

Report on Additional Geotechnical Investigation

Cranbrook School ECI Victoria Road, Bellevue Hill

> Prepared for Cranbrook School

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

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Report on Additional Geotechnical Investigation Cranbrook School ECI Victoria Road, Bellevue Hill

1. Introduction

This report presents the results of an additional geotechnical investigation undertaken as part of an 'Early Contractor Involvement' (ECI) process for a proposed development at Cranbrook School, Victoria Road, Bellevue Hill. The work was commissioned by Cranbrook School in consultation with Buildcorp Contracting NSW Pty Ltd.

It is understood that the proposed development includes the construction of an underground sporting facility (swimming pool, sports courts) and basement parking area beneath the oval in the northern portion of the site. This will involve a deep excavation followed by the replacement of the oval on a suspended structure. A separate performing arts and indoor sporting facility (the 'Centenary Building') is also proposed to the south-east of the oval which will involve the demolition of several existing buildings followed by a deep excavation into the embankment.

Geotechnical investigation for the development was initially undertaken in 2015 which included the drilling of seven boreholes and six cone penetration tests (CPTs). Further investigation was undertaken in April 2017 to complement the existing information on the subsurface conditions on the site and included the drilling of seven cored boreholes, 20 augered boreholes, eight CPTs, laboratory analysis and engineering interpretation. An *In Situ Waste Classification Assessment* was undertaken at the same time as the April 2017 investigation and is reported separately (Ref. 84944.01.R.001).

Additional investigation was undertaken in August and September 2017 for the War Memorial Hall and included the drilling of eight cored boreholes, one CPT, the excavation of two test pits, laboratory analysis and engineering interpretation. Further investigation was completed in January, May and July 2018 which included the drilling of seven boreholes in both areas of redevelopment, the excavation of seven test pits on the northern side of Perkins Building and Cranbrook house, and several dynamic penetrometer tests between Perkins Building and the oval. Details of the field work and comments relevant to design and construction are given in this report.

The information contained in this report supersedes the previous geotechnical reports prepared under Project 84944.00 and Project 84944.01.

2. **Previous Investigations**

Douglas Partners has previously undertaken several geotechnical investigations on the site. Apart from those described in Section 1 of this report, these have included:

- Project 10957 (1988 & 1990): 20 boreholes adjacent to the south-western boundary;
- Project 23950A (1997): six boreholes for a proposed science and technology centre near the south-western corner of the oval; and



• Project 72080 (2010): risk assessment of the Hordern Embankment.

Relevant previous test results have been used to develop the geotechnical model of the site. The relevant previous boreholes logs, cone penetrometer test results and core photographs are provided in the relevant report appendices.

3. Site Description and Geology

The Cranbrook School senior campus is located on the northern side of a hill that dips in a northerly direction towards Point Piper. The school is bounded by New South Head Road to the north and west, residential properties to the west, Victoria Road to the south and Rose Bay Avenue to the east. Surface levels vary from approximately RL 40 m AHD along the southern boundary to RL 15 m AHD near the northern boundary.

At the time of the investigation there were numerous buildings of varying age occupying the southern portion of the school and a large sporting oval in the northern portion. Numerous retaining structures create terrace areas down the slope and some significant embankments are also present on the site, particularly along the southern side of the oval.

The *Sydney 1:100 000 Geological Series Sheet* shows that the site is underlain by Hawkesbury Sandstone with some overlying quaternary-aged marine sands with podsols. An extract of the geological map is shown in Figure 1.

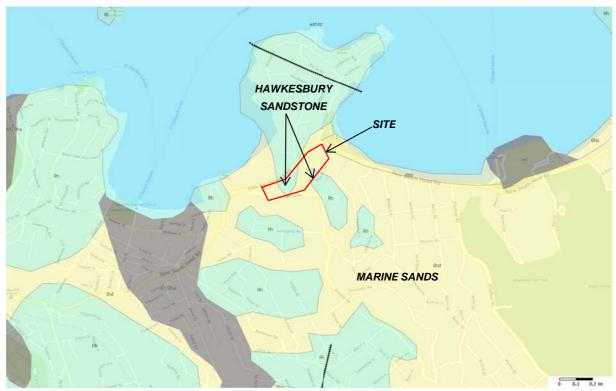


Figure 1: Extract from geological map



4. Field Work Methods

4.1 2015 Investigation

The 2015 field work included six cone penetration tests (CPTs 1 to 6), the drilling of three cored boreholes (BH2, BH4 and BH10), and the drilling of four augered boreholes (BH7, BH8, BH11 and BH12).

The CPTs were undertaken to depths of between 4.2 m and 17.8 m at which point refusal of the equipment occurred. A CPT involves pushing a 35 mm diameter instrumented cone and friction sleeve into the ground using hydraulic thrust from a ballasted truck-mounted testing rig. Measurements of cone resistance and sleeve friction are made at 20 mm depth intervals and are stored on a portable computer for subsequent analysis and interpretation.

The cored boreholes were drilled to depths of between 14.3 m and 22.2 m using a DT250 geotechnical drilling rig. They were commenced using solid flight augers to drill through the overburden materials. Disturbed soil samples were collected from the tip of the auger and Standard penetrometer tests (SPTs) were undertaken at regular depth intervals throughout the filling/soil profile. Rotary drilling equipment was used to progress the bores to prevent hole collapse at depth. Once weathered rock was encountered, NMLC-sized diamond core drilling equipment was used to obtain 50 mm diameter continuous core samples of the rock for identification and strength testing purposes.

The augered boreholes were drilled to depths of between 2.4 m and 4.1 m using a hand-auger. Dynamic penetrometer tests were also undertaken at these locations.

The locations are shown on Drawing G1 in Appendix B. The ground surface levels at the CPTs and bores were measured to AHD using an automatic level, relative to temporary benchmarks on the site.

4.2 April 2017 Investigation

The April 2017 field work included the drilling of seven cored boreholes (BH101 to BH107) to depths of between 12.4 m and 17.5 m using geotechnical investigation rigs. They were commenced using solid flight augers to drill through the overburden materials. Disturbed soil samples were collected from the tip of the auger and SPTs were undertaken in selected boreholes. Rotary drilling equipment was used to progress the bores to prevent hole collapse at depth. Once weathered rock was encountered, NMLC-sized diamond core drilling equipment was used to obtain 50 mm diameter continuous core samples of the rock for identification and strength testing purposes.

Eight cone penetration tests (CPTs 101 to 105 and 108 to 110) were undertaken to depths of between 4.1 m and 14.2 m at which point refusal of the equipment occurred.

Twenty (20) augered boreholes (BH111 to BH130) were drilled to depths of between 2.0 m and 4.0 m using geotechnical investigation rigs. The primary purpose of these boreholes was to collect samples for laboratory analysis associated with the waste classification assessment.

Two temporary groundwater wells (BH101 and BH106) were installed on the site following completion of drilling. The purpose of these wells was to allow groundwater level measurements to be made.



The test locations are shown on Drawing G1 in Appendix B. The ground surface levels have been measured relative to AHD using either an automatic level or a high-precision differential global positioning system (dGPS) receiver.

4.3 August/September 2017 Investigation

The August/September 2017 field work included the drilling of eight cored boreholes (BH202 to BH205, BH208 and BH210 to BH212) to depths of between 15.8 m and 28.2 m using geotechnical investigation rigs and similar techniques to the boreholes drilled in April 2017.

One CPT (CPT208) was undertaken to a depth of 19.3 m at which point refusal of the equipment occurred.

Two temporary groundwater wells (BH202 and BH204) were installed on the site following completion of drilling. The purpose of these wells was to allow groundwater level measurements to be made.

Two test pits (TP206 and TP207) were excavated adjacent to the Perkins Building to assess the footing and foundation conditions. These pits were initially excavated to depths of 1.5 m and 1.4 m using a small excavator with bucket attachment. The base of the footings could not be located within these pits and therefore additional pits were excavated at the same locations using a combination of a bucket attachment and an auger to achieve a greater investigation depth of 3 m.

The test locations are shown on Drawing G1 in Appendix B. The ground surface levels have been measured relative to AHD using either an automatic level or a high-precision dGPS receiver.

4.4 January 2018 Investigation

The January 2018 field work included the drilling of seven boreholes (BH251 to BH254 and BH256 to BH258) to depths of between 12.1 m and 22.6 m using geotechnical investigation rigs and similar techniques to the boreholes drilled in April 2017. Boreholes BH250 and BH255 which were also requested as part of the scope of works could not be drilled due to access constraints.

The test locations are shown on Drawing G1 in Appendix B. The ground surface levels have been measured relative to AHD using a high-precision dGPS receiver.

4.5 May 2018 Investigation

The May 2018 field work included the excavation of five test pits (TP301 to TP305) adjacent to the Perkins Building and Cranbrook House to assess the footing and foundation conditions. These pits were excavated to depths of between 0.8 m and 3.5 m using a small excavator with bucket attachment. Six dynamic penetrometer tests (DPTs) were also undertaken between Perkins Building and the oval.

The test locations are shown on Drawing G1 in Appendix B. The ground surface levels were interpreted from a survey plan provided by the client.



4.6 July 2018 Investigation

The July 2018 field work included the excavation of an additional two test pits (TP401 and TP402) adjacent to the eastern end of the Perkins Building to assess the footing and foundation conditions. These pits were excavated to depths of 0.5 m and 1.0 m using hand tools. Probing was undertaken below the apparent base of the footings using a steel rod, and a DPT was also undertaken in the base of each pit.

The test locations are shown on Drawing G1 in Appendix B.

5. Field Work Results

The subsurface conditions encountered during the various stages of the investigation are presented in the borehole logs (Appendix C), and CPT and DPT results sheets (Appendix D). Notes defining descriptive terms and classification methods are included in Appendix A.

The boreholes and/or the CPTs encountered:

- FILLING typically silty sand, sand and silty clay filling to depths of between 0.2 m and 4.0 m;
- NATURAL SOILS sand/silty sand to depths of between 4.1 m and 20.5 m. The sand varies from very loose to loose in some areas of the site, to medium dense to dense in others. A thin layer of clayey material (probably weathered rock) was encountered in the base of several tests;
- BEDROCK sandstone which was typically low, medium and high strength, with some weaker bands, to the base of the cored bores at depths of between 12.4 m and 28.2 m.

The test pit results are provided in Drawings G6 to G14 in Appendix B.

Tables 1A to 1C summarise the levels at which different materials were encountered in the cored boreholes.



Strate	RL of Top of Material Strata (m, AHD)									
Strata	BH2	BH4	BH10	BH101	BH102	BH103	BH104	BH105	BH106	BH107
Ground Surface/ Filling	16.1	16.4	32.4	16.1	16.3	16.8	16.3	16.5	34.1	34.5
vl to l Sands	11.3	11.9	30.4	12.9	15.7	NE	16.1	15.9	33.3	33.5
md to d Sands	NE	11.4	28.9	8.4	9.5	16.3	NE	NE	31.6	NE
Weathered Sandstone	NE	-1.5	12.1	NE	NE	NE	NE	12.4	NE	NE
MS or HS Sandstone	4.8	-1.6	NE	1.7	4.7	8.5	9.4	12.2	21.6	29.6
Base of Test	1.8	-4.7	10.2	-1.3	-1.2	2.4	3.9	1.0	18.5	20.5

Table 1A: Summary of Material Strata Levels

Notes: vI = very loose; I = loose; md = medium dense; d = dense; MS = medium strength; HS = high strength; NE = not encountered

Otroto	RL of Top of Material Strata (m, AHD)								
Strata	BH202	BH203	BH204	BH205	BH208	BH210	BH211	BH212	
Ground Surface/ Filling	34.9	34.1	34.1	27.4	30.5	34.0	33.7	34.3	
vI to I Sands	NE	31.6	30.1	NE	NE	N/A	N/A	N/A	
md to d Sands	31.9	28.6	28.6	24.6	29.7	N/A	N/A	N/A	
Weathered Sandstone	29.4	24.1	14.7	6.9	12.1	N/A	N/A	20.0	
MS or HS Sandstone	26.0	23.6	14.3	6.8	9.9	15.2	14.8	19.3	
Base of Test	6.8	6.1	5.9	3.8	5.5	13.9	13.7	18.5	

Table 1B: Summary of Material Strata Levels

Notes: vI = very loose; I = loose; md = medium dense; d = dense; MS = medium strength; HS = high strength; NE = not encountered; N/A = not applicable as bore was drilled to find top of rock only



Strata	RL of Top of Material Strata (m, AHD)								
Strata	BH251	BH252	BH253	BH254	BH256	BH257	BH258		
Ground Surface/ Filling	34.0	34.7	26.6	25.8	16.4	16.3	16.1		
vl to l Sands	NE	NE	26.0	25.3	15.6	15.9	14.8		
md to d Sands	33.0	33.4	24.6	23.8	12.4	11.8	9.1		
Weathered Sandstone	14.5	NE	10.6	14.3	NE	9.8	6.6		
MS or HS Sandstone	13.8	21.7	10.4	13.1	NE	9.2	6.1		
Base of Test	11.4	18.6	8.2	10.4	4.4	4.1	4.0		

Table 1C: Summary of Material Strata Levels

Notes: vI = very loose; I = loose; md = medium dense; d = dense; MS = medium strength; HS = high strength; NE = not encountered

Table 2 summarises the DPT depths for the testing on the embankment. Note that refusal may have occurred on bedrock, however due to the crude nature of the test method this should be considered approximate only.

Description	1A	1B	2	3	4	5	6
Top of Test	33.9	33.9	31.5	30.0	27.0	22.7	21.8
Base of Test	31.5	30.4	30.2	28.7	25.5	18.4	16.4
Refusal?	No	Yes	Yes	Yes	Yes	Yes	No

Table 2: Levels of Refusal in Dynamic Penetrometer Tests (m, AH	ID)
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Groundwater was observed at depths of between 3.7 m and 9.4 m (RL 6.7 m to RL 12.8 m AHD) in several boreholes/CPTs during the time of the field work. A level logger was recently installed in four of the monitoring wells on the site (BH101, BH106, BH204 and BH205) and the monitoring results will be provided separately once available.

Groundwater level measurements made during a recent site visit are provided in Table 3.

Date	Groundwater Observations in Wells (RL, m AHD)						
	BH101	BH106	BH204	BH205			
12 Feb 2018	<3.5*	<21.6*	15.0	7.8			

Table 3: Groundwater Level Measurements in Monitoring Wells

Note: *Well was dry therefore groundwater level is below these RLs

6. Laboratory Testing

6.1 Rock Samples

A total of 148 samples from the various investigation stages were tested for axial point load strength index (Is_{50}). The results ranged between 0.1 MPa and 4.1 MPa which correspond to very low to low strength and very high strength rock, respectively.

Five samples from the August/September 2017 investigation were tested for uniaxial compressive strength to complement the point load strength index results. These results are summarised in Table 4. Representative Is_{50} results are also included to assess a suitable UCS: Is_{50} correlation ratio.

Borehole	Depth (m)	Description	UCS (MPa)	Is ₅₀ (MPa)	UCS: Is ₅₀ Ratio
BH202	9.00-9.20	Sandstone	2.28	0.33	6.9
BH203	11.74-11.92	Sandstone	7.59	0.63/0.43*	14.3
BH204	20.10-20.28	Sandstone	10.9	0.66	16.5
BH205	22.78-23.00	Sandstone	11.3	0.87/0.74*	14.0
BH208	24.00-24.20	Sandstone	12.4	0.52	23.8

 Table 4: Summary of Uniaxial Compressive Strength Results

Note: Where two results are close to the UCS sample the average result has been used to calculate the ratio

Hawkesbury Sandstone typically exhibits UCS: Is_{50} ratios of between 16 and 24, with an average ratio of 20 often adopted. The sample from BH202 exhibited a low UCS which is probably due to the steep bedding evident in the sample. The average ratio of the remaining four tests was 17.2 which falls within the typical range. There is an insufficient number of samples to provide any further statistical analysis of these results.

6.2 Soil Samples

Thirty (30) soil samples obtained from the April 2017 investigation were analysed for pH and electrical conductivity (EC) to aid in the assessment of aggressivity. The pH results ranged between 5.3 and 8.0. The EC results ranged between 8 μ S/cm and 200 μ S/cm. The results are attached in Appendix E.



Aggressivity test results from the 2016 investigation and the August/September 2017 investigation are summarised in Table 5. The detailed results are also included in Appendix E.

Sample/Depth (m)	Description	рН (pH units)	EC (µS/cm)	Chloride (mg/kg)	Sulphate (mg/kg)
BH2/1.0	Sandy filling	6.3	21	<10	<10
BH2/2.0	Sandy filling	6.5	13	<10	<10
BH2/3.0	Sandy filling	6.5	13	<10	<10
BH2/4.0	Sandy filling	5.8	14	<10	<10
BH4/1.0	Sandy filling	6.3	14	<10	<10
BH4/2.0	Sandy filling	6.1	12	<10	<10
BH4/3.0	Sandy filling	6.0	11	<10	<10
BH4/4.0	Sandy filling	6.2	14	<10	<10
BH10/1.0	Sandy filling	9.9	87	<10	38
BH10/2.0	Sand	7.2	36	<10	31
BH202/1-1.45	Sandy filling	5.2	14	<10	<10
BH202/5.5-5.67	Sandstone	4.8	23	10	20
BH203/2.5-2.95	Sand	5.5	74	20	89
BH203/7-7.45	Sand	6.2	22	10	<10
BH204/10-10.45	Sand	7.3	53	<10	<10
BH204/17.5-17.95	Sand	7.0	20	<10	<10
BH205/4-4.45	Sand	6.4	27	<10	<10
BH205/13-13.45	Sand	6.9	18	<10	<10
BH208/1-1.45	Sand	6.3	26	<10	26
BH208/11.25-11.7	Sand	7.0	17	<10	<10

Table 5: Summary of Soil Aggressivity Results from 2015 and August/September 2017 Investigations

Notes: EC = electrical conductivity; All samples mixed at a ratio of 1(soil):5(water) prior to testing

Particle size distribution and shear box testing was also undertaken on selected samples. These results are provided in Appendix E.



7. Geotechnical Model

The geotechnical model interpreted for the site can be described as follows:

- Filling of varying depth which was primarily sandy. This material may have been natural soils that were moved around the site to level the area of the oval;
- Natural generally sandy soils that were very loose to loose. The depth of soil increased to the north and east, and in these areas the sands graded to medium dense and dense in the lower part of the profile;
- Sandstone bedrock beneath the sands. The depth to rock tends to increase towards the north and east in both the oval and embankment areas. The rock was typically low, medium and high strength with some bands/layers of weaker material present. It is likely that buried sandstone rock faces/cliffs are present in the area of the Perkins Building where significant differences in bedrock levels have been observed over relatively small distances;
- The depth to groundwater varies across the site. It is likely to flow through the sandy soils until it hits the bedrock, and then along the bedrock surface. This is evident in the two wells in which water was observed where the water level was just above the bedrock. The direction of flow is likely to be towards the north-east to Rose Bay and towards the north-west to Double Bay.

This interpreted geotechnical model is shown in Sections A-A' to D-D' on Drawings G2 to G5 in Appendix B.

The test pits excavated adjacent to the northern side of the Perkins Building suggest that the building may be founded on strip footings that vary in depth from about 0.5 m to approximately 3 m depth. It is noted that confirmation by physically probing and inspecting the base of the footing could not be undertaken at all locations due to the depth of the pit and the safety and damage risks posed by such deep excavations in very loose sandy filling. The nearest boreholes to the test pits encountered loose sands at these depths.

Sketches showing the conditions encountered in the test pits, including photographs, are shown in Drawings G6 to G14 in Appendix B.

8. **Proposed Development**

It is understood that the proposed development is likely to include:

- An Aquatic Recreation Centre (ARC) in the northern portion of the oval. This is likely to require excavation to approximately RL 8 m AHD for the pool hall level which is about 8 m below the level of the oval, with the pool itself about 2 m deeper;
- An adjoining underground carpark facility which will require excavation to approximately RL 12 m AHD;
- A separate performing arts and indoor sporting facility (Centenary Building) constructed into the embankment to the south-east of oval. This will require excavation to approximately RL 18 m AHD which is in the order of 17 m below the ground surface in the more elevated areas of the site.



The geotechnical issues considered relevant to the proposed development include excavation, excavation support, groundwater and foundations. Comments on seismicity and aggressivity are also provided.

9. Comments

9.1 Excavation

The excavation for the ARC and carpark structures appears to primarily be within filling and sandy soils. The excavation for the Centenary Building will be within filling and sandy soils in the northern and eastern sections, and sandstone bedrock in the south-western area.

Excavation in the filling and sandy soils should be readily achievable using excavators with bucket attachments. Excavation in the sandstone bedrock is likely to require heavy ripping, rock hammering and/or rock sawing as the boreholes indicate that the rock is low, medium and high strength.

