304001328	Sheet: 4 of 5
Project: Central Coast Quarter Stage 2		
Location: 26-30 Mann Street, Gosford		
Position: Refer to site plan	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Comacchio Geo 300	Mounting: Track	Driller: RM
Casing Diameter: HQ	Bit Type: TC-Bit	Bit Condition:
Date Started: 17/10/24	Date Completed: 17/10/24	Logged By: TB
		Checked By:

Coring					Depth (m)	Material Description	Weathering	Estimated Strength $I_{s(50)}$ MPa	Average Natural Defect Spacing (mm)	Defect Description	Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)							
		100	89		9.10m	Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°	SW - F			9.00 m: HB 9.17 m: SZ, 0°, >=10 mm 9.25 m: HB 9.32 m: HB 9.40 m: DB 9.44 m: DB 9.54 m: HB	
					9.79m	SANDSTONE, fine to coarse grained, pale grey, minor fine to medium subrounded gravel clasts, massive				9.95 m: DB	
					9.95m	Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°				10.00 m: BP, 10°, PR, S, CN 10.04 m: BP, 0 - 5°, PR, S, CN	
					10.5					10.56 m: HB	
					11.0					10.67 m: DB 10.74 m: DB 10.79 m: HB 10.81 m: HB 10.94 m: BP, 5 - 10°, UN, S, CN 11.00 m: HB 11.02 m: BP, 0 - 5°, UN, SL, CN	
		100	86		11.24m	SANDSTONE, fine to medium grained, pale grey, slightly bedded at 0-5°				11.22 m: HB 11.23 m: BP, 0 - 5°, UN, S, CN	
					11.49m	Interlaminated SANDSTONE/SILTSTONE, fine to medium grained, pale grey and dark grey, weakly bedded/laminated at 0-10°				11.47 m: DB	
					12.0					11.67 m: HB 11.70 m: HB 11.77 m: BP, 0 - 5°, PR, S, CN 11.85 m: DB 11.91 m: HB 11.95 m: HB 12.08 m: BP, 5°, UN, S, CN	
					12.24m	SANDSTONE, fine to coarse grained pale grey minor orange-red staining about defects, massive				12.15 m: BP, 10°, PR, S, CN	
					12.5		XW			12.40 - 12.45 m: SM, =45 mm 12.45 - 12.48 m: SZ, 10°, =35 mm	
							MW			12.53 m: JT, 40°, PR, C 12.55 m: BP, 10°, PR, RF, SN 12.57 m: BP, 0°, PR, RF, SN	
					13.0		SW - F			12.67 m: BP, 5°, PR, RF, SN	
		100	72				HW - MW			12.73 m: JT, 35°, PR, RF, SN 12.82 m: BP, 5 - 10°, UN, RF, SN 12.87 m: JT, 50°, PR, RF, SN 12.91 m: HB 13.00 m: JT, 40°, UN, RF, CN 13.18 m: BP, 5°, IR, RF,	

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford
 Job No: 304001328
 Hole No: MW01
 Sheet: 5 of 5

Position: Refer to site plan
 Angle from Horizontal: 90°
 Surface Elevation:

Rig Type: Comacchio Geo 300
 Mounting: Track
 Driller: RM

Casing Diameter: HQ
 Bit Type: TC-Bit
 Bit Condition:
 Contractor: Stratacore

Date Started: 17/10/24
 Date Completed: 17/10/24
 Logged By: TB
 Checked By:

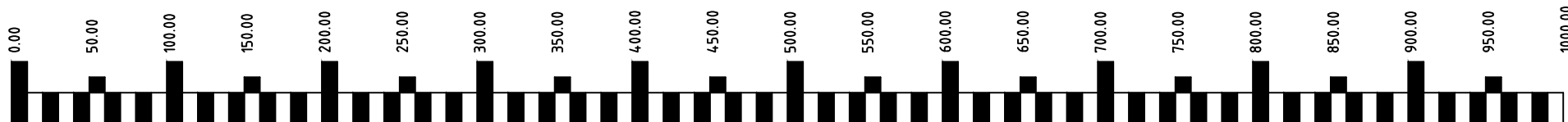
Coring					Depth (m)	Material Description	Weathering	Estimated Strength $I_{s(50)}$ MPa	Average Natural Defect Spacing (mm)	Defect Description	Monitoring Well Details
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)							
NMLC	0% Water LOSS	100	72		14.0	13.47m: rock structure becoming bedded at 0-10° and fine to medium grained SANDSTONE, fine to coarse grained pale grey minor orange-red staining about defects, massive (continued) 14.00m: rock structure becoming massive and fine to coarse grained	F			CN 13.36 m: JT, 75°, PR, RF, FILLED, sheared 13.40 m: gravelly seam / zone 13.42 m: DB 13.47 m: DB 13.48 m: JT, 40°, PR, RF, CN 13.57 m: BP, 0 - 5°, PR, RF, CN 13.74 m: BP, 0 - 5°, UN, S, CN 13.76 m: BP, 0 - 5°, UN, S, CN 13.92 m: BP, 0 - 5°, UN, S, CN 13.97 m: HB 14.00 m: BP, 0 - 5°, UN, S, CN 14.82 m: HB 14.90 m: HB	
					14.92m	TERMINATED AT 14.92 m					
					15.0						
					15.5						
					16.0						
					16.5						
					17.0						
					17.5						

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

CLIENT: Urban Property
PROJECT: Central Coast Quarter Stage 2
LOCATION: 26-30 Mann Street, Gosford, NSW
PROJECT NO.: 304001328

BOREHOLE ID: MW01
CORED DEPTH: 7.20m - 14.92 m
CORE TRAYS: 2
DATE CORED: 17/10/2024



Client: Urban Property
Project: Central Coast Quarter Stage 2
Location: 26-30 Mann Street, Gosford
Job No: 304001328
Hole No: MW02
Sheet: 1 of 4

Position: Refer to site plan
Angle from Horizontal: 90°
Surface Elevation:

Rig Type: Comacchio Geo 300
Driller: RM

Casing Diameter: HW
Contractor: Stratacore

Date Started: 18/10/24
Date Completed: 18/10/24
Logged By: TB
Checked By:

Drilling			Sampling & Testing		Material Description					Monitoring Well Details	
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition		Consistency Relative Density
AD/T	F	HW	Water level on date shown	SPT 0.50 - 0.95 m 5, 5, 6 N=11	0.5	[Cross-hatched pattern]	ML	0.15m: FILL: Sandy GRAVEL: fine to coarse, angular, grey	D - M		FILL
	0.50m: FILL: Clayey SAND: fine to medium grained, brown, trace fine to medium gravel										
E-F				SPT 1.00 - 1.45 m 2, 3, 2 N=5	1.0			0.50m: increasing gravel fraction, some minor pockets of clay	M		ALLUVIUM
AD/T				SPT 2.00 - 2.45 m 0, 3, 5 N=8	2.0	[Green dotted pattern]	SP-SC	1.30m: Clayey SILT: low plasticity, black, with fine grained sand, some root fibres	M (<LL)	F	RESIDUAL SOIL
								1.70m: SAND: fine to medium grained, brown, with clay, trace fine to medium gravel	W	L	
AD/T				SPT 3.00 - 3.45 m 4, 6, 8 N=14	3.0	[Blue diagonal lines]	CL-CI	2.10m: Sandy CLAY: low to medium plasticity, pale grey, fine to medium grained sand, some root fibres	M (>PL)	St	
								3.10m: Silty CLAY: medium to high plasticity, pale grey, trace fine to medium grained sand	M (>PL)		
AD/T				SPT 4.00 - 4.45 m 4, 4, 5 N=9	4.0	[Blue diagonal lines]	CI-CH	3.80m: becoming pale grey mottled orange-red, with fine to medium grained sand	M (≈PL)	St	

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford
 Job No: 304001328
 Hole No: MW02
 Sheet: 2 of 4

Position: Refer to site plan
 Angle from Horizontal: 90°
 Surface Elevation:

Rig Type: Comacchio Geo 300
 Driller: RM

Casing Diameter: HW
 Contractor: Stratacore

Date Started: 18/10/24
 Date Completed: 18/10/24
 Logged By: TB
 Checked By:

Drilling			Sampling & Testing		Material Description					Monitoring Well Details	
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition		Consistency Relative Density
								4.60m	M (≈PL)	St	RESIDUAL SOIL
								Silty CLAY: low to medium plasticity, pale grey mottled brown, extremely weathered siltstone	M (<PL)	VSt	EXTREMELY WEATHERED
				SPT 5.00 - 5.45 m 5, 12, 15 N=27	5.0			5.20m			
								Clayey SAND: fine to medium grained, pale grey, extremely weathered sandstone			
					5.5						
				SPT 6.00 - 6.45 m 6, 7, 9 N=16	6.0			6.00m: becoming fine to coarse grained	D - M	MD - D	
					6.5						
				SPT 7.00 - 7.15 m 13 HB N=R	7.0			7.00m			WEATHERED ROCK
					7.5			SANDSTONE, fine to medium grained, grey-pale grey mottled orange-red, extremely to highly weathered, probable interbedded siltstone inclusions			
					8.0						
				SPT 8.50 - 8.68 m 20, 11/30mm HB N=R	8.5						

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property
 Project: Central Coast Quarter Stage 2
 Location: 26-30 Mann Street, Gosford
 Job No: 304001328
 Hole No: **MW02**
 Sheet: 3 of 4

Position: Refer to site plan
 Angle from Horizontal: 90°
 Surface Elevation:

Rig Type: Comacchio Geo 300
 Driller: RM

Casing Diameter: HW
 Contractor: Stratacore

Date Started: 18/10/24
 Date Completed: 18/10/24
 Logged By: TB
 Checked By:

Drilling			Sampling & Testing		Material Description					Monitoring Well Details		
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition		Consistency Relative Density	STRUCTURE & Other Observations
AD/T	F-H	HW		SPT 10.00 - 10.27 m 19, 20/120mm HB N=R	9.5 10.0 10.5			SANDSTONE, fine to medium grained, grey-pale grey mottled orange-red, extremely to highly weathered, probable interbedded siltstone inclusions (continued)			WEATHERED ROCK	
					10.70m			Continued as Cored Drill Hole				
					11.0 11.5 12.0 12.5 13.0							

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Urban Property	Job No: 304001328	Hole No: MW02
Project: Central Coast Quarter Stage 2		Sheet: 4 of 4
Location: 26-30 Mann Street, Gosford		
Position: Refer to site plan	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Comacchio Geo 300	Mounting: Track	Driller: RM
Casing Diameter: HW	Bit Type:	Bit Condition:
Date Started: 18/10/24	Date Completed: 18/10/24	Logged By: TB
		Checked By:

Coring					Material Description				Defect Description		Monitoring Well Details	
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa	Average Natural Defect Spacing (mm)		Visual
					9.5							
					10.0							
					10.5							
					11.0		10.70m START CORING AT 10.70m					10.70 m: DB
					11.0		10.79m SANDSTONE, fine to coarse grained, grey-dark grey and brown, massive	MW				10.70: TC-Bit refusal
					11.0		10.87m SILTSTONE, grey, slightly laminated	MW				10.79 m: BP, 0°, IR, S, SN
					11.0		SANDSTONE, fine to coarse grained, grey-dark grey and brown, massive	MW				10.87 m: BP, 0°, IR, S, SN
					11.5		11.38m CORE LOSS 0.30m (11.38-11.68)	HW				11.00 m: HB
					11.5							11.05 m: DB
					11.5							11.07 m: DB
					12.0		11.68m SANDSTONE, fine to medium grained, grey-dark grey and brown, massive	MW - SW				11.24 m: JT, 20°, UN, RF, VNR
					12.0		12.00m: becoming slightly laminated / bedded					11.27 m: JT, 15 - 25°, UN, RF, VNR
					12.0		TERMINATED AT 12.10 m					11.27 - 11.38 m: possibly weathered / gravelly seam (material loss evident)
					12.5							11.68 m: DB
					13.0							11.86 m: JT, 80°, PR, C
												11.95 m: JT, 75°, PR, RF, VNR
												12.06 m: HB

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown Water inflow Water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Qz Quartz
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STANTEC 2.02.0 LIB:GLB Log_CARDNO CORDED BOREHOLE MANN ST LOGS.0.GPJ <<DrawingFile>> 22/10/2024 15:12 10.03.00.09 Datigel AGS RTA, Photo, Monitoring Tools

CLIENT: Urban Property
PROJECT: Central Coast Quarter Stage 2
LOCATION: 26-30 Mann Street, Gosford, NSW
PROJECT NO.: 304001328

BOREHOLE ID: MW02
CORED DEPTH: 10.70m - 12.10 m
CORE TRAYS: 1
DATE CORED: 18/10/2024