9.2 Excavation Support

9.2.1 General

Vertical excavations in filling and sandy soil are not expected to be stable for any extended period of time. Temporary batters may be feasible above the groundwater table and should be cut no steeper than 1.5(H):1(V) for cuts up to 3 m depth. Flatter batters or batters that incorporate intermediate benching should be provided for deeper cuts and stability analysis will need to be undertaken to confirm appropriate batter geometries in this case.

Shoring support will be required where temporary batters are not feasible. Suitable shoring systems where groundwater is below the proposed bulk excavation level include contiguous pile walls and driven steel sheet piles. Contiguous pile walls can be constructed by installing concrete or grout-injected continuous flight auger (CFA) piles around the perimeter of the excavation so that the adjacent piles are close or touching, thereby supporting the material behind the wall. Any gaps between piles can be plugged with grout as excavation proceeds. Secant pile walls, in which the adjacent piles overlap, could also be used.

Driven steel sheet piles are installed around the perimeter of the excavation area prior to the commencement of the works. The adjacent sheets are interlocked to provide support to the material behind the wall. Driving sheets through obstructions in the filling may prove problematic and predrilling in some areas of the site may be necessary. Vibrations induced by driving equipment may also cause damage to adjacent structures and detract from the suitability of this option. Steel sheet piles will also only be feasible in areas of the site where the level of bedrock is well below the excavation level so that the sheets can be driven to a sufficient depth to achieve the necessary passive restraint.

These wall types are likely to require the use of temporary ground anchors to provide lateral support during construction. Permanent lateral support would need to be provided by the finished structure or, where required, by permanent ground anchors.



9.2.2 Earth Pressures

Excavation faces retained either temporarily or permanently will be subjected to earth pressures from the ground surface down to either the base of the excavation or the top of competent medium strength sandstone, whichever is shallower. Table 6 outlines material and strength parameters that could be used for the preliminary design of excavation support structures.

Material	Bulk Density (kN/m³)	Friction Angle (deg.)	Cohesion (kPa)	Young's Modulus (MPa)	Coefficient of Active Earth Pressure (K _a)	Coefficient of Earth Pressure at Rest (K _o)	Ultimate Passive Earth Pressure
Sandy Filling	20	27	0	10	0.4	0.6	NA
vl to l Sand	20	30	0	15	0.35	0.5	K _p = 3.0
md to d Sand	20	35	0	30	0.3	0.45	K _p = 3.5
Weathered Rock	22	36	10	50	0.15	0.2	1000 kPa
MS or HS Sandstone	23	38	50	500	0	0	3000 kPa

Table 6: Material and Strength Parameters for Excavation Support Structures

Notes: vl = very loose; l = loose; md = medium dense; d = dense; MS = medium strength; HS = high strength; NA = not applicable

Cantilevered retaining walls and walls with a single row of anchors could be designed by assuming a triangular lateral earth pressure distribution (increasing linearly with depth). For preliminary design purposes, a trapezoidal lateral earth pressure distribution where the maximum pressures act over the central 60% of the wall could be assumed for retaining walls with multiple rows of anchors/support. Refinement of the design should be undertaken using a computer program such as WALLAP, PLAXIS or FLAC.

Lateral pressures due to surcharge loads from sloping ground surfaces, adjacent buildings, road pavements and construction machinery should be included where relevant. Drainage should also be provided to prevent hydrostatic pressure from acting on the shoring walls if hydrostatic pressures are not incorporated into the assumed surcharges.

9.2.3 Rock Wedges

Hawkesbury Sandstone usually contains sub-horizontal bedding. However, two major joint sets are usually present within the rock mass which strike slightly east of north and slightly south of east. These joints are often steeply inclined (i.e. approximately 70°) and can dip in either direction normal to the strike. If an excavation runs parallel to the strike of these joints and exposes a joint above the excavation level then large wedges of rock can mobilise and slide into the excavation.



The current excavation alignment where rock is expected to be exposed (i.e. the south-western corner of the Centenary Building) is oriented north-west and north-east and is therefore unlikely to be parallel to these major joint sets. However, any changes to the building orientation should consider the potential presence of these defects and the shoring system designed accordingly.

9.2.4 Ground Anchors

Where necessary, the use of declined tie-back (ground) anchors is suggested for the temporary lateral restraint of the pile walls. Such ground anchors should be declined below the horizontal to allow anchorage into the stronger materials at depth. The design of temporary ground anchors for the support of pile wall systems may be carried out using the allowable average bond stresses at the grout-rock/soil interface given in Table 7.

Table 7: Allowable Bond Stresses for Anchor Design

Material Description	Allowable Bond Stress (kPa)
Medium Dense to Dense Sand	25
Low Strength Sandstone	200
Medium and High Strength Sandstone	500

It is unlikely that conventional anchors will have sufficient capacity unless they are installed in the bedrock. Secondary-grouted anchors could be used in the natural soils to increase the anchor capacity. This technique involves installing a conventionally-grouted anchor and then, once cured, injecting grout into the anchor at a higher pressure to crack the primary grout and densify the surrounding materials. This technique is fairly specialised and only experienced contractors should be engaged for the design and installation of secondary-grouted anchors.

Ground anchors should be designed to have a free length equal to their height above the base of the excavation and have a minimum 3 m bond length. After installation they should be proof loaded to 125% of the design working load and locked-off at no higher than 75% of the working load. Periodic checks should be carried out during the construction phase to ensure that the lock-off load is maintained and not lost due to creep effects or other causes.

The parameters given in Table 7 assume that the anchor holes are clean, with grouting and other installation procedures carried out carefully and in accordance with good anchoring practice. Careful installation and close supervision by a geotechnical specialist may allow increased bond stresses to be adopted during construction, subject to testing. The cone pull-out failure criterion should also be considered, where necessary.

The use of permanent anchors would require careful attention to corrosion protection. Permanent anchors should also be proof loaded to 150% of the design working load, with the lock-off load determined by the structural designer.

It will be necessary to obtain permission from neighbouring landowners prior to installing anchors that will extend beyond the perimeter of the site. In addition, care should be taken to avoid damaging buried services and pipes during anchor installation.



9.3 Groundwater

The groundwater levels measured on the site during the recent investigations, where encountered, varied between RL 6.7 m and RL 15.0 m AHD. Groundwater is likely to flow along or close to the rock surface as it flows towards Rose Bay and Double Bay, and the groundwater table is likely to be at considerable depth on the site. The groundwater level is also likely to vary as a result of rainfall events.

Monitoring of groundwater levels has been undertaken and the results of this monitoring have been reported separately (Ref. 84944.02.R.005).

Groundwater levels will need to be compared to the proposed excavation levels. The proposed ARC and carpark structure is likely to be above the groundwater table in its current location. The excavation for the Centenary Building is likely to intercept seepage as water flows through the sandy soils above the bedrock, particularly in the western portion of the building. Drainage measures will need to be incorporated into the structure to ensure the seepage can be diverted around the building. Flow rates through the sands could be significant.

9.4 Foundations

9.4.1 Spread Footings in Rock

Isolated spread footings (e.g. pad footings and strip footings) are only likely to be suitable for supporting the proposed structures in areas where sandstone bedrock is exposed at or close to the bulk excavation level. The sandy soils will not be able to support the column loads expected.

Spread footings could be designed using the parameters provided in Table 8.

Table 8:	Desian	Parameters	for S	pread	Footinas
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Material Description	Allowable Bearing Pressure (kPa) ¹	Young's Modulus (MPa)
Weathered Sandstone	1000	100
Low Strength Sandstone	3500	500
Medium Strength Sandstone	6000	1000
High Strength Sandstone	10,000	2000

Notes: ¹Provided that adverse seams are not present within the zone of influence of the footings

Settlement of a footing is dependent on the load applied to the footing and the foundation conditions below the footing. The total settlement of a spread footing designed using the parameters provided in Table 8 would be expected to be less than 1% of the footing width upon application of the design working load.



All footing excavations should be inspected by a geotechnical engineer to check the adequacy of the foundation material. In addition, spoon testing should be carried out in 30% to 50% of all footings designed on the basis of allowable bearing pressures greater than 3500 kPa.

9.4.2 Lightly Loaded Spread Footings in Sand

Spread footings in sand should be suitable for supporting lightly loaded structures (e.g. small retaining walls). The bearing capacity of a sand is a function of the width and depth of the footing as well as the sand density. A 1 m wide footing (or wider) founded at 0.5 m depth (or deeper) would be suitable for an allowable bearing pressure of 150 kPa provided that the sand is at least medium dense and well above the groundwater table. A Density Index of 70% could be targeted for the medium dense foundation material.

9.4.3 Raft Slabs

Raft slabs are sometimes used to transfer column loads into weaker materials that cannot support spread footings (e.g. sands). However, the varying thickness of the sands and differences in density across the site would indicate that a raft slab is probably not a suitable footing solution for the proposed buildings.

For the swimming pool shell, the weight of the soil to be removed from the pool footprint is expected to be much greater than the weight of the new pool. As such, additional settlement is theoretically unlikely to occur. However, in practice the sandy subgrade will become disturbed during construction activities and therefore some minor settlement will occur as the disturbed material consolidates under the weight of the new pool.

To reduce the risk of unacceptable differential settlements, it is recommended that at least 1 m of sandy soil is present beneath the entire pool shell. This may require over-excavation of rock and replacement with sand if rock is encountered above or within 1 m of the pool subgrade level. The sand filling should be compacted to achieve a Density Index in the order of 70%.

The subgrade beneath other areas of slab-on-ground should also be compacted to achieve a Density Index in the order of 70% to reduce the risk of differential settlements.

9.4.4 Piles

Piles could be used to support the proposed structures where bedrock is below the proposed excavation level. Suitable pile types include concrete or grout-injected CFA piles, bored piles drilled with temporary or permanent casing, or driven pile-types such as precast concrete, steel tube or steel H-section piles.

CFA piles and bored piles could be designed using the parameters provided in Table 9. Parameters for both the working stress and limit-state design approaches have been provided.

	Allowable Parameters		Ultimate P	Veursie	
Material Description	End-Bearing Pressure (kPa)	Shaft Adhesion (kPa) ¹	End-Bearing Pressure (kPa)	Shaft Adhesion (kPa) ¹	Young's Modulus (MPa)
Weathered Sandstone	1000	50	3000	150	100
Low Strength Sandstone	3500	300	15,000	600	500
Medium Strength Sandstone	6000	600	30,000	1200	1000
High Strength Sandstone	10,000	1000	60,000	2000	2000

Table 9: Design Parameters for CFA and Bored Piles in Compression

Notes: ¹Only where adequate socket roughness has been achieved. Reduce by 50% for tension and analyse for cone pullout

It should be noted that the serviceability limit-state is likely to govern the design of the piles and the ultimate bearing pressures provided in Table 9 are unlikely to be able to be achieved in practice. An appropriate geotechnical strength reduction factor should be applied when using the limit-state approach as outlined in AS 2159 – 2009 *Piling – Design and installation*.

Settlement of a pile is dependent on the loads applied to the pile and the foundation conditions in the socket zone and below the pile toe. The total settlement of a pile designed using the 'allowable' parameters provided in Table 9 would be expected to be less than 10 mm upon application of the design load.

Driven piles are often used to support high column loads on sites in which driving is practicable. The capacity of a pile driven to near-refusal in rock is likely to be governed by the structural capacity of the pile and the weight/efficiency of the driving equipment. The installation of test piles and pile load testing should then be undertaken to confirm driving conditions, pile set, pile capacity and an appropriate geotechnical strength reduction factor.

Settlement of a driven pile should be estimated using load test data obtained during the design confirmation stage of the piling process.

9.5 Seismicity

A Hazard Factor (*Z*) of 0.08 would be appropriate for the development site in accordance with Australian Standard AS 1170.4 – 2007 *Structural design actions – Part 4: Earthquake actions in Australia.* The site sub-soil class would be Class D_e based on the depths and strengths of the materials (i.e. very loose sands) encountered in the boreholes and CPTs.



9.6 Aggressivity

The laboratory test results for soil aggressivity were compared with the exposure classifications outlined in Australian Standard AS 2159 - 2009 *Piling – Design and installation*. Table 10 summarises the exposure classifications for steel and concrete piles based on the average laboratory test results.

Table 10 [.]	Exposure	Classifications	for Steel	and Concrete Piles
	LAPOSUIC	olassifications	IOI OLEEI	

Type of Laboratory Analysis	Exposure Classification for Steel Piles	Exposure Classification for Concrete Piles
Soil	Non-Aggressive	Mild

10. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for a redevelopment project at Cranbrook School, Bellevue Hill in accordance with DP's ongoing commission for this project. The report is provided for the use of Cranbrook School for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations.

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

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

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP.



DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical/groundwater components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About this Report



Introduction

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

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

Copyright

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

Borehole and Test Pit Logs

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

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

Groundwater

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

 In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

 In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

 In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

15, 30/40 mm

Sampling Methods

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Soil Descriptions

Description and Classification Methods

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

Soil Types

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

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

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

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

The proportions of secondary constituents of soils are described as:

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

Definitions of grading terms used are:

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

Cohesive Soils

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

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

Cohesionless Soils

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

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

Soil Descriptions

Soil Origin

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

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

Transported soils may be further subdivided into:

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

Rock Descriptions

Rock Strength

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

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

* Assumes a ratio of 20:1 for UCS to Is₍₅₀₎

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

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

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

Rock Descriptions

Rock Quality Designation

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

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

Stratification Spacing

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

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

Symbols & Abbreviations

Introduction

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

Drilling or Excavation Methods

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

Water

\triangleright	Water seep
$\overline{\bigtriangledown}$	Water level

Sampling and Testing

- Auger sample А
- В Bulk sample
- D Disturbed sample Е
- Environmental sample
- U₅₀ Undisturbed tube sample (50mm)
- W Water sample
- pocket penetrometer (kPa) рр
- PID Photo ionisation detector
- PL Point load strength Is(50) MPa
- S Standard Penetration Test V Shear vane (kPa)

Description of Defects in Rock

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

Defect Type

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

Orientation

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

h horizonta

21

- vertical ٧
- sub-horizontal sh
- sub-vertical sv

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

ро	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General



Asphalt Road base

Concrete

Filling

Soils



Topsoil

Peat

Clay

Silty clay

Sandy clay

Gravelly clay

Shaly clay

Silt

Clayey silt

Sandy silt

Sand

Clayey sand

Silty sand

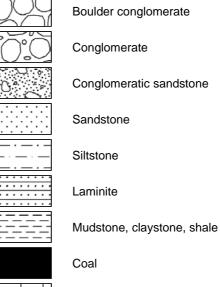
Gravel

Sandy gravel

Cobbles, boulders

Talus

Sedimentary Rocks



Limestone

Metamorphic Rocks

Slate, phyllite, schist

Quartzite

Gneiss

Igneous Rocks



Granite

Dolerite, basalt, andesite

Dacite, epidote

Tuff, breccia

Porphyry

...

July 2010

Cone Penetration Tests

Introduction

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

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

 q_{c}

 \mathbf{f}_{s}

i.

7

- Cone tip resistance
- Sleeve friction
- Inclination (from vertical)
- Depth below ground

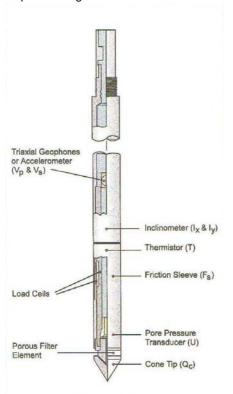


Figure 1: Cone Diagram

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

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



Figure 2: Purpose built CPT rig

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

Types of CPTs

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

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

Strata Interpretation

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

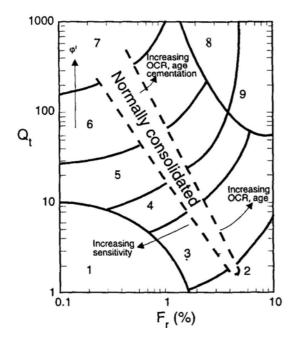


Figure 3: Soil Classification Chart

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

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

Engineering Applications

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

Settlement

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

Pile Capacity

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

Dynamic or Earthquake Analysis

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

Other Applications

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

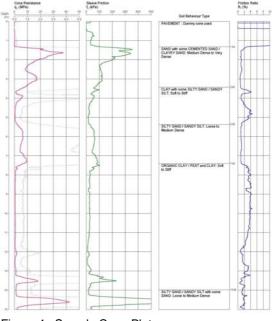
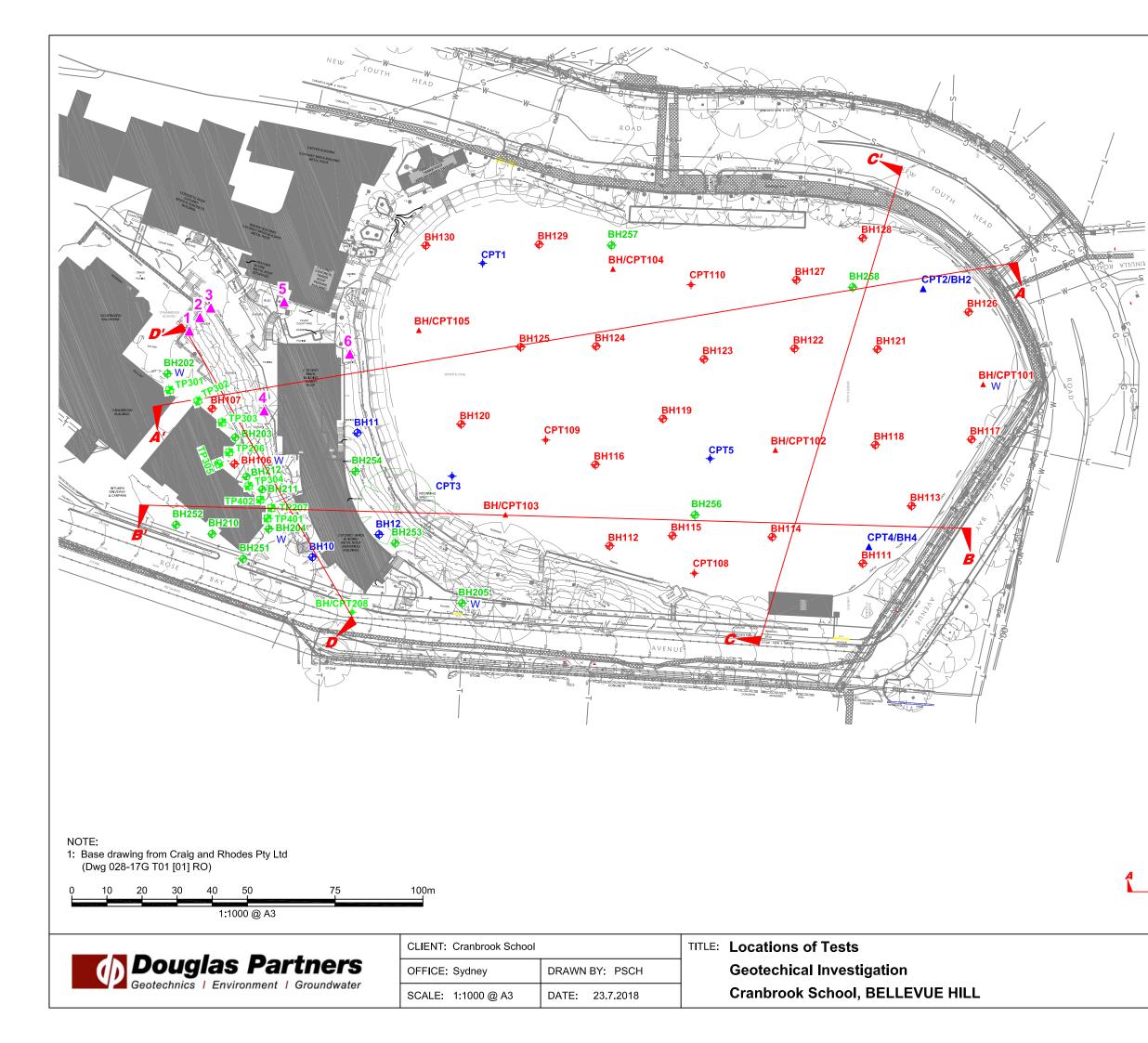
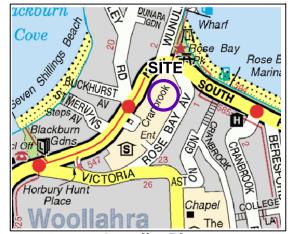


Figure 4: Sample Cone Plot

Appendix B

Drawings





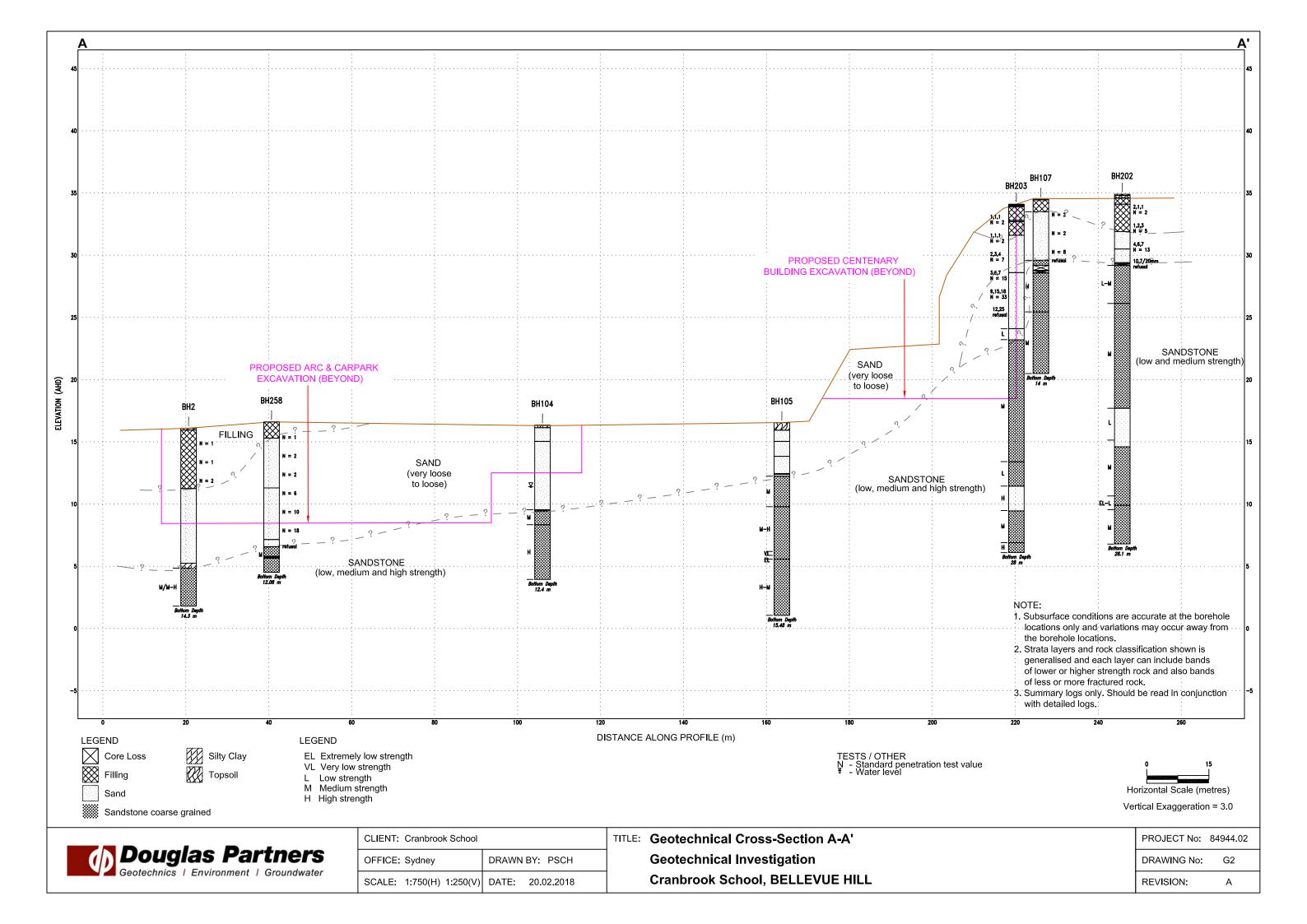
Locality Plan

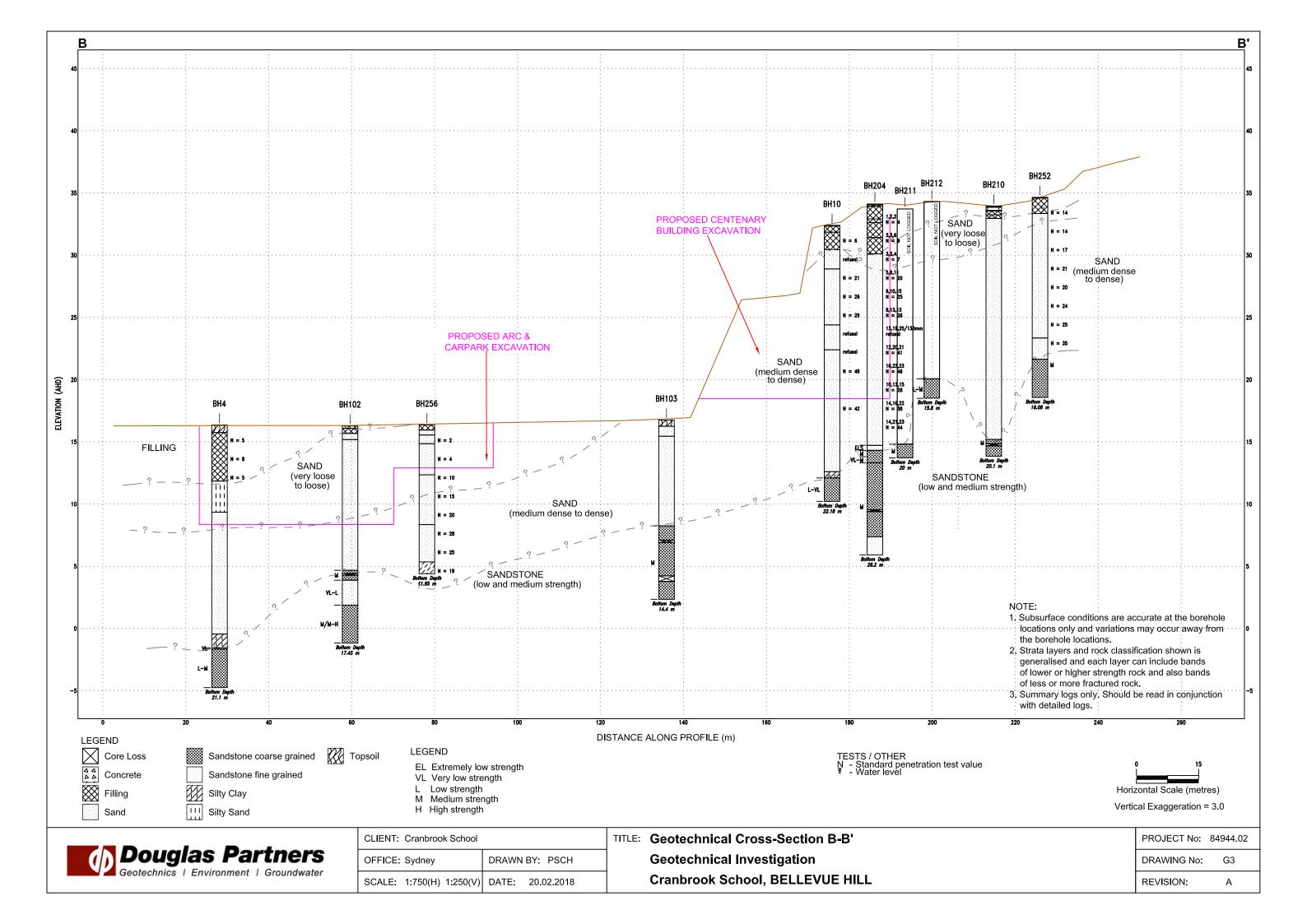
LEGEND

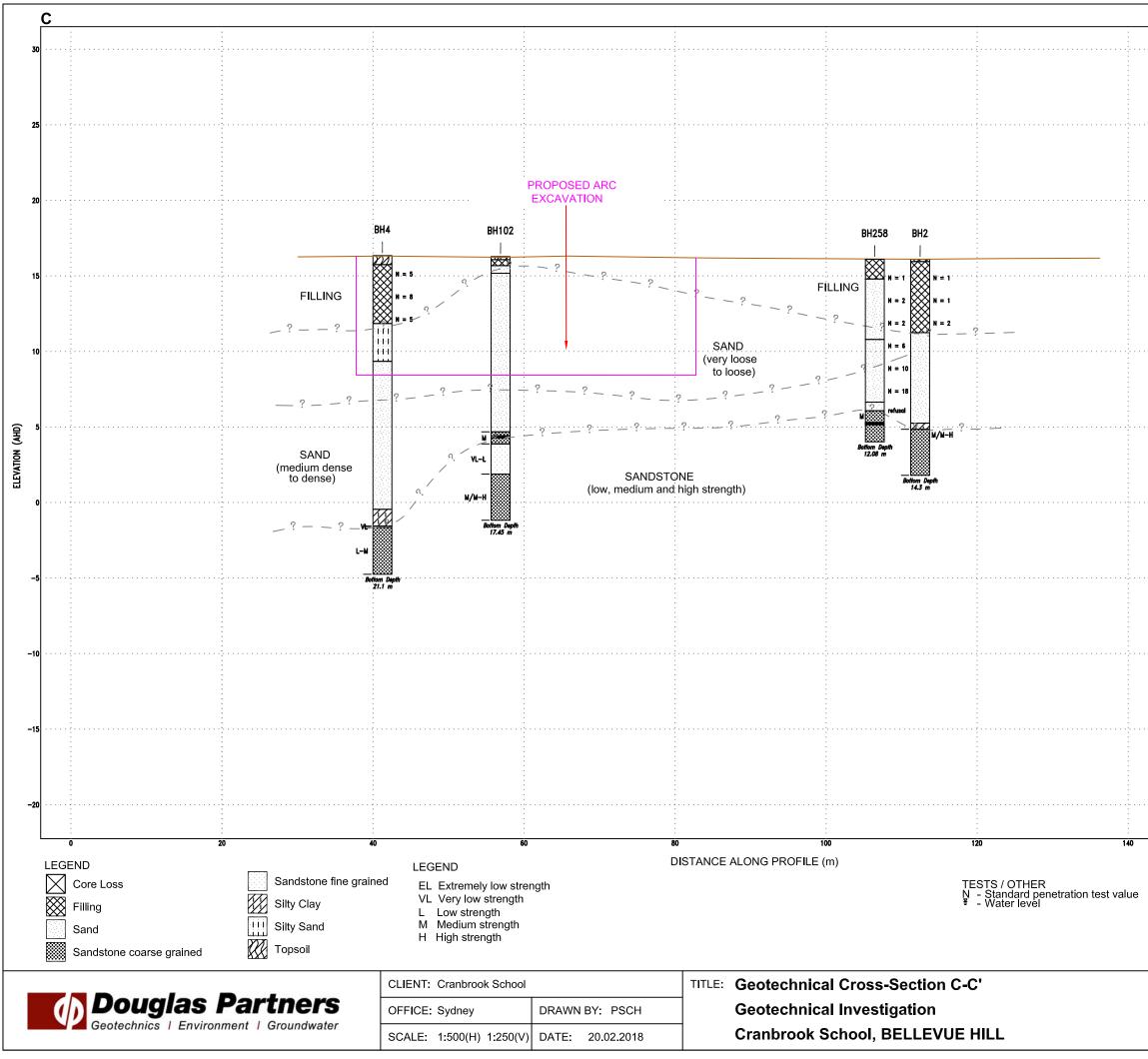
- Previous borehole 2015
- Previous CPT 2015
- Previous borehole & CPT 2015
- Previous borehole & CPT 2017
- + Previous CPT 2017
- Previous borehole 2017
- W Groundwater well
- Current borehole
- Current test pit
- + Current borehole and CPT
- Current dynamic penetrometer test

Geotechnical Cross Section A-A'

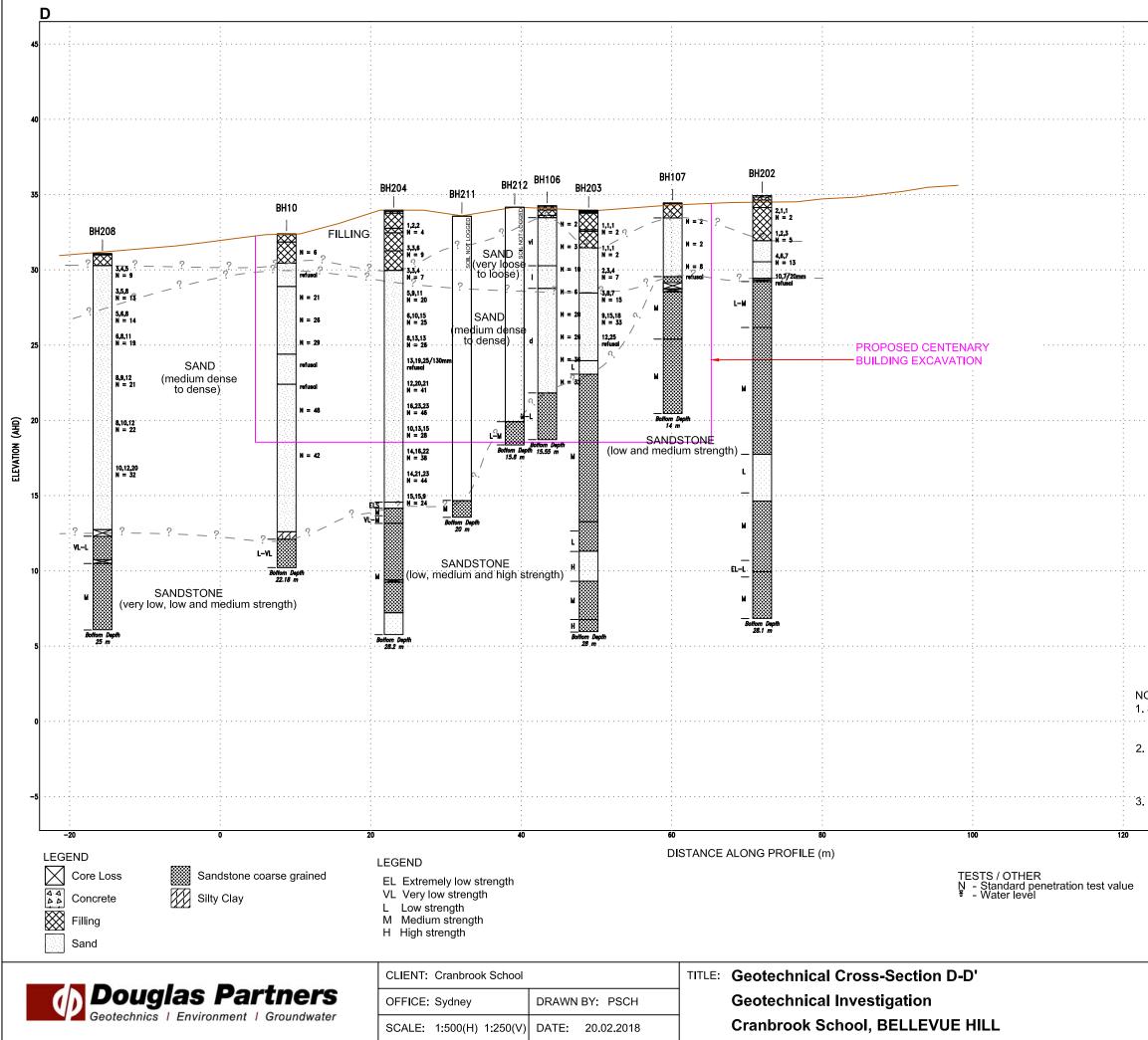
PROJECT No: 84944.02 DRAWING No: G1 REVISION: C



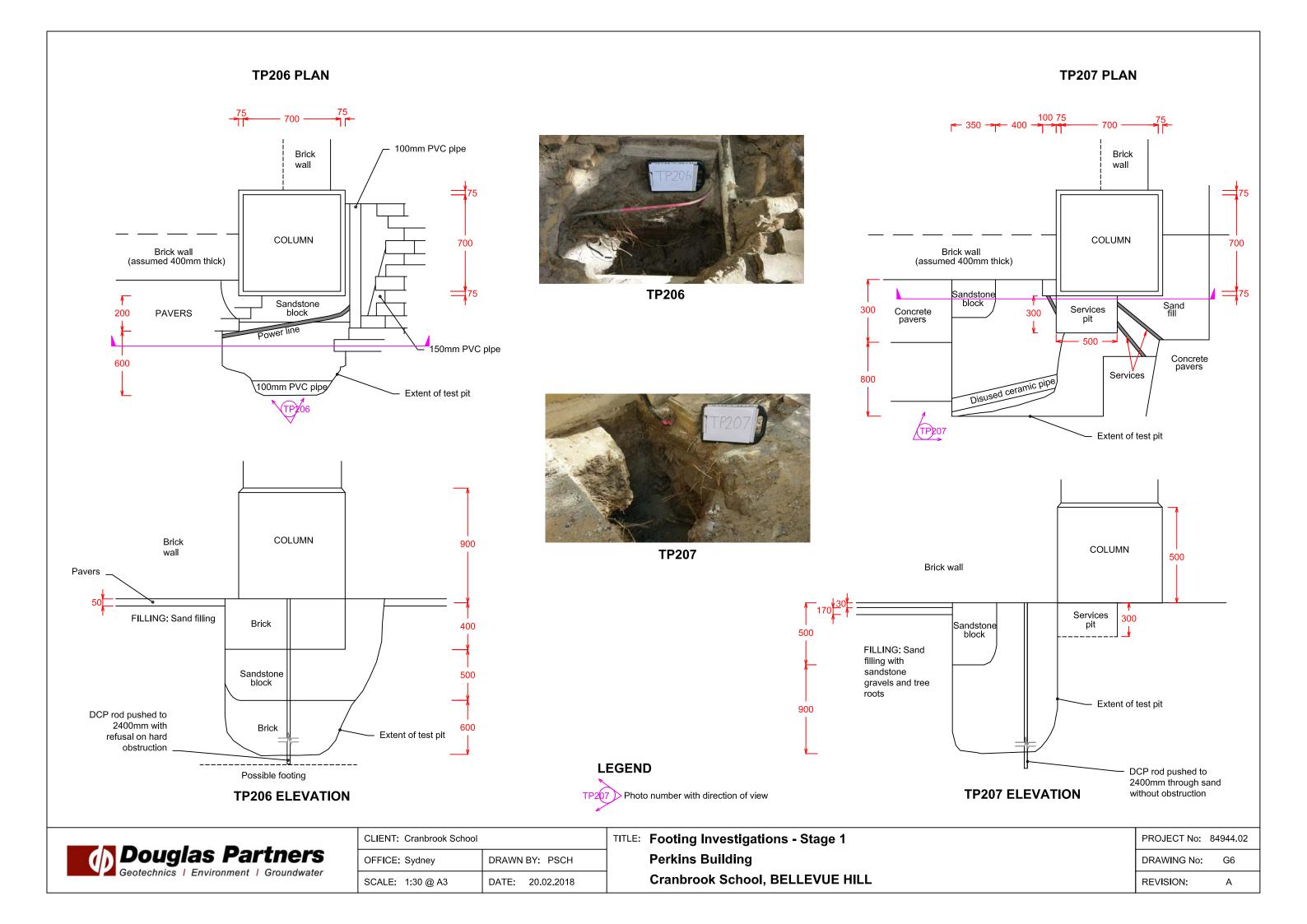


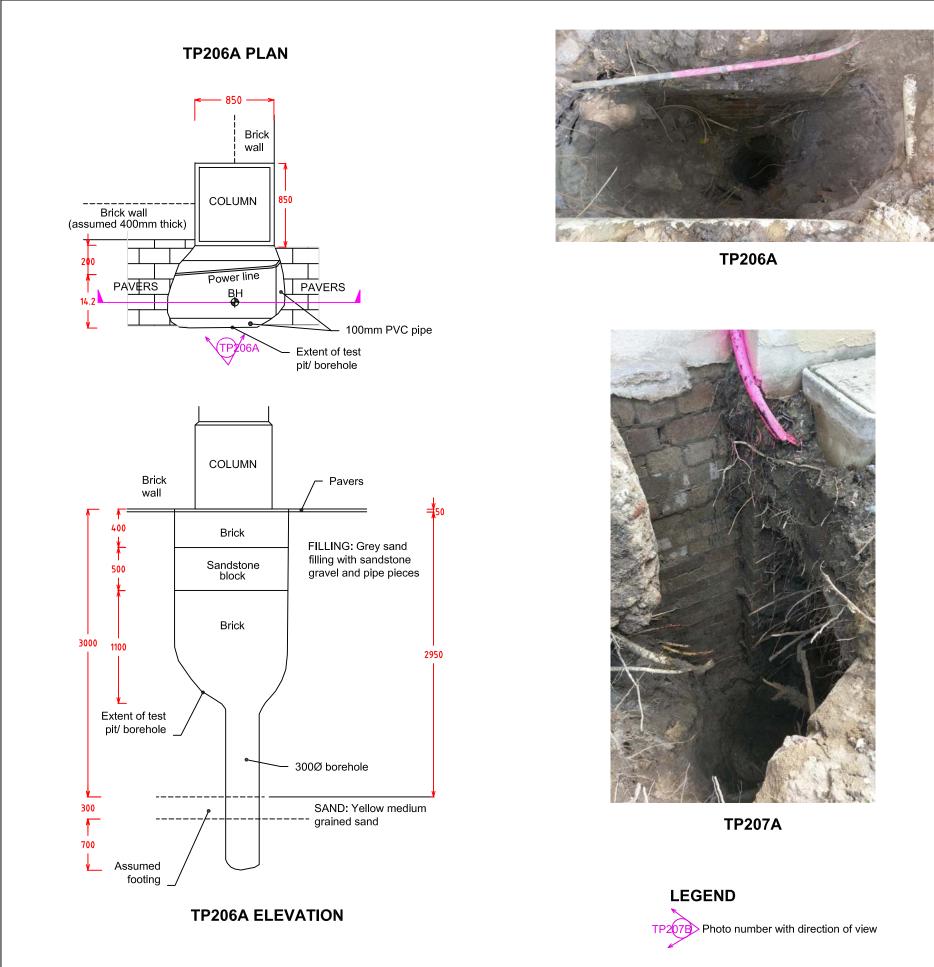


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	DRAWING No:	G4	
	REVISION:	Α	_



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Subsurface conditions are accurate	e at the borehole
locations only and variations may o	occur away from · · · · · · · · 0
the borehole locations. . Strata layers and rock classificatior	
generalised and each layer can inc	
of lower or higher strength rock and	
of less or more fractured rock.	
Summary logs only. Should be read	d in conjunction
with detailed logs.	
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	PROJECT No: 84944.02
	DRAWING No: G5
	REVISION: A





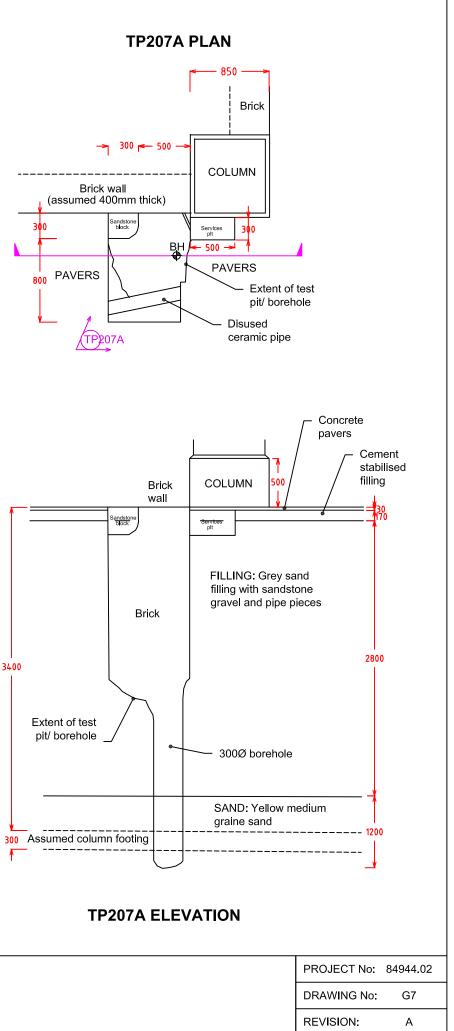


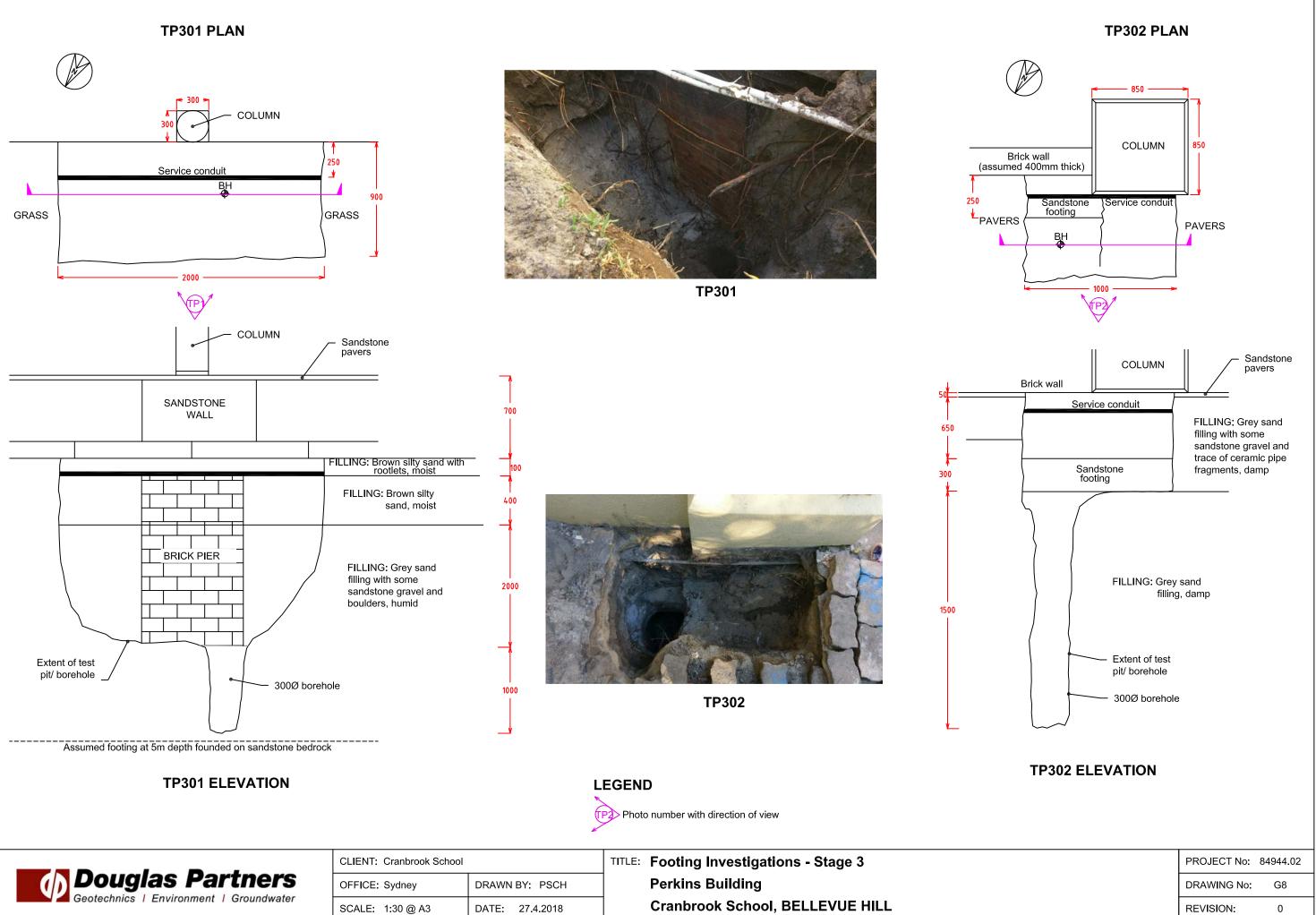
CLIENT: Cranbrook School		TITLE: Footing Investigations - Stage 2
OFFICE: Sydney	DRAWN BY: PSCH	Perkins Building
SCALE: 1:30 @ A3	DATE: 20.02.2018	Cranbrook School, BELLEVUE HILL

Brick wall (assumed 400mm thick) PAVERS 800 (TP207A

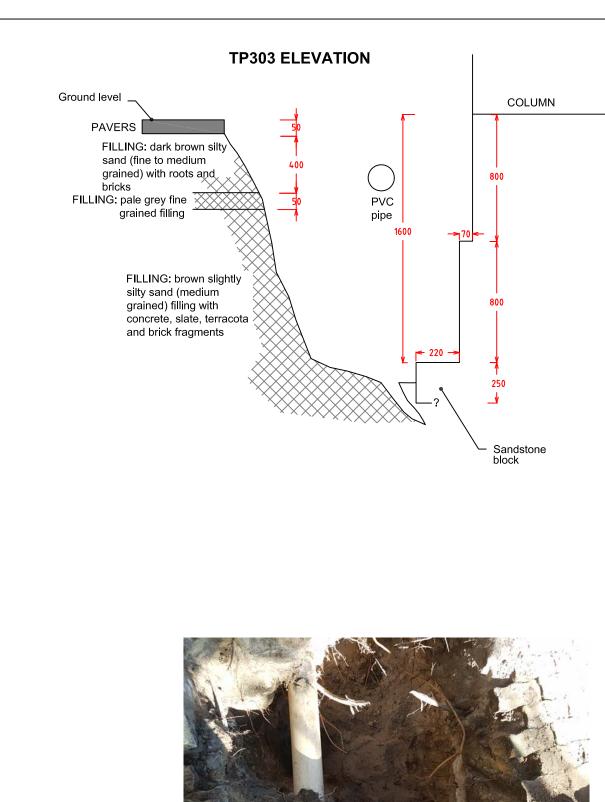
3400

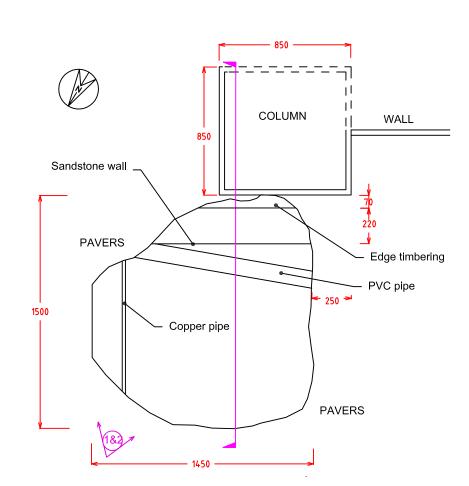
Extent of test pit/ borehole





	CEIENT. Cranbrook Schoo
glas Partners	OFFICE: Sydney
ics Environment Groundwater	SCALE 1:30 @ A3









CLIENT: Cranbrook School		Г
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: 1:25 @ A3	DATE: 14.5.2018	

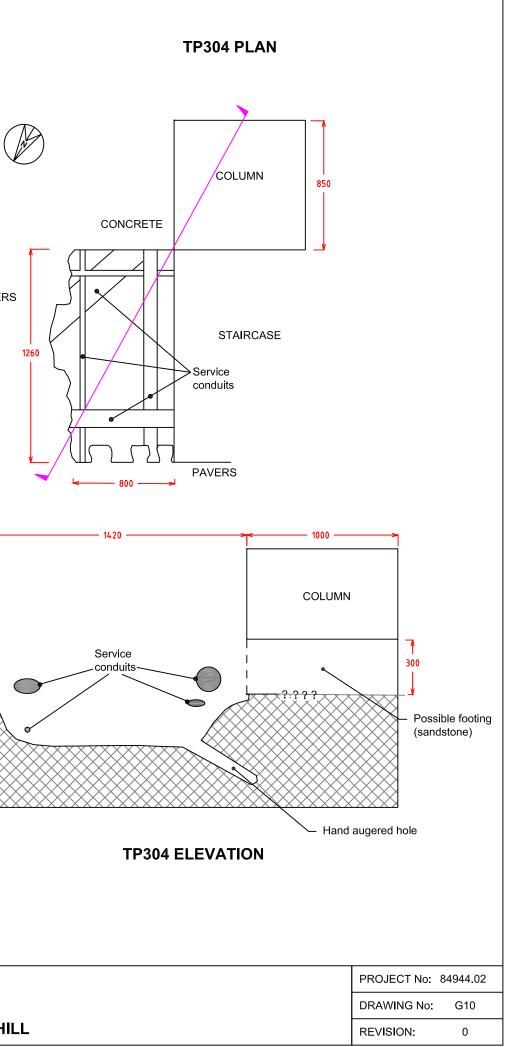
TITLE: Footing Investigations - Stage 3 Perkins Building Cranbrook School, BELLEVUE HILL

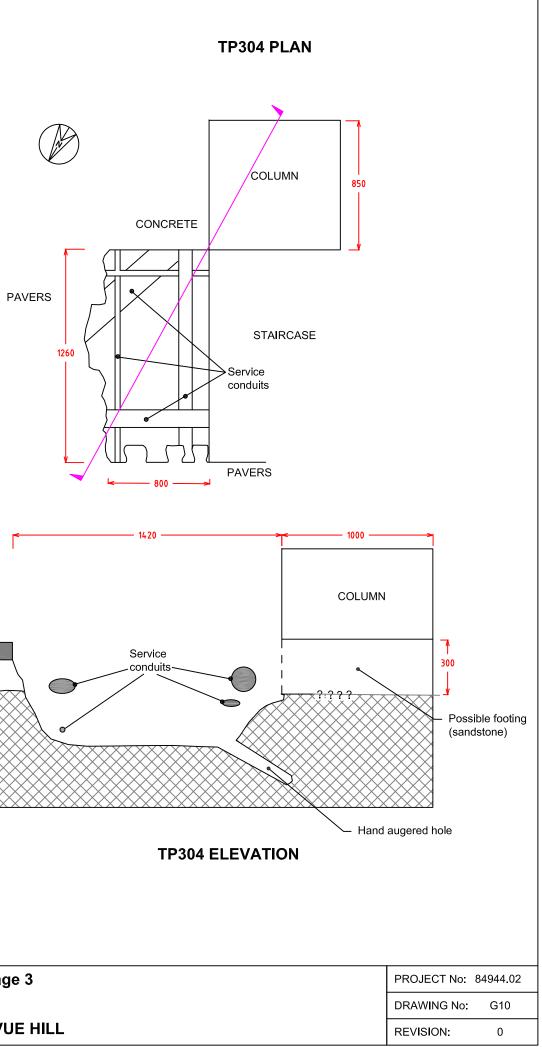
TP303 PLAN

PROJECT No: 84944.0	2
DRAWING No: G9	
REVISION: 0	











Ground level PAVER FILLING: light brown silty sand (fine to medium grained) filling with a trace of fragmented terracota, 300 FILLING: dark brown sand (fine to medium grained) filling with a trace of crushed sandstone and slate



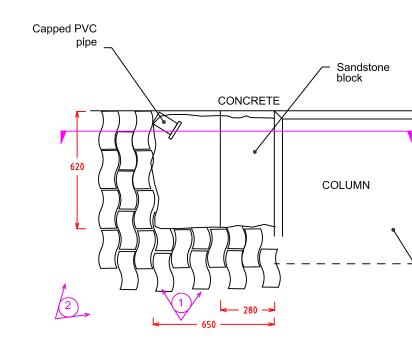
CLIENT: Cranbrook School							
OFFICE: Sydney	DRAWN BY: PSCH						
SCALE: 1:25 @ A3	DATE: 14.5.2018						

brick and concrete

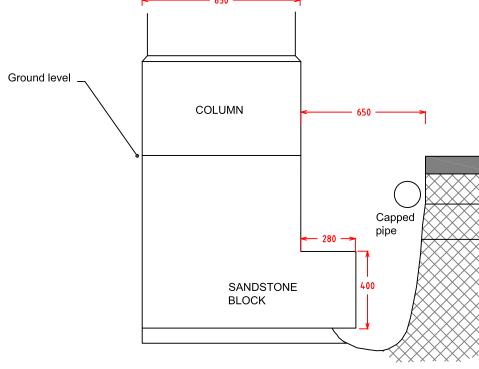
Footing Investigations - Stage 3 Perkins Building Cranbrook School, BELLEVUE HILL

TP305 PLAN









TP305 ELEVATION



CLIENT: Cranbrook School		Τľ
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: 1:25 @ A3	DATE: 14.5.2018	

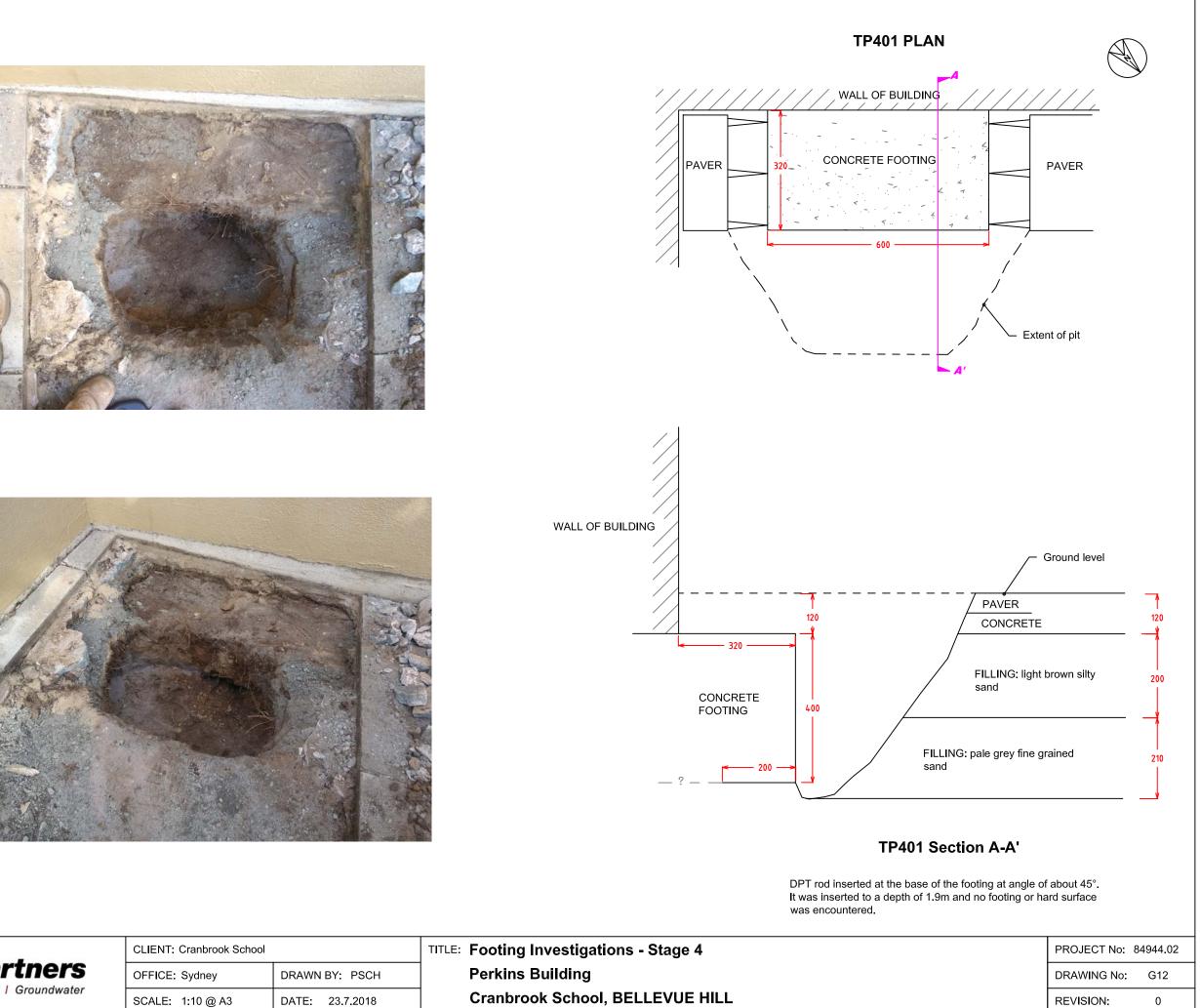
™LE: Footing Investigations - Stage 3 Perkins Building Cranbrook School, BELLEVUE HILL



Flush with wall assumed 850x850mm square column



PROJECT No: 84944.02 DRAWING No: G11 REVISION: 0

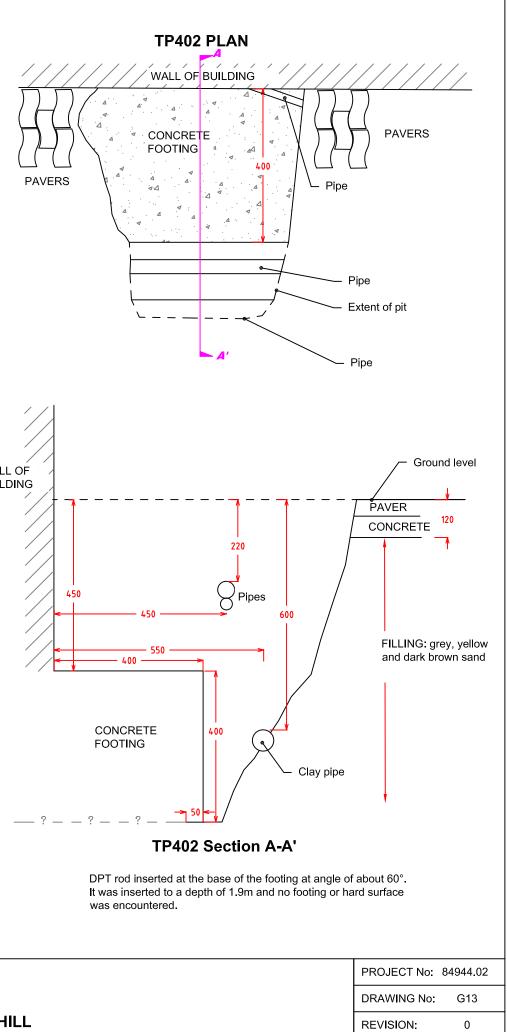




CLIENT: Cranbrook School	
OFFICE: Sydney	DRAWN BY: PSCH
SCALE: 1:10 @ A3	DATE: 23.7.2018

Cranbrook School, BELLEVUE HILL





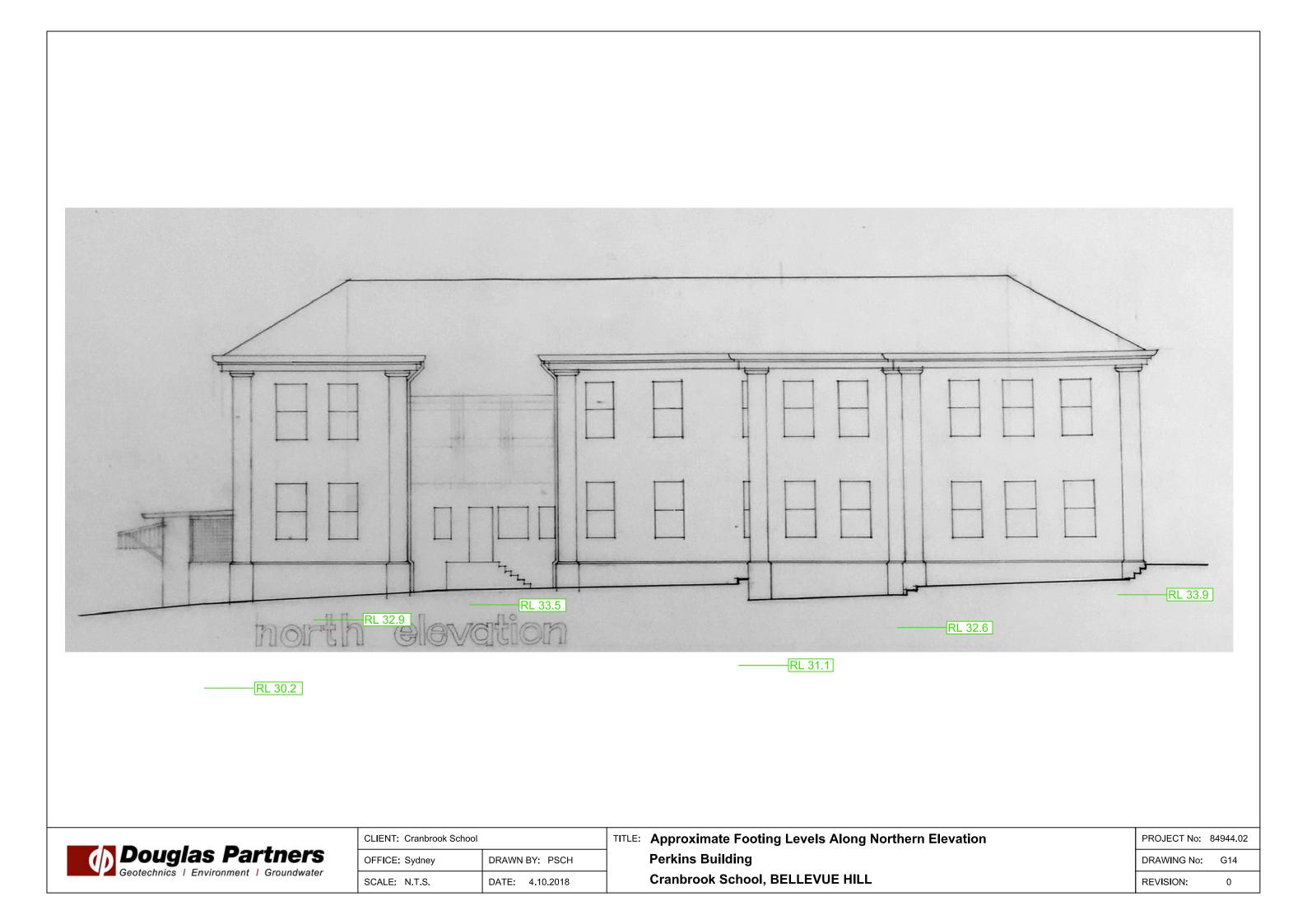
WALL OF BUILDING

A



CLIENT: Cranbrook School							
OFFICE: Sydney	DRAWN BY: PSCH						
SCALE: 1:10 @ A3	DATE: 23.7.2018						

Footing Investigations - Stage 4 Perkins Building Cranbrook School, BELLEVUE HILL



Appendix C

Borehole Logs

SURFACE LEVEL: 16.10 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 2 PROJECT No: 84944 DATE: 7/7/2015 SHEET 1 OF 2

			Derret		Dool			1			
	Depth	Description	Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ	hic L	Rock Strength	Fracture Spacing	Discontinuities				n Situ Testing
Ч	(m)	of		Loc	Strendth High Fix High High Nedrium Very High Ex High Nater 0.01	(m)	B - Bedding J - Joint	Type	Core Rec. %	D%	Test Results &
			H M M M M M M M M M M M M M M M M M M M	0	Ex Low Very Low Low Medium High Very Hig Ex High B Very O	0.05 0.10 1.00	S - Shear F - Fault	L L	сğ	Ψ,	Comments
-16	0.15	TOPSOIL - dark brown, silty sand \topsoil with trace rootlets, damp /		$\frac{\gamma}{\sqrt{\lambda}}$							
Ē		FILLING - poorly compacted, dark brown and light grey-brown mottled,		\times							
E		brown and light grey-brown mottled, silty sand, damp		\bigotimes							
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RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HQ to 9.5m

TYPE OF BORING:Solid flight auger to 9.5m;Rotary to 11.25m;NMLC-Coring to 14.3mWATER OBSERVATIONS:No free groundwater observed whilst augeringREMARKS:

	SAMF	PLIN	3 & IN SITU TESTING	LEG					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)				
B	Bulk sample	Р	Piston sample) Point load axial test Is(50) (MPa)				Partners
BLI	< Block sample	U,	Tube sample (x mm dia.)	PL(C) Point load diametral test ls(50) (MPa)			26	Partners
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)		DUGG	IGJ -	\mathbf{r} as the \mathbf{J}
D	Disturbed sample	⊳	Water seep	S	Standard penetration test				
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	I Enviro	nment Groundwater
-						 			

SURFACE LEVEL: 16.10 AHD EASTING: NORTHING:

DIP/AZIMUTH: 90°/--

BORE No: 2 PROJECT No: 84944 DATE: 7/7/2015 SHEET 2 OF 2

					L)P/	AZIMUTH:	90°/	SHE	ELŻ	2 OF	- 2
\square		Description	Degree of Weathering	<u>i</u>	Rock Strength	_	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
RL	Deptl (m)		Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ	Graph Log	Ex Low Very Low Medium High Very High	Water	Spacing (m) 500 000 500 00000000	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
- 9 	10.8	SILTY CLAY - light grey, slity clay						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
	- 12	⁵ SANDSTONE - medium and medium to high strength, moderately weathered then fresh, slightly fractured and unbroken, red-brown then light grey-brown, medium grained sandstone with some very low strength bands						12.34-12.37m: Cs				PL(A) = 0.5
	- 13							12.58-12.60m: fg	с	100	86	PL(A) = 0.7 PL(A) = 1.2
	- 14 - 14 - 14	13.85-14.15m: very low strength siltstone bands						13.83m: J65°, un, ro, cly ∖ 14.1m: B5°, cly co ∖ 14.15m: J30°, pl, sm, cly,				PL(A) = 0.4
	-15	Bore discontinued at 14.3m						<u></u>				
	- 16											
	- 17											
	- 18					1 1						
- e	- 19											

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HQ to 9.5m

 TYPE OF BORING:
 Solid flight auger to 9.5m; Rotary to 11.25m; NMLC-Coring to 14.3m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 No free groundwater observed whilst augering

	SAME	PLINO	3 & IN SITU TESTING	LEG			
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample) Point load axial test Is(50) (MPa)		Douglas Partners
BLI	< Block sample	U,	Tube sample (x mm dia.)	PL(C) Point load diametral test ls(50) (MPa)		I DAIIAISE Barthere
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
•						 	

SURFACE LEVEL: 16.35 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 4 PROJECT No: 84944 DATE: 3/7/2015 SHEET 1 OF 3

_						50 /				
		Description	Degree of Weathering A A K K K K K K K K K K K K K K K K K K	Rock Strength	Fracture	Discontinuities	S	amplir	ng & I	n Situ Testing
⊾	Depth (m)	of	Log	× Low /ery Low /edium /edium /ery High × High	Spacing (m)	B - Bedding J - Joint	be	re .%	Q.,	Test Results
	()	Strata	G FR SW WW FW	Ex Low Very Low Medium High Very High Ex High	0.05 0.10 0.50 0.50	S - Shear F - Fault	Type	Core Rec. %	R 0 %	& Comments
	-	TOPSOIL - dark brown. silty sand								
-9	-	topsoil with trace rootlets, damp								
Ē	- • 0.6						E			
	-	FILLING - dark brown and grey-brown, silty sand filling, damp								
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	-						s			2,2,3 N = 5
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Ē	-	- becoming slightly silty and yellow-brown mottled below 2.0m						1		
-4										
<u> </u>	-									344
	-						S			3,4,4 N = 8
Ē	- 3						E	1		
- <u>e</u>	-									
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E	- 4	4.0-4.5m: trace organic material					E			
ŧ	-						s			1,2,3 N = 5
-6	- 4.5							-		N = 0
E		brown-grey, fine to medium grained								
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<u> </u>	-77.0	SAND - vellow-brown, medium								
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RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HW to 11.5m

TYPE OF BORING: Solid flight auger to 9.5m; Rotary to 18.0m; NMLC-Coring to 21.1m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

	SAN	IPLING	3 & IN SITU TESTING	LEG		1		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
B	Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)			Douglas Partners
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(E	D) Point load diametral test Is(50) (MPa)		1.7	Indidias Partners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		11	
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwater
							_	

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

SURFACE LEVEL: 16.35 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 4 PROJECT No: 84944 DATE: 3/7/2015 SHEET 2 OF 3

)onth	Description	De We	egr eath	ee o nerir	if ig i⊊	2	S	Rc Stre	ng	th	٦.	F	Frac Spac	ture	•	Discon	tinuities				n Situ Testing
	epth (m)	of				Tank	2 S	Ex Low Very Low		5	High	Water		(n	ר)		B - Bedding		Type	c. %	RQD %	Test Result &
			N N H	₹ ₹	ES V	Ĕ.	, 	L K L		High		X I	0.01	0.05	- 0.50	1.00	S - Shear	F - Fault	⊢ `	ပီရွိ	<u>م</u> _	Comments
Ē		SAND - yellow-brown, medium grained sand, damp <i>(continued)</i>	li		ļ					İ			ļ		į	i l						
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Ļ	16.8	SILTY CLAY - light grey, silty clay	1				 /															
- 17	7				Ì	iĽ	\langle			Ì							Note: Unles					
E							/										stated, rock along rough	planar				
F							$\langle \rangle$										bedding dip	oing 0°- 10°				
Ē	17.0						$\frac{1}{1}$	İ		Ì					Ì	İ						
- 18	17.9 3 18.0	SANDSTONE - very low strength, light grey-brown, fine to medium										+		++		$\left \right $						
F		grained sandstone		l	ļ					İ			i		۲,	į	18.27 & 18.4	46m: B (x2)				
E		SANDSTONE - low and medium strength, highly to moderately then													ľ	1	5°- 10°, cly	/n, ti				PL(A) = 0.5
ŧ		slightly weathered, slightly fractured,													٦							
- 19)	red-brown then light brown, medium grained sandstone with some very						ſ		1						 			с	100	91	
ŧ		low strength bands													ľ		19.2m: B10°	, fe, cly				
ŧ				Ľ					l						Ľ	ĺ	19.5-19.55m	n: Cs				
E									Ľ]							10.0 10.001					PL(A) = 0.2
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G:		at DRILL		~									_			'SI		CASING: HW				

WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

Γ	SAM	PLIN	G & IN SITU TESTING	LEG	END		
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	3 Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		
	3LK Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)		I Dollaise Barthara
	C Core drilling	Ŵ	Water sample	, ad	Pocket penetrometer (kPa)		Douglas Partners
	D Disturbed sample	⊳	Water seep	ŝ	Standard penetration test		
	E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	12	Geotechnics Environment Groundwate
-	· · ·				· · ·		

SURFACE LEVEL: 16.35 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 4 PROJECT No: 84944 DATE: 3/7/2015 SHEET 3 OF 3

					DIF	AZIMU I H:	90 /	SHE			5
Γ		Description	Degree of Weathering	<u>.0</u>	Rock Strength ក្រ	Fracture	Discontinuities			-	n Situ Testing
Ъ	Depth (m)	of Strata	Degree of Weathering ﷺ ≩ ≩ ⊗ ∞ ₭	Graph Log	Strength Extrom New International Addition Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength New International Strength Stre	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
- +	- 21	SANDSTONE - low and medium strength, highly to moderately then slightly weathered, slightly fractured, red-brown then light brown, medium grained sandstone with some very low strength bands <i>(continued)</i>					20.2m: B10°, cly vn, ti 20.45m: J70°, pl, ro, fe, cly 20.82m: B0°, cly	с	100	91	PL(A) = 0.5
ŧ	21.1	Bore discontinued at 21.1m									PL(A) = 0.4
	-										
Ē	-22										
- 9- 9- 	-										
ŧ	-23										
-	-24										
-	- 25										
- ማ	-										
Ē	-26										
-10-1-	[
ł	- 27										
	-										
ŧ	-28										
-12	[
-											
-13	-29										
	-										

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HW to 11.5m

TYPE OF BORING: Solid flight auger to 9.5m; Rotary to 18.0m; NMLC-Coring to 21.1m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAN	IPLIN	3 & IN SITU TESTING	LEGF	END	1					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
В	Bulk sample	Р	Piston sample) Point load axial test Is(50) (MPa)			Doug			
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test ls(50) (MPa)				196	Dal	rtnore
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			PUUU		Га	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test						
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics	I Enviro	nment	Groundwater
-	· · ·						_	000100111100			Groundwater

CLIENT: Cranbrook School SURFACE LEVEL: 30.0 AHD PROJECT: Stage 1 Development EASTING: LOCATION: Victoria Road, Bellevue Hill NORTHING: DIP/AZIMUTH: 90°/-

BORE No: 7 PROJECT No: 84944 DATE: 6/7/2015 SHEET 1 OF 1

Sampling & In Situ Testing Description Graphic Log Dynamic Penetrometer Test Water Depth Sample 닙 of (blows per 150mm) Depth Type Results & Comments (m) Strata 20 10 15 TOPSOIL - dark brown, silty sand with trace rootlets, 0.07 damp FILLING - poorly compacted, dark brown, grey and red-brown, silty sand filling with some sandstone gravel and cobbles 0.94 2 SAND - loose, yellow-brown and brown, slightly silty, medium grained sand, damp 1.95 -8-2 SAND - loose, pale yellow-brown, medium grained sand, -2 damp - becoming medium dense below 2.70m -12 - 3 - 3 -%-4 4 4.05 Bore discontinued at 4.05m - target depth reached RIG: Hand tools DRILLER: MP LOGGED: MP CASING: Uncased

TYPE OF BORING: Hand auger to 4.05m WATER OBSERVATIONS: No free groundwater observed REMARKS:

 SAMPLING & IN SITU TESTING LEGEND

 A Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 Use sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 BLK Block sample
 V
 Water sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 D Disturbed sample
 V
 Water sample
 p
 Pocket penetrometer (kPa)

 E Environmental sample
 ¥
 Water level
 V
 Shear vane (kPa)

Sand Penetrometer AS1289.6.3.3 Cone Penetrometer AS1289.6.3.2



	JCAI				P/AZI		H: 90°/		SHEET 1 OF 1	
	Derth	Description	nic		Sam		& In Situ Testing	5	Dynamic Penetrome	tor Tost
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	(blows per 150m 5 10 15	nm) 20
	0.0	BRICK PAVEMENT								:
34	-	FILLING - poorly compacted, red-brown, brown and light grey, sand filling with some ripped sandstone gravel and some silt, damp								
	- 0.5 - - - - 1	3 SAND - very loose, light grey and dark brown, slightly silty sand, damp								
33 1	-	- clean sand below 1.20m								
32	- 2 	- becoming slightly clayey and wet below 2.27m - very wet to saturated below 2.35m						Ţ		
-		 Bore discontinued at 2.4m hole collapse 							-	
31	-3								-3	
	- - 4 -								-4	
30	-									
TY W/	'PE OF	Id tools DRILLER: MP BORING: Hand auger to 2.40m DBSERVATIONS: Free groundwater observed at 2.35m S:		LOC	GED	: MP	CAS		Incased Sand Penetrometer AS1 Cone Penetrometer AS1	289.6.3.3

SURFACE LEVEL: 34.3 AHD EASTING: NODTUNO

BORE No: 8 **PROJECT No:** 84944 DATE. 0/7/0045

Cranbrook School PROJECT: Stage 1 Development Mistaria Deed Della

CLIENT:

니슈니네

IARKS:

 SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 P
 Piston sample
 PL(A) Point bad axial test Is(50) (MPa)

 U
 Tube sample (x mm dia.)
 PL(D) Point bad diametral test Is(50) (MPa)

 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 e
 V
 Water seep
 S
 Standard penetration test

 ample
 ¥
 Water level
 V
 Shear vane (kPa)

 A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample **Douglas Partners** Geotechnics | Environment | Groundwater

SURFACE LEVEL: 32.4 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 10 PROJECT No: 84944 DATE: 6/7/2015 SHEET 1 OF 3

							30 / X				5
\square		Description	Degree of	<u>io</u>	Rock Strength uon work High High High High High High High High	Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
ᆋ	Depth (m)	of	weathering	aphi		D Spacing (m)	B - Bedding J - Joint	e	e%	D	Test Results
	(11)	Strata	a ≩ ≩ ≳ o ⊭	9 <u>-</u>	isk Low fery Line fery H sx High	0.01	S - Shear F - Fault	Type	C C S	RQD %	& Comments
	0.05			Ŵ		1 1 1			_		Commonto
		FILLING - dark brown, silty sand,		\bowtie							
32	0.55	medium to coarse grained sand, ¬ damp		\bigotimes		i ii ii					
		FILLING - light grey, medium grained sand with trace of silt, damp		\bigotimes							
	-1	grained sand with trace of silt, damp		\bigotimes				E			
				\bigotimes				s			3,3,3 N = 6
-2				\bowtie	iiiiii	i ii ii					N = 0
				\bigotimes							
	2 1.95			\bigotimes		i ii ii			-		
	-2 1.95	SAND - yellow-brown, medium grained sand with a trace of silt,						E	1		
8	-	damp				i ii ii					
l"											0.0.44*
F F		- loose				i ii ii		S			6,8,11* refusal
Ē	-3										
E						i ii ii					
-8-	- 3.5										
F		- medium dense below about 3.5m				i ii ii					
	-4										
					iiiiii	i ii ii		s			7,9,12
58											N = 21
	-5					i ii ii					
27											
						i ii ii					0 10 11
								S			9,12,14 N = 26
E	-6										
26											
E	-7										
t 1								s			8,13,16 N = 29
25						! !! !!					N = 29
	:										
Ē	-8 8.0	- dense below about 8.0m									
24	.										
L.	:							-			13,20,20/100mm
E				····				S			refusal
	-9										
	:			[····							
3											
				·.··							
Ŀ	10.0										

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HW to 8.5m; HQ to 17.5m

TYPE OF BORING:Solid flight auger to 8.5m;Rotary to 20.3m;NMLC-Coring to 22.18m**WATER OBSERVATIONS:**No free groundwater observed whilst augering**REMARKS:***SPT pushed 0.5m in collapsed sand prior to SPT. Numbers higher than realistic

	SAN	/IPLIN(3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	P	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)	1.	Nonnas Parners
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)		Douglas raiticis
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	11	
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
-							

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

SURFACE LEVEL: 32.4 AHD EASTING:

NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 10 PROJECT No: 84944 DATE: 6/7/2015 SHEET 2 OF 3

	Description	Degree of Weathering	ic	Rock Strength	Fracture	Discontinuities	S		n Situ Testing
Depth (m)	of	Degree of Weathering ≞ ≩ ≩ ⊗ ፼ ፼	Graph Log	Kr Low Very Low Nedium High Ex High Rex High Addr Not Stater	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. % %	Test Result &
-	Strata SAND - yellow-brown, medium	E SW HW			0.00	S-Sileal F-Fault			Comments 12,26/150m
-	SAND - yellow-brown, medium grained sand with a trace of silt, damp						S	_	refusal
	·								
-11									
-									
-							s		13,24,24 N = 48
- 12								-	
-									
-									
-									
- 13									
- 14									
								-	13 16 26
							S		13,16,26 N = 42
- 15									
-									
-									
- 16									
-									
47									
- 17									
				•					
- 18									
10									
- 19									
						Note: Unless otherwise stated, rock is fractured			
- - 19.8 -						along rough planar bedding dipping 0°- 10°			

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *SPT pushed 0.5m in collapsed sand prior to SPT. Numbers higher than realistic

	SAM	MPLING	3 & IN SITU TESTING	LEG	END					
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)					
В	Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Doug			
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test ls(50) (MPa)				Dan	rnere
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		PUUy	IIAJ	r ai t	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test					
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	: Envir	ronment G	Groundwater
						 -			•••••••••••••••••••••••••••••••••••••••	, ounanator

SURFACE LEVEL: 32.4 AHD EASTING: NORTHING:

DIP/AZIMUTH: 90°/--

BORE No: 10 PROJECT No: 84944 DATE: 6/7/2015 SHEET 3 OF 3

										I	JIP/	AZI	MUTH:	: 90°/	SHE	EI	3 OI	- 3
		Description	De	egre	e of	<u>.</u>		R Stre	lock	(ith	L		acture	Discontinuities			-	n Situ Testing
R	Depth (m)	of Strata	N A	MW	5 E E	Graphic Log	Ex Low	Very Low	Medium	Very High	Water		m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
-	-	SILTY CLAY - light grey and red-brown, silty clay with trace				1												
12	- 20.3 	Vironstone bands (continued) // SANDSTONE - low and very low strength, highly to moderately then slightly weathered, slightly fractured, light grey-brown, medium to coarse grained sandstone					· · · · · · · · · · · · · · · · · · ·							20.48-20.6m: B (x3) 0°- 10°, fe, cly co 20.86m: B0°, cly				PL(A) = 0.2
	-													21.18m: B5°, fe 21.55m: B10°, fe, cly	С	100	80	PL(A) = 0.2
-	- 22 22.18		ļ	İİ	İİ		į	Ē		ii				21.93-22.18m: J80°, pl, ro, cly inf				PL(A) = 0.1
- - 10 -	- 22.18	Bore discontinued at 22.18m		- 					 									
	-23																	
-6	-																	
	-24											, 						
	-											 						
	- 25																	
	- 26																	
ŧ	-																	
-	-27											 						
	-								İİ				1 11					
	-28											 						
-4	-																	
-	- 29		I.		İ İ			İİ				 						
	-																	

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

DRILLER: SY

LOGGED: MP/SI

CASING: HW to 8.5m; HQ to 17.5m

TYPE OF BORING:Solid flight auger to 8.5m;Rotary to 20.3m;NMLC-Coring to 22.18m**WATER OBSERVATIONS:**No free groundwater observed whilst augering**REMARKS:***SPT pushed 0.5m in collapsed sand prior to SPT. Numbers higher than realistic

A Auger sample G Gas sample PD Photo ionisation detector (ppm) B Bulk sample U, Tube sample (x mm dia.) C Core drilling W Water sample (x mm dia.) C Core drilling W Water sample (x mm dia.)	SA	AMPLING & IN SITU TESTING	LEGEND	
B Buik sample P Piston sample PL(A) Point lod ad vial test ls(50) (MPa) BLK Block sample U Tube sample (x mm dia.) PL(D) Point lod ad viametral test ls(50) (MPa) C Core drilling W Vater sample (x mm dia.) PD(D) Point lod diametral test ls(50) (MPa)	A Auger sample	G Gas sample	PID Photo ionisation detector (ppm)	
C Core drilling Water sample pp Pocket pendrometer (RPa)				Noualac Dartnarc
				\mathbf{D} \mathbf{D}
D Disturbed sample D water seep S Standard penetration test				

Π		Description	. <u>e</u>		Sam	npling &	& In Situ Testing		
R	Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
\vdash		Strata TOPSOIL - dark brown, silty sand with trace rootlets,	XX			Sa			5 10 15 20 : : : :
	- 0.2	damp							J
-		FILLING - poorly compacted, dark brown and grey-brown, silty sand with trace of gravel and cobbles, damp						F	1
	-								
22	-								
~	-			>					
	- - 1			>					1
				>					ן או או או או או או או או או או או או או
				>					<u>ן</u>
-				>					
	1.55	SAND - loose, pale yellow-brown, slightly silty, medium							
-2-		grained sand, damp							
	-	- clean sand below 1.80m		ł					
	-2			}					2
				ļ					
-	-								
20	-								
ŀ									
	-3								з Ц
	- -			ł					
-	-	- becoming medium dense below 3.30m							
	-]					
-¢-				-					
	- -4 4.0								4
		Bore discontinued at 4.0m - target depth reached							
	-								
	-								
-%-									
$\left \right $									
RIC	G: Hand	tools DRILLER: MP		1.00	GGED	• MP	CASI	NG: Un	heren

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

BORE No: 11 **PROJECT No: 84944** DATE: 6/7/2015 SHEET 1 OF 1

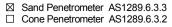
WATER OBSERVATIONS: No free groundwater observed **REMARKS:**

TYPE OF BORING: Hand auger to 4.0m

SAMPLING & IN SITU TESTING LEGEND LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample G & IN SITUTES TING Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level G P U, W ₽

Douglas Partners

Geotechnics | Environment | Groundwater





CLIENT: PROJECT:

Stage 1 Development LOCATION: Victoria Road, Bellevue Hill

Cranbrook School

	_	Description of					In Situ Testing	_	Durantia		1
R	Depth (m)	of Strata	Graphic Log	Type	Depth	Comments		Water	Dynamic P (blows 5 1	enetrometer Te per 150mm)	
	 - -	TOPSOIL - dark brown, silty sand with trace rootlets, damp	R			S					
- 8-	0.3	FILLING - poorly compacted, brown-grey and brown, silty sand with trace ripped sandstone gravel, damp						-			
 	-1 1.00	3 SAND - loose, pale yellow-brown, slightly silty, medium grained sand						-			
23	- 2 - 2 - 2 2 3 3 3	- clean sand below 1.50m							-2		
22	-4 -4.08	Bore discontinued at 4.05m - target depth reached							-4		
TY W/		BORING: Hand auger to 4.05m DBSERVATIONS: No free groundwater observed		LOC	GED	: MP	CASI	NG: Ur ⊠ S		eter AS1289.	6.3.3

SURFACE LEVEL: 26.4 AHD EASTING: NORTHING:

DIP/AZIMUTH: 90°/--

PROJECT No: 84944 SHEET 1 OF 1

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Stage 1 Development

- A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample
 - SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 P
 Piston sample
 PL(A) Point bad axial test Is(50) (MPa)

 U
 Tube sample (x mm dia.)
 PL(D) Point bad diametral test Is(50) (MPa)

 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 e
 V
 Water seep
 S
 Standard penetration test

 ample
 ¥
 Water level
 V
 Shear vane (kPa)



BORE No: 12 DATE: 6/7/2015

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

SURFACE LEVEL: 16.13 AHD EASTING: 338378.84 NORTHING: 6250846.18 DIP/AZIMUTH: 90°/-- BORE No: BH101 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 2

_										
	.	Description	Degree of Weathering Claphic Od B Ug B Claphic	Rock Strength _{ច្ច}	Fracture	Discontinuities				n Situ Testing
Ч	Depth (m)	of	Loa	Strength High Neadim High Ex High Nate Not High	Spacing (m)	B - Bedding J - Joint	Type	ore :. %	RQD %	Test Results &
	(,	Strata	G G		0.10	S - Shear F - Fault	Γ <u>Γ</u>	nc c	R S ⊗	& Comments
16	-	TOPSOIL - dark brown, fine to medium silty sand topsoil, moist					A/E			
Ē	0.4									
ł	-	FILLING - yellow-brown, fine to medium sand filling, dry to moist					A/E			
ŧ	F	0.7m: as above, grey-brown and								
15	-1	yellow-brown					A			
E	-									
ţ	-	1.5m: as above, grey-brown and								
ŧ	E	yellow brown mottled dark brown								
Ē	-2						A/E			
4	-									
ł	-									
ţ	Ē									
Ē	ļ									
-₽	-3						A/E			
Ę	- 3.2	SAIND - VEIIOW-DIOWN, IINE LO	1 ×.×							
Ē	ŀ	medium sand, dry to moist								
E	-									
ł	-4						A/E			
-6	Ē									
Ē	[
E	-									
ţ	-									
÷=	-5									
E	-									
ł	-									
ŧ	Ē									
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E	-									
RI	G: Scou	it 2 IIIRI	.ER: JS	1 0661	ED: SI/RW	CASING: HW	/ to 5 4	4m		
	_ . 0000			20001						

TYPE OF BORING: Solid flight auger to 5.5m; Rotary to 14.35m; NMLC-Coring to 17.4m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 13.7m (screen 10.7-13.7m; gravel 9.7-13.7m; bentonite 8.7-9.7m; backfill to 0.1m below ground level; grass over gatic cover)

	SAM	IPLIN	G & IN SITU TESTING	LEG	END			
1	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
E	3 Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)			Douglas Partners
E	BLK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)	.		Indiage Partnere
0	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	• •		
1	Disturbed sample	⊳	Water seep	S	Standard penetration test	' /		
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	_	4	Geotechnics Environment Groundwater
•						_	_	

SURFACE LEVEL: 16.13 AHD EASTING: 338378.84 NORTHING: 6250846.18 DIP/AZIMUTH: 90°/-- BORE No: BH101 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 2 OF 2

_											
		Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ፼ 땵	<u>.</u>	Rock Strength ਰਹ	Fracture	Discontinuities				In Situ Testing
RL	Depth	of	weathening	aphi og	Ex Low Very Low Medium High KEX High Ex High Ex High Ex High	Spacing (m)	B - Bedding J - Joint	e	e%	۵	Test Results
	(m)	Strata	H H W K S W W K F S W K	5 d			S - Shear F - Fault	Type	ပ္လ ဂ်	RQD %	& Comments
-9	_	SAND - yellow-brown, fine to	ШТ>ОСС			- 00 07			-		Comments
Ē	-	medium sand, dry to moist (continued)									
ŀ	-	(conunded)									
	-			[·							
È	- - - 11										
-9											
Ē	-										
E	-										
Ł	-										
	- - 12										
-4	-										
F											
E	-										
ŀ	-										
-0	- 13 -					ii ii					
F	-						Note: Unless otherwise				
Ē	-						stated, rock is fractured				
E	-						along rough planar bedding dipping 0°- 10°				
È	- - 14										
-2-	-										
ł	14.35	SANDSTONE - medium and high									
Ē	-	strength, moderately weathered, slightly fractured and unbroken,									PL(A) = 4.14
	-	red-brown and brown, medium to					14.7m: B0°, fe				
	- 15	coarse grained sandstone				ii i					
ŀ							15.2m: B10°, cly vn, ti				PL(A) = 0.66
Ē	-					ii li					1 2(77) 0.00
-	-				┊╎╪╤╤┛╌┓╎╎╎│╎╽		15.72 & 15.75m: Cs	с	100	99	
	- - 16					ii ii			100	99	
-0											
F	_										PL(A) = 1.52
E	-										1 2(1) 1.02
-											
	- 17										PL(A) = 0.91
Ē	- - 17.4										FL(A) = 0.91
[-	Bore discontinued at 17.4m									
ŀ	-										
	- 18										
-7-	-										
E	_										
E	-										
E	-										
-ņ	- 19										
F	-										
E	-										
ŀ	-										
Ŀ	-										

RIG: Scout 2

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: JS

LOGGED: SI/RW

CASING: HW to 5.4m

TYPE OF BORING: Solid flight auger to 5.5m; Rotary to 14.35m; NMLC-Coring to 17.4m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 13.7m (screen 10.7-13.7m; gravel 9.7-13.7m; bentonite 8.7-9.7m; backfill to 0.1m below ground level; grass over gatic cover)

	SAM	IPLIN	G&INSITUTESTING	i LEG	END		
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	B Bulk sample	P	Piston sample	PL(A) Point load axial test Is(50) (MPa)		
	BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.7	N DALIAISE PSTAAFE
	C Core drilling	Ŵ	Water sample	ga	Pocket penetrometer (kPa)	/ 🖌	Douglas Partners
	D Disturbed sample	⊳	Water seep	S	Standard penetration test	11	
	E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)	12	Geotechnics Environment Groundwater
-						_	

SURFACE LEVEL: 16.28 AHD EASTING: 338374.19 NORTHING: 6250784.3 DIP/AZIMUTH: 90°/--

BORE No: BH102 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 2

Depth (m) Description of strata Degree of Weathering of strata Procession of Strata Fracture Spacing (m) of strata Discontinuities Sampling & Ir 2 0.2 TOPSOIL - dark brown, fine to medium sand filling with clay, dry sand topsoil, dry to moist 1	n Situ Testing Test Results & Comments
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	&
Image: Conduct Image: Conduc	
0.2 medium silty sand topsoil, dry to moist Image: Comparison of the top of the to	
0.6 PiLLING - Gark brown, fine to medium sand filling with clay, dry 1 SAND - dark brown, fine to medium sand, dry to moist (possibly filling) 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.1 SAND - grey fine to medium sand, dry to moist 1.2 SAND - grey fine to medium sand, dry to moist 1.3 SAND - grey fine to medium sand, dry to moist 1.4 SAND - grey fine to medium sand, dry to moist	
Image: All state of the st	
SAND - grey fine to medium sand, I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I<td></td>	
1.4m: as above but becoming 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	
1.8m: as above but grey-brown	

RIG: Scout 2

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: JS

LOGGED: SI/RW

CASING: HW 11.6m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary to 11.6m; NMLC-Coring to 17.45m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PIL(A) Point load axial test Is(50) (MPa)

 BLK
 Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 ¥
 Water level
 V
 Shear vane (kPa)



SURFACE LEVEL: 16.28 AHD EASTING: 338374.19 NORTHING: 6250784.3 DIP/AZIMUTH: 90°/-- BORE No: BH102 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 2 OF 2

Degree of Weathering Rock Fracture Discontinuities Sampling & In Situ Testing Description Strength Water Spacing Depth High Core Rec. % RQD 8 Test Results 님 of Very Low Low Medium Very High Ex High No. Type B - Bedding J - Joint (m) (m) ≷۱ & ቫ S - Shear F - Fault Strata 102 020 HW NW EN Comments SAND - grey fine to medium sand, dry to moist (continued) Note: Unless otherwise stated, rock is fractured along rough planar 11 bedding dipping 0°- 10° 11.35m: yellow brown, fine to medium grained clayey sand 11.6 PL(A) = 0.82 SANDSTONE - medium strength, highly weathered, slightly fractured, brown, coarse grained sandstone 11.86m: CORE LOSS: 12 12.0 140mm with some quartz gravel С 86 50 12.4 SANDSTONE - very low and low 12.4-12.6M: dS strength, highly to moderately weathered, slightly fractured, light 12.8m: J60°, pl, ro, cln 12.85m: B0°, cly grey and red-brown, fine to medium grained sandstone with some PL(A) = 0.2313 extremely low strength bands 13.52-13.58m: Ds -13.65m: J60°- 70°, cu, С 100 92 PL(A) = 0.22ro, fe 14 14.35m: B0°, cly, 10mm 14.4 SANDSTONE - medium and 14.4-14.45m: Cs 14.5-14.62m: B (x3) 0°medium to high strength, moderately weathered, slightly fractured, brown PL(A) = 0.83 $5^\circ,\,\text{fe},\,\text{cly}\,\text{co}$ to red-brown, medium grained 15 sandstone 15.4m: J30°, he PL(A) = 0.55С 100 92 16 PL(A) = 2.87 16.15 & 16.42m: B (x2) 5°, fe 16.9m: B5°, fe, cly, 17 10mm PL(A) = 0.8417.45 Bore discontinued at 17.45m 18 19

RIG: Scout 2

CLIENT:

PROJECT:

LOCATION:

Cranbrook School

Cranbrook School ECI

Victoria Road, Bellevue Hill

DRILLER: JS

LOGGED: SI/RW

CASING: HW 11.6m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary to 11.6m; NMLC-Coring to 17.45m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

	SAMPLING & IN SITU TESTING LEGEND													
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)									
	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)									
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test Is(50) (MPa)									
	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)									
D	Disturbed sample	⊳	Water seep	S	Standard penetration test									
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)									



CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

 SURFACE LEVEL:
 16.75 AHD

 EASTING:
 338361.5

 NORTHING:
 6250706.3

 DIP/AZIMUTH:
 90°/-

BORE No: BH103 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 2

	Description	Degree of Weathering	ic	Rock Strength _{ট্র}	Fracture	Discontinuities			-	n Situ Testir
Depth (m)	of		Log	Very Low Neddium Neddium Kex High Ex High Mater	Spacing (m)	B - Bedding J - Joint	Type). %	RQD %	Test Resu &
<u> </u>	Strata	HW HW FR S	U	Ex Lo Very Low Very Low	0.01 0.10 0.50	S - Shear F - Fault	Ţ	ပိမ္မိ	Яγ	& Comment
	TOPSOIL - dark brown, silty clay topsoil with rootlets, dry		\mathcal{D}				A/E			
			KX							
0.5	SAND - yellow-brown mottled dark brown, iron indurated, fine to						A			
	medium sand, dry to moist									
1							A/E			
1.3	SAND - yellow-brown, fine to									
	medium sand, dry to moist									
2							A/E			
3			····							
4					· · · · · ·					
5										
6										
					i ii ii					
,					1 11 11 					
"			····							
			:.·:			Note: Unless otherwise stated, rock is fractured				
						along rough planar				
в					1 	bedding dipping 0°- 10°				
8.5	SANDSTONE - medium strength,									
	slightly weathered then fresh stained, fractured and slightly] 						PL(A) = 0
9	fractured, light grey, medium grained sandstone with some					8.96m: B0°- 5°, un, ro, fe stn				
	extremely low and very low strength					10 301	С	93	89	PL(A) = 0.
	bands and traces of carbonaceous laminations			┇┎╾╾┛┆╵╵╵		9.45m: J20°, pl, ro, fe				
9.85			\geq			stn 9.6m: Cs, 50mm				
						^L 9.65m: CORE LOSS:				

WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAM	PLINC	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Douglas Partners
BL	Block sample	U,	Tube sample (x mm dia.)	PL(C) Point load diametral test ls(50) (MPa)		LINIINIAE Partnere
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
	•				· ·		

 SURFACE LEVEL:
 16.75 AHD

 EASTING:
 338361.5

 NORTHING:
 6250706.3

 DIP/AZIMUTH:
 90°/-

BORE No: BH103 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 2 OF 2

			Degree of	Rock		D : <i>i</i> : ii:				<u> </u>
	Depth	Description	Degree of Weathering B B B B B B B B B B B B B B B B B B B	Strength	Fracture 할 Spacing	Discontinuities			-	n Situ Testing
묍	(m)	of	Brap	Strength Kery Low Medium Kery High Kery High	(m)	B - Bedding J - Joint	Type	ore c. %	RQD %	Test Results &
			M H M S S H M	High FX F	0.01 0.10 1.00	S - Shear F - Fault	ΓÉ.	ပမ္ရ	R _	Comments
9	11	SANDSTONE - medium strength, slightly weathered then fresh stained, fractured and slightly fractured, light grey, medium grained sandstone with some extremely low and very low strength bands and traces of carbonaceous laminations (continued)				200mm 10.10, 10.15m: J45°, un, ro, cln 10.13m: J70°, un, ro, cln 10.26m: Ds, 20mm	с	93	89	PL(A) = 0.7
2	12					11.66m: B0°- 5°, un, ro, cbs, st 11.68m: J0°- 30°, cu, ro, cbs, st 11.97m: J0°- 30°, cu, ro,				PL(A) = 0.36
4	12.52					fe stn 12.52m: J30°, pl, ro, cln CORE LOSS: 450mm				PL(A) = 0.31
	₁₃ 12.97						С	85	75	PL(A) = 0.54
	14					13.68m: Cs, 10mm 13.72, 13.76m: J30°, pl, ro, cln				
Ē						13.8m: Ds, 50mm 13.88m: Cs, 30mm				PL(A) = 0.47
-	14.4	Bore discontinued at 14.4m				14.12m: Cs, 80mm				
-~~		- target depth reached								
	15									
	16									
	17									
	18									
	19									
- - -										

RIG: Scout 2

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: JS

LOGGED: RW/JN

CASING: HQ to 8.5m

TYPE OF BORING:Solid flight auger (TC-bit) to 8.5m;NMLC-Coring to 14.4mWATER OBSERVATIONS:No free groundwater observed whilst augeringREMARKS:

	SAMPL	.INC	3 & IN SITU TESTING	LEGE	IND		
A Au	iger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	ilk sample	Р	Piston sample) Point load axial test Is(50) (MPa)		Douglas Partners
BLK Blo	ock sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.1	I DALIGISE PSTRAFE
C Co	ore drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D Dis	sturbed sample	⊳	Water seep	S	Standard penetration test	11	
E Env	ivironmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
						 -	

SURFACE LEVEL: 16.34 AHD EASTING: 338308.87 **NORTHING:** 6250760.78 **DIP/AZIMUTH:** 90°/--

BORE No: BH104 **PROJECT No:** 84944.01 DATE: 12/4/2017 SHEET 1 OF 2

П					ear	ee of	Graphic	Т	Roc	:k		Т	Fraatura		Discontinuition	6		20 0 1	n City Tooting
	Dep	th	Description	We	eath	nering	g ici g	2	Stren	igth	Ex High Water		Fracture Spacing		Discontinuities				n Situ Testing Test Results
R	(m		of Strata		. >	_	Grap	ן נ		P High	Na Na	-	(m) ພວ ວວ		B - Bedding J - Joint S - Shear F - Fault	Type	Core ec. %	RQD %	&
\vdash			TOPSOIL - dark brown, fine to	S ≥ U I	₹	ES V		۱ ۱		<u>e</u> l <u>f</u> i	Ш	0:0	0.05	!			° æ	<u> </u>	Comments
Ē		0.2	medium silty sand topsoil, moist	łį.	İ	İİ	4	4		İ		ļ	11 11			A/E			
-9			SAND - dark brown mottled brown, iron indurated, fine to medium sand,									ľ				A/E			
			moist (possibly filling)					·				l.							
ŧ	-1		0.8m: as above but brown and grey-brown mottled dark brown									ľ				A/E			
Ē	-		grey-brown motied dark brown																
-5	-	1.3	SAND - yellow brown mottled brown and dark brown, grey fine to medium	11	ii						i	i	11 11						
Ē			sand, moist									H							
ŀ	-			l į	ii	ii			iii	ii		i	ii ii			A/E			
ŧ	-2											ľ				AVE			
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	- 5										╎╵	ľ							
-=	-																		
Ē				ļį	ii	ii			iii	ii		i	ii ii						
								·.							Note: Unless otherwise				
	-6														stated, rock is fractured				
- <u>e</u>											i	i			along rough planar bedding dipping 0°- 10°				
	-																		
		6.8	SANDSTONE - medium strength,				-	-			4	Ĺ		\downarrow	6.8m: CORE LOSS:				
	-7	6.9	moderately weathered, fractured and												100mm				PL(A) = 0.71
0	-		slightly fractured, light grey and red-brown, medium grained										┟┼┛╎╎		7.3-7.45m: B (x3) 0°, cly				
	-		sandstone	l i	i							i	<u>H</u>		co, 1-2mm				
E																			PL(A) = 0.36
	- 8	8.0	SANDSTONE - high strength, fresh,	ļ	įĻ		ז		i i iL	h		ļ		ון	7.9 & 7.95m: B0°, fe				
Ŀ	-		slightly fractured and unbroken, light grey, medium grained sandstone													С	97	90	
׀ [*]	-		grey, meulum grained sandstone																PL(A) = 1.19
E										ili		ļ							FL(A) - 1.19
	-9																		
Ē	-																		
												ľ		۶	9.4m: B0°, cly, 5mm				
ŧ	-															с	100	100	PL(A) = 1.2
Ē	-			Li	Ĺ					ĺ		li			>>				
						c													

RIG: DT100

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: SS

LOGGED: RW/SI

CASING: HW to 6.8m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary to 6.8m; NMLC-Coring to 12.4m WATER OBSERVATIONS: Free groundwater observed at 5.0m whilst augering **REMARKS:**

	SAMP	LINC	3 & IN SITU TESTING	LEGE	IND							
A Auger	sample	G	Gas sample	PID	Photo ionisation detector (ppm)							
	ample	Р	Piston sample) Point load axial test Is(50) (MPa)		Doug	_	-			
BLK Block	sample	U,	Tube sample (x mm dia.)	PL(D)) Point load diametral test Is(50) (MPa)	1.			G	Dai	rtno	rG
C Core	drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	1	DUUY		9	r ai		13
D Distu	bed sample	⊳	Water seep	S	Standard penetration test	11						
E Enviro	nmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	I Er	iviro	nment	Groundv	vater

 SURFACE LEVEL:
 16.34 AHD

 EASTING:
 338308.87

 NORTHING:
 6250760.78

 DIP/AZIMUTH:
 90°/-

BORE No: BH104 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 2 OF 2

\square		Description	Degree of Weathering ≧ ≩ ≩ ፩ ፼ ፼	U	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
RL	Depth (m)	of		Log	Strength Very Low Medium Medium Very High Ex High 001	Spacing (m)	B - Bedding J - Joint	be	.%	Q.,	Test Results
	(,	Strata	H M M M M M M M M M M M M M M M M M M M	Ū		0.10	S - Shear F - Fault	٦ _۲	ပိ မို	RQD %	& Comments
	- 11	SANDSTONE - high strength, fresh, slightly fractured and unbroken, light grey, medium grained sandstone (continued)									PL(A) = 1.17
	-12						11.9m: B0°, cly, 10mm	С	100	100	PL(A) = 1.01
-4	-										PL(A) = 1.08
	- 13	Bore discontinued at 12.4m		****							
	- 14										
ŀ											
1 2	- 15										
	- 16										
	- 17 										
	- 18										
	-										

RIG: DT100

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: SS

LOGGED: RW/SI

CASING: HW to 6.8m

TYPE OF BORING:Solid flight auger (TC-bit) to 5.5m;Rotary to 6.8m;NMLC-Coring to 12.4mWATER OBSERVATIONS:Free groundwater observed at 5.0m whilst augeringREMARKS:

	SAMPLI	NG & IN SITU TEST	TING LEG						
A Auger sample	(Gas sample	PID	Photo ionisation detector (ppm)					
3 Bulk sample	F	P Piston sample		A) Point load axial test Is(50) (MPa)					tners
3LK Block sample	ι	J, Tube sample (x mm o	dia.) PL(D) Point load diametral test Is(50) (MPa)				Par	rners
C Core drilling	\	V Water sample	pp	Pocket penetrometer (kPa)		D UU	1143	Гаг	
D Disturbed sam	le D	 Water seep 	S	Standard penetration test					
Environmental	ample	Water level	V	Shear vane (kPa)		Geotechnic	s Enviı	ronment	Groundwater

SURFACE LEVEL: 16.54 AHD EASTING: 338303.82 NORTHING: 6250703.09 DIP/AZIMUTH: 90°/--

BORE No: BH105 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 2

Degree of Weathering Rock Sampling & In Situ Testing Fracture Discontinuities Description Strength Water Spacing Depth Core Rec. % RQD % 8 Test Results Ъ of Very Low Low Medium Very High Ex High B - Bedding J - Joint Type (m) (m) ≷۱ & ቫ S - Shear F - Fault Strata 102 020 HW NW EN Comments TOPSOIL - dark brown, silty sand A/E topsoil filling with some rootlets, damp A/E 0.6 SAND - grey-brown medium sand with some coarse graining, moist (possible filling) A/E - 1 1.5 SAND - brown to dark brown medium sand, damp (possible filling) -2 A/E 2.7 SAND - light brown to orange-brown medium sand, damp -3 A/E Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10° 4 4.1m: becoming extremely 4.1 4.1m: CORE LOSS: 4.15 weathered sandstone 50mm 4.3 SANDSTONE - medium strength, 4.15-4.3m: Cs moderately to slightly weathered, slightly fractured, light grey-brown to PL(A) = 0.54.35m: J35°, he 4.4m: B20°, pl, ro, cln red-brown, medium grained sandstone 5 4.93, 5.05 & 5.18m: B (x3) 0°- 5°, fe 5.28m: J70°, un, ro, fe 5.44, 5,81, 5.86m: B (x3) 0°- 5°, fe, cly С 98 84 PL(A) = 0.496 5.93m: J60° & 85°, st, ro, fe PL(A) = 0.31 6.63m: J (x2) 70°, un, ro, 6.75 SANDSTONE - medium and high fe, partially he strength, moderately to slightly weathered and fresh, slightly fractured, light grey-brown, medium grained sandstone 6.75-6.77m: Cs 7 7.16m: J70°, he PL(A) = 1.31 7.82m: B0°, cly, 5mm 8 8.12m: J30°, pl, sm, cln С 100 91 PL(A) = 0.618.6m: J20°, pl, ro, cln - 9 9.35m: B5°, fe, cly, 5mm `9.45m: J25°, pl, ro, fe PL(A) = 0.499.85-10.10m: Cs RIG: Scout 2 DRILLER: JS LOGGED: RM/SI CASING: HQ to 4.1m TYPE OF BORING: Solid flight auger (TC-bit) to 4.1m; NMLC-Coring to 15.48m

WATER OBSERVATIONS: Some seepage from 0.5m REMARKS:

CLIENT:

PROJECT:

LOCATION:

Cranbrook School

Cranbrook School ECI

Victoria Road, Bellevue Hill

	SAMP	LIN	3 & IN SITU TESTING					
А	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
В	Bulk sample	Ρ	Piston sample) Point load axial test Is(50) (MPa)			Douglas Partners
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)		. \	Dollaise Partnere
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		• 1	Dugias rai licis
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwater

SURFACE LEVEL: 16.54 AHD **EASTING:** 338303.82 **NORTHING:** 6250703.09 **DIP/AZIMUTH:** 90°/--

BORE No: BH105 **PROJECT No: 84944.01** DATE: 10/4/2017 SHEET 2 OF 2

Γ		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	In Situ Testing
R	Depth (m)	of Strata	Weathering USA Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Caphic Cod Cod Cod Cod Cod Cod Cod Cod Cod Cod	Ex Low Very Low Medium Very High	Construction of the second sec	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	- 11 10.96	SANDSTONE - medium and high strength, moderately to slightly weathered and fresh, slightly fractured, light grey-brown, medium grained sandstone <i>(continued)</i> 40.35-10.66m: very low strength 10.66-10.96m: extremely low strength				10.45-10.47m: Ds 10.66-10.96m: Ds	С	100		PL(A) = 0.65 PL(A) = 0.1
4		SANDSTONE - high then medium strength, slightly weathered and fresh, slightly fractured and unbroken, light grey to light grey-brown, medium grained sandstone with some extremely low to very low strength bands				11.7m: J25°, ,pl, ro, cln 12.15m: J30°, pl, ro, fe, cly 12.22-12.36m: Cs	с	100	72	PL(A) = 1.26
-	- - - 13 -					12.6m: J70°, pl, ro, cln				PL(A) = 1.06
-e 	- - - 14					13.86m: B5°, cly, 10mm 14.15m: B5°, cbs co				PL(A) = 1.26
	- - - - - - 15					14.75-14.9m: Cs	C	100	88	PL(A) = 1.03 PL(A) = 0.92
	- - 15.48 -	Bore discontinued at 15.48m								T L(A) = 0.32
	- 16									
-	- 17									
	- 18									
	- - - - - - - - - - - - - - - - - - -									
RI	G: Scou	t 2 DRILL	.er: JS	ـــــــــــــــــــــــــــــــــــــ	LOGGED: RM/S	GI CASING: HO	2 to 4.	1m		

TYPE OF BORING: Solid flight auger (TC-bit) to 4.1m; NMLC-Coring to 15.48m WATER OBSERVATIONS: Some seepage from 0.5m **REMARKS:**

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:





 SURFACE LEVEL:
 38.47 AHD

 EASTING:
 338318.63

 NORTHING:
 6250640.39

 DIP/AZIMUTH:
 90°/-

BORE No: BH106 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 2

					Dealt	I					
	Derth	Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ፼ ಱ	ic -	Rock Strength _{ਹੋ}	Fracture Spacing	Discontinuities				n Situ Testing
RL	Depth (m)	of		irapt Log	Very Low Very Low Low Medium High Very High Ex High Ex High	(m)	B - Bedding J - Joint	Type	ore%	RQD %	Test Results &
	. ,	Strata	FIS W W W	G	Ex Low High Ex High		S - Shear F - Fault	Ę	N N	Ж,	Comments
E	- 0.08	FILLING - brick pavers		\bigotimes				А			
ţ	- 0.3	FILLING - brown silty sand filling with some fine to medium grained sandstone gravel, moist		\bigotimes				А			
-86	0.65	sandstone gravel, moist		\bigotimes					-		
Ē	- 0.05	FILLING - sandstone boulder filling		ĶХ				А			
E	-1	FILLING - concrete slab							-		
ŧ	_	SAND - very loose, light grey medium grained sand, moist						S			1,1,1 N = 2
37	-	3 1 1 1 1							-		
Ē	-										
È	-2										
È	-										
36	-										
ſ	-							_			1,1,2
ŧ	_							S			N = 3
F	-3								1		
E	-										
35	_			[·. · ·							
F	-										
E	- -4 4.0	SAND - loose, pale yellow medium							-		
È		grained sand, moist						S			4,5,5 N = 10
-45	-								-		
Ē	-										
ŧ	-5										
ŧ	-										
33	-										
Ē	- 5.5	SAND - dense, yellow medium grained sand, moist						s			2,3,3
F	-	graineu sanu, moist						3			N = 6
Ē	-6			· · ·							
ł											
32	-										
Ē	-										
	-7								-		
F	-							S			5,10,10 N = 20
-5	-								-		
Ł	-										
ŧ	-8										
ŧ	-										
39-											
Ē	-			: ···				s			6,11,15
Ē								3			N = 26
E	-9										
ł				····							
29	-										
Ē	-										
Ŀ											

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: GM

LOGGED: JN

CASING: HW to 8.5m; HQ to 12.45m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 12.45m; NMLC-Coring to 15.55m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 12.5m (screen 9.5-12.5m; gravel 8.5-12.5m; backfill to GL with gatic cover)

	SAM	IPLIN	G & IN SITU TESTING	LEG	END]		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
B	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)			Douglas Partners
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)			Indialas Parthers
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwater
	· · · · ·						-	

 SURFACE LEVEL:
 38.47 AHD

 EASTING:
 338318.63

 NORTHING:
 6250640.39

 DIP/AZIMUTH:
 90°/-

BORE No: BH106 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 2 OF 2

		Description	Degree of Weathering	0	Rock	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
RL	Depth	of	Weathering	aphic og	Strength High High Low	Spacing	B - Bedding J - Joint				
	(m)	Strata	H W W FR S W W	5 J	Ex Low Very Low Medium High Ex High Ex High	(m)	S - Shear F - Fault	Type	Rec C	RQD %	& Comments
28	- 11	SAND - dense, yellow medium grained sand, moist <i>(continued)</i> 10.0m: becoming wet						S			10,17,19 N = 36
27	-12						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S			10,14,18 N = 32
25	- 13	SANDSTONE - medium then low strength, slightly weathered then fresh stained, slightly fractured then unbroken, orange and light grey medium grained sandstone with traces of very low strength bands					12.85-13.08m: J60°- 90°, un, ro, cln, partially he 13.08m: Ds, 20mm 13.5, 13.9, 14.06m: B0°-				PL(A) = 0.63 PL(A) = 0.56
24	- 14						5°, pl, ro, cly, 1mm 14.5m: B5°, pl, ro, fe stn	С	100	99	PL(A) = 0.53
23	- 15 15.55 -	Bore discontinued at 15.55m - target depth reached									PL(A) = 0.28
22	- 17										
21	- 18										
20	- 19										

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: GM

LOGGED: JN

CASING: HW to 8.5m; HQ to 12.45m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 12.45m; NMLC-Coring to 15.55m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 12.5m (screen 9.5-12.5m; gravel 8.5-12.5m; backfill to GL with gatic cover)

	SAM	IPLIN	G & IN SITU TESTING	LEG	END]		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
B	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)			Douglas Partners
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)			Indialas Parthers
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwater
	· · · · ·						-	

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

 SURFACE LEVEL:
 39.22 AHD

 EASTING:
 338301.69

 NORTHING:
 6250640.1

 DIP/AZIMUTH:
 90°/-

BORE No: BH107 PROJECT No: 84944.01 DATE: 13/4/2017 SHEET 1 OF 2

		Description	Degree of Weathering	0	Rock	Fracture	Discontinuities	S	amplii	ng & I	n Situ Testing
R	Depth	of	Weathering	aphic og	Strength Very Low Very Low Very High Very High Ex High	Spacing				-	Test Results
r	(m)	Strata	>>>>	с Gra	Ex Low Very Low Medium High Very High Ex High	(m)	B - Bedding J - Joint S - Shear F - Fault	Type	EC OT	RQD %	&
_	0.05	\FILLING - brick pavers	M H M S S E E	k A		0.01			- 22	_	Comments
	0.00	FILLING - brown silty sand filling		\bigotimes		i ii ii		A			
E		with some fine to medium sandstone		\bigotimes				A			
L		gravel, moist		\bigotimes							
ļ				\bigotimes				A			
. +	1 1.0	SAND - very loose then loose, light		$\overset{r}{\ldots}$							1,1,1
-85		grey medium grained sand, moist						S			N = 2
E											
F						1 11 11					
F	2										
37						i ii ii					
Ē											
E								6			1,1,1
ţ								S			N = 2
ŀ	3			[· · ·							
36											
t											
ţ											
F	4						Note: Unless otherwise				
35							stated, rock is fractured along rough planar	s			2,3,5 N = 8
ł							bedding dipping 0°- 10°		-		
F											
Ē	4.9 5	SANDSTONE - medium strength,						s			10/149mm refusal
34	5	slightly weathered, slightly fractured,									
٣		orange and light grey medium grained sandstone		$\overline{\mathbf{N}}$			5.3m: CORE LOSS:				PL(A) = 0.48
F	(•					410mm	С	58	56	
E	5.71 5.91			\boxtimes			5.73m: CORE LOSS:				
F	6						∖ 180mm 5.91m: J45°, pl, ro, cln				
33							6.2m: J20°, un, ro, cln				PL(A) = 0.54
F											
Ē											
E	7						∫ 6.8m: J30°, pl, ro, cly, ∫ 5mm				
32							^L 6.88m: J45°- 60°, un, ro,				
Ē						1 11 11	cln				
Ē							7.57, 7.64m: J20°, pl, ro,				
ł						i ii ii	cly, 2mm	С	100	92	PL(A) = 0.46
F	8					╎╎┢╾┛╎╎	8.03-8.35m: J70°, un,				
<u>.</u>							ro, fe stn, partially he				
E											PL(A) = 0.45
Ę			liiii			i il ii					
F	9 9.05						8.93, 8.94m: B10°, pl,				
	9.00	SANDSTONE - medium strength, fresh, slightly fractured then					ro, cly, 1mm				
Ē		unbroken, light grey medium							-	$\left - \right $	
E		grained sandstone with traces of carbonaceous laminations						с	100	100	PL(A) = 0.48
ļ											
	Bobca		. ER: GM		LOG	GED: JN	CASING: HW	' to 4	.9m;	HQ to	o 4.9m

TYPE OF BORING: Solid flight auger (TC-bit) to 4.9m; NMLC-Coring to 14.0m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

	SAMF	LIN	G & IN SITU TESTING	LEG	END						
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
В	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Doug	_			
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)				36	Dart	norg
C	Core drilling	Ŵ	Water sample	`qq	Pocket penetrometer (kPa)			41C		rait	11513
D	Disturbed sample	⊳	Water seep	S	Standard penetration test						
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	s	Enviro	onment G	roundwate
						 					/ ourrain are

 SURFACE LEVEL:
 39.22 AHD

 EASTING:
 338301.69

 NORTHING:
 6250640.1

 DIP/AZIMUTH:
 90°/-

BORE No: BH107 PROJECT No: 84944.01 DATE: 13/4/2017 SHEET 2 OF 2

		Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ∞ ∰	<u>⊇</u>	Rock Strength	5	Fracture	Discontinuities				n Situ Testing
R	Depth (m)	of		Log	Ex Low Very Low Medium Very High	Water	Spacing (m)	B - Bedding J - Joint	Type	sre %	RQD %	Test Results &
	()	Strata	M H M S S H	ני	Very Very Very High	>100		S - Shear F - Fault	≧	ပိမ္မ	R S	∝ Comments
28 29 29	- 11	SANDSTONE - medium strength, fresh, slightly fractured then unbroken, light grey medium grained sandstone with traces of carbonaceous laminations (continued)						10.4m: B0°, pl, ro, cly, 1mm 10.54m: Cs, 10mm	с	100	100	PL(A) = 0.5
27	- 12							11.37m: B5°, pl, ro, cly, 2mm 11.87m: B5°, pl, ro, fe stn				PL(A) = 0.64
26	- 13								с	100	100	PL(A) = 0.49
	- - - 14 14.0	Bore discontinued at 14.0m				- +						PL(A) = 0.71
25		- target depth reached										
24	- 15											
23	- 16											
22	- 17											
21	- 18											
20	- 19											
-	-											

RIG: Bobcat

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: GM

LOGGED: JN

CASING: HW to 4.9m; HQ to 4.9m

TYPE OF BORING:Solid flight auger (TC-bit) to 4.9m;NMLC-Coring to 14.0mWATER OBSERVATIONS:No free groundwater observed whilst augeringREMARKS:

	SAMP	LINC	3 & IN SITU TESTING	LEGE	END								
A Auger sam	ole	G	Gas sample	PID	Photo ionisation detector (ppm)								
B Bulk sample		Р	Piston sample) Point load axial test Is(50) (MPa)		Dou						_
BLK Block sam	le	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.			26		Jart	nerg	5
C Core drillin	1	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		D UG	<u> </u>	143		ai t	11513	,
D Disturbed	ample	⊳	Water seep	S	Standard penetration test	11							
E Environme	ntal sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnic	CS	l Envir	roni	ment G	roundwate	r
						 _				••••		ounanaro	

PROJECT: Cranbrook School ECI **EASTING:** 338412.68 **PROJECT No: 84944.01** LOCATION: Victoria Road, Bellevue Hill NORTHING: 6250794.55 DATE: 13/4/2017 DIP/AZIMUTH: 90°/--SHEET 1 OF 1 Sampling & In Situ Testing Graphic Log Well Description Water Depth 嵒 Sample Construction of Depth Type Results & Comments (m) Details Strata TOPSOIL - brown medium sand filling with trace 0.1 0.15 A/E red-brown clay and rootlets -@ 0.3 FILLING - dark brown medium sand filling (possibly 0.45 AVE natural) 0.5 0.8 FILLING - pale brown mottled dark brown, medium sand A/E_ 1.0 1.05 filling (possibly natural) ŝ 1.9 2.0 A/E -2 -2 2.6 SAND - pale brown and yellow, medium sand, moist 2.9 3.0 A/E - 3 -3 3.1 Bore discontinued at 3.1m - target depth reached 4 - 4 - 5 -5 6 6 -2 7 - 7 - 8 - 8 9 -9

BOREHOLE LOG

SURFACE LEVEL: 16.28 AHD

BORE No: BH111

RIG: DT100

CLIENT:

Cranbrook School

DRILLER: SS

LOGGED: AT

CASING: Uncased

TYPE OF BORING: Auger to 3.1m WATER OBSERVATIONS: No free groundwater observed REMARKS:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 Ux
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shard vane (kPa)



SURFACE LEVEL: 16.61 AHD EASTING: 338380.55 NORTHING: 6250730.19 DIP/AZIMUTH: 90°/-- BORE No: BH112 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

			DIF	'AZI		H: 90°/		SHEET 1 OF 1
	Description	ы		Sam	pling 8	& In Situ Testing		Well
」 Depth ピ (m)	of	Graphic Log	۵				Water	Construction
∞ (m)	Strata	ы В П	Type	Depth	Sample	Results & Comments	3	Details
	TOPSOIL - dark brown, silty clay topsoil with rootlets, dry	1278	A/E	0.1	<u></u>			-
								-
- 0.4 - 9	SAND - dark brown mottled yellow-brown, fine to medium grained sand, dry to moist (possibly filling)		A	0.5				
	grained sand, dry to moist (possibly filling)							-
1 1.0		<u> </u>	A/E	1.0				-1
	SAND - yellow-brown mottled dark brown, fine to medium sand, dry to moist							
								-
-12-	1.5m: as above but yellow-brown							-
				20				
-2 2.0	Bore discontinued at 2.0m		-we-	-2.0-				
 	- target depth reached							-
-4-								-
								-
3								-3
								-
- - -								-
								-
-4								-4
								-
								-
-2-								
5								-5
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6 - [-6 [
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								-
- 7								-7
								-
8								-8
9								-9
			I					L

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Shadra vane (kPa)



SURFACE LEVEL: 16.22 AHD CLIENT: Cranbrook School BORE No: BH113 PROJECT: Cranbrook School ECI **EASTING:** 338402.54 **PROJECT No: 84944.01** LOCATION: Victoria Road, Bellevue Hill NORTHING: 6250814 DATE: 13/4/2017 DIP/AZIMUTH: 90°/--SHEET 1 OF 1 Sampling & In Situ Testing Well Description Graphic Log Water Depth Sample Construction of Depth Type Results & Comments (m) Details Strata FILLING - brown, medium grained sand filling (topsoil) 0.1 0.15 A/E 0.2 with some red-brown clay, traces of rootlets FILLING - dark brown, medium sand filling 0.5 AVE 0.55 0.7 FILLING - pale brown mottled dark brown, medium sand filling A/E_ 1.0 1.05 1.95 2.0 2 -2 A/E 2.3 SAND - pale brown and yellow, medium sand, moist 3.0 -3.0-- 3 -A/F Bore discontinued at 3.0m - target depth reached 4 - 4 5 -5 6 6

BOREHOLE LOG

RIG: DT100

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DRILLER: SS

LOGGED: AT

CASING: Uncased

Douglas Partners

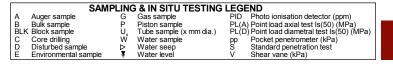
Geotechnics | Environment | Groundwater

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TYPE OF BORING: Auger to 3.0m WATER OBSERVATIONS: No free groundwater observed **REMARKS:**



SURFACE LEVEL: 16.40 AHD EASTING: 338395.64 **NORTHING:** 6250774.08 DIP/AZIMUTH: 90°/--

BORE No: BH114 **PROJECT No: 84944.01** DATE: 11/4/2017 SHEET 1 OF 1

								H: 90°/		SHEET 1 OF 1
	_	- nth	Description	hic –		Sam		& In Situ Testing	зr	Well
RL	De	epth m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
F	-	0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, \moist	XX.	A/E	0.1				
16	-		SAND - dark brown mottled-brown, fine to medium sand, moist (possibly filling)		A/E	0.5				
-	-1				A/E	1.0				-1
15										
ŀ	-	1.8								-
-	-2		SAND - dark brown mottled yellow-brown, fine to medium sand with iron indurated pockets, moist		ΑÆ	2.0				-2
- 41	-									
	-3	3.0			-A/E-	-30-				[
- - -	-		Bore discontinued at 3.0m - target depth reached							
	-									
Ē	-4									-4
12										
Ē	-									
ŀ	-5									-5
-£	-									
Ē	-6									-6
-9										
-										
	-7									-7
-6										
ł	-									
-	-8									
	-9									-9
-	-									
Ŀ	ŀ									<u> </u>
PI								CASING		

RIG: Scout 2 TYPE OF BORING: Auger to 3.0m

G P U, W

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A Auger sample B Bulk sample BLK Block sample

CDE

Core drilling Disturbed sample Environmental sample

DRILLER: JS

LOGGED: RW

CASING: Uncased

Douglas Partners

Geotechnics | Environment | Groundwater



Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

BOREHOLE LOG SURFACE LEVEL: 16.43 AHD CLIENT: Cranbrook School BORE No: BH115 PROJECT: Cranbrook School ECI **EASTING:** 338384.73 **PROJECT No: 84944.01** LOCATION: Victoria Road, Bellevue Hill NORTHING: 6250747.66 DATE: 11/4/2017 SHEET 1 OF 1 DIP/AZIMUTH: 90°/--Sampling & In Situ Testing Well Description Graphic Log Water Depth Sample Construction of Depth Type Results & Comments (m) Details Strata TOPSOIL - dark brown, fine to medium silty sand topsoil, A/E 0.1 dry to moist 0.3 SAND - grey-brown, fine to medium sand, dry to moist A/E 0.5 (possibly filling) 0.8m: as above but becoming dark brown and grey-brown A/E 1.0 1.1 SAND - pale grey, fine to medium sand, dry to moist 2 2.0 -A/E--2.0-Bore discontinued at 2.0m - target depth reached - 3 -3 4 - 4

RIG: DT100

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<u>e</u>

DRILLER: SS

LOGGED: RW

CASING: Uncased

-5

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-9

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed **REMARKS:**

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level LEGENU PID Photo ionisation detector (ppm) PL(A) Point bad axial test Is(50) (MPa) PL(D) Point bad diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample G P U,x W Core drilling Disturbed sample Environmental sample CDE ₽



SURFACE LEVEL: 16.45 AHD EASTING: 338357.98 **NORTHING:** 6250734.72 DIP/AZIMUTH: 90°/--

BORE No: BH116 **PROJECT No: 84944.01** DATE: 11/4/2017 SHEET 1 OF 1

_								п. 907		
	De		Description	ic m		Sam		& In Situ Testing	5	Well
Ч	De (n	pth n)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction
			Strata	U		De	San	Comments		Details
		0.3	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	<u> </u>	A/E	0.1				-
16		0.7	SAND - dark brown and yellow-brown, fine to medium sand, dry to moist (possibly filling)		A/E	0.5				-
	- 1	0.7	SAND - dark grey, fine to medium sand, moist		A/E	1.0				- - -1
15										
			1.5m: as above but becoming pale grey							
	-2	2.2			A/E	2.0				-2
-1-		2.2	SAND - dark brown mottled brown, fine to medium sand, iron indurated, dry to moist							
[2.0								
	-3	3.0-	Bore discontinued at 3.0m	•	-AVE-	-3.0-				-
-5			- target depth reached							
	-4									-4
12										
	-5									-5
										-
	-6									-6
	, ,									
-9										
	-7									7
6										
	-8									-8
	-9									- -9 T
E										-

RIG: DT100

DRILLER: SS TYPE OF BORING: Auger to 3.0m

LOGGED: RW

CASING: Uncased

WATER OBSERVATIONS: No free groundwater observed **REMARKS:**

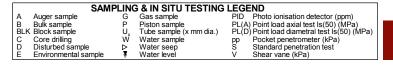
Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:





BOREHOLE LOG Cranbrook School SURFACE LEVEL: 16.04 AHD Cranbrook School ECI PROJECT: **EASTING:** 338392.47 LOCATION: Victoria Road, Bellevue Hill **NORTHING:** 6250837.21 **DIP/AZIMUTH:** 90°/--

BORE No: BH117 **PROJECT No: 84944.01** DATE: 13/4/2017 SHEET 1 OF 1

	_		Description	ic		Sam		& In Situ Testing	J.	Well
RL	Dep (m	pth n)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction
16			Strata				Sa	Comments		Details
-	-	0.2		K	_A/E_	0.1 0.15				-
	-		FILLING - dark brown, medium sand filling	\mathbb{X}	_A/E_	0.45 0.5				
ł	-					0.05				
15	-1			\bigotimes	A/E	0.95 1.0				
F	-			\bigotimes						
-	-			\mathbb{X}						
14	-2			\mathbb{X}	A/E	1.95 2.0				-2
-	_					2.0				-
-	-	2.5	FILLING - pale grey and dark brown, medium sand filling	\bigotimes						-
-	-			\bigotimes	L	2 95				
13	-3	3.2	OAND and many house and house modium and		A/E	2.95 3.0				-3
	-		SAND - pale grey, brown and brown, medium sand (possibly filling)							
	-									
-12	4	4.0	Bore discontinued at 4.0m							- - - -
-	-		- target depth reached							
-	-									
	- 5									- 5
-										-
-	-									
-	_									
10	-6									-6
-	-									
-										
- 6	-7									-7
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-00	-8									
-	-									
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	-9									-9
F	_									
-	-									
-	-									

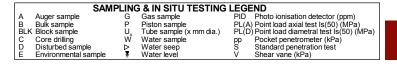
RIG: Scout 2 DRILLER: JS

CLIENT:

LOGGED: AT

CASING: Uncased

TYPE OF BORING: Auger to 4.0m WATER OBSERVATIONS: No free groundwater observed **REMARKS:**





LOCATION: Victoria Road, Bellevue Hill NORTHING: 6250811.43 DATE: 13/4/2017 DIP/AZIMUTH: 90°/--SHEET 1 OF 1 Sampling & In Situ Testing Well Description Graphic Log Water Depth Sample 뭅 Construction of Depth Type Results & Comments (m) Details Strata TOPSOIL - grey-brown, medium silty sand (topsoil), 0.1 0.15 ۵ A/E 0.2 traces of rootlets, organic odour FILLING - dark brown medium sand filling, traces of silt 0.45 AVE 0.5 0.7 SAND - pale brown and yellow, medium sand, moist 0.95 1.0 A/E / Ω. 1.8 SAND - pale brown and brown, medium sand, moist 1.95 2.0 2 -2 A/E -4 2.5 Bore discontinued at 2.5m - target depth reached -3 .3 <u>-</u><u></u> 4 - 4 -0 5 -5 6 6 7 - 7 8 - 8 9 -9

BOREHOLE LOG

SURFACE LEVEL: 16.14 AHD

EASTING: 338382.59

BORE No: BH118

PROJECT No: 84944.01

RIG: DT100

CLIENT:

PROJECT:

Cranbrook School

Cranbrook School ECI

DRILLER: SS

LOGGED: AT

CASING: Uncased

TYPE OF BORING: Auger to 2.5m WATER OBSERVATIONS: No free groundwater observed REMARKS:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U,
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p

 D
 Disturbed sample
 V
 Water seep
 S

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)



SURFACE LEVEL: 16.38 AHD EASTING: 338353.07 NORTHING: 6250757.73 DIP/AZIMUTH: 90°/-- BORE No: BH119 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 1

			DIF	P/AZII	NUT	l: 90°/		SHEET 1 OF 1
	Description	. <u>0</u>		Sam	pling 8	k In Situ Testing		Well
교 Depth (m)	of	Graphic Log	e	Ę	ple	Results &	Water	Construction
	Strata	9 D	Type	Depth	Sample	Results & Comments	>	Details
- 0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	XX.	A/E	0.1				-
- <u>@</u> _ 0.6	SAND - grey-brown, fine to medium sand, dry to moist (possibly filling)		A/E	0.5				-
	SAND - yellow, fine to medium sand, dry to moist							-
- 1 	1.0m: as above but dark brown		A/E	1.0				
12								
	1.5m: as above but grey-brown mottled yellow-brown							
-2 2.0	1.9m: as above but dark grey		-AVE-	-2.0-				2
	Bore discontinued at 2.0m - target depth reached							
-4-								
-3								-3
- 4								-4
- <u>2</u> -								
-5								-5 [
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RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shard ard penetration test

 E
 Environmental sample
 ¥
 Water level
 V
 Shard ard penetration test



 SURFACE LEVEL:
 16.70 AHD

 EASTING:
 338333.04

 NORTHING:
 6250703.65

 DIP/AZIMUTH:
 90°/-

BORE No: BH120 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

					DIP/AZIMUTH: 90°/				SHEET 1 OF 1		
			Description	<u>i</u>		Sam	ipling &	& In Situ Testing	_	Well	
R	De (1	pth n)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction	
	Ì	,	Olidid	C)	Тy		San	Comments	_	Details	
ł		0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil,	ΎΛ	А	0.1					
ł	_		SAND - brown-yellow, fine to medium sand, dry to moist (possibly filling)		А	0.5					
-9	-	0.7	SAND - dark brown and yellow-brown, fine to medium sand, iron indurated, dry to moist							-	
F	-1		sand, iron indurated, dry to moist		А	1.0				-1 T	
F	-				_						
12	-		- 		Е	1.5					
È	-2	2.0	-		-A/E-	-2.0-				2	
È	-		Bore discontinued at 2.0m - target depth reached								
ł	-										
-4											
È	-3									-3	
ŧ	-										
- 0	-										
F	-4									-4	
F	-										
F.	-										
-5	-										
È	-5									-5	
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RIG: Scout 2 DRILLE

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

DRILLER: JS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

	SAMPLING & IN SITU TESTING LEGEND											
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)							
B	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)							
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test Is(50) (MPa)							
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)							
D	Disturbed sample	⊳	Water seep	S	Standard penetration test							
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)							
L _	Environmental sample	=	Water level	v								



SURFACE LEVEL: 16.11 AHD **EASTING:** 338357.75 **NORTHING:** 6250821.77 **DIP/AZIMUTH:** 90°/-- BORE No: BH121 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 1

						<i></i>		-: 90 /		SHEET I OF I
	_		Description	lic		Sam		& In Situ Testing	sr.	Well
RL	De (n	pth n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
-16		0.2	TOPSOIL - dark brown fine to medium silty sand topsoil	N	A/E	0.1	0)			-
		0.2	dry to moist // FILLING - yellow-brown fine to medium sand filling, dry to moist		A/E	0.5				
15	-1	0.75	SAND - yellow-brown and grey-brown mottled dark brown, fine to medium sand, dry to moist (possibly filling)		A/E	1.0				- 1
	-2				A/E	2.0				-2
-1-		2.2	SAND - yellow-brown, fine to medium sand, dry to moist		712	2.0				
13	-3	3.0	Bore discontinued at 3.0m - target depth reached	1	-A/E-	-3.0-				3
12	-4									-4
	-5									5
	-6									
-9-										
-6	-7									-7
	-8									-8
	-9									-9
									I	

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 3.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shear vane (kPa)



 SURFACE LEVEL:
 16.22 AHD

 EASTING:
 338349.17

 NORTHING:
 6250799.56

 DIP/AZIMUTH:
 90°/-

BORE No: BH122 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

			DIF	'AZI	MUTH: 90°/			SHEET 1 OF 1	
D "	Description	jc _	Sampling & In Situ Testing				<u>۲</u>	Well	
교 Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details	
-9	FILLING - dark brown, fine to medium silty sand filling, dry to moist	\bigotimes	A/E	0.1					
0.3	SAND - dark brown mottled grey, fine to medium sand, dry to moist (possibly filling)		A/E	0.5					
-1 	SAND - yellow-brown, fine to medium sand, dry to moist		A/E	1.0				-1	
· · · · · · · · · · · · · · · · · · ·									
-2 2.0				-2.0-				2	
	Bore discontinued at 2.0m - target depth reached								
								-3	
-2- -2-								-4	
5									
-==									
								6	
- 7 -0 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7								-7	
								-8	
· • • • • • •									
								-9	
								· ·	

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Shadra vane (kPa)



SURFACE LEVEL: 16.31 AHD EASTING: 338341.92 NORTHING: 6250774.57 DIP/AZIMUTH: 90°/-- BORE No: BH123 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

								H: 90°/		SHEET 1 OF 1
			Description	ic		Sam		& In Situ Testing	_	Well
RL	Dep (n	oth ו)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
-		0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, \dry to moist /	<u>XX</u>	A/E	0.1				-
		0.7	SAND - grey-brown, fine to medium sand, dry to moist (possibly filling)		A/E	0.5				
	- 1	0.7	SAND - dark brown, fine to medium sand, iron indurated, dry to moist		A/E	1.0				[_ 1
15		1.5								
		1.5	SAND - yellow-brown, fine to medium sand, dry to moist							
E	-2	2.0	Bore discontinued at 2.0m	·· · · ·	-A/E-	-2.0-				2
11			- target depth reached							-
										-
	-3									-3
-13-										
	- 4									
12	4									
	-5									-5
	- 6									-6
	-7									7
-6										
	8									-8
	-9									-9
Ŀ										<u> </u>

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Shadra vane (kPa)



SURFACE LEVEL: 16.51 AHD EASTING: 338327.48 NORTHING: 6250748.48 DIP/AZIMUTH: 90°/-- BORE No: BH124 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 1

					DIP/AZIMUTH: 90 ⁻⁷					SHEET 1 OF 1		
	-		Description	jc		Sam		& In Situ Testing	Ļ	Well		
RL	De (r	pth n)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction		
			Strata TOPSOIL - dark brown, fine to medium silty sand topsoil,	1 XX	A	0.1	Sa			Details		
-	-	0.3-	_ dry to moist			0.1						
-16	-		SAND - grey-brown, fine to medium sand, dry to moist (possible filling)		A/E	0.5				-		
	- - - 1	0.75	SAND - grey-brown mottled yellow-brown, fine to medium sand with occasional dark brown pockets of iron indurated sand, dry to moist		А	1.0				- - -1		
ł			sand, dry to moist									
15	-											
-	-											
F	-2	2.0-	Bore discontinued at 2.0m	[-A/E-	-2.0-				2		
4	-		- target depth reached									
Ē	_											
-	-3									-3		
-	_											
-5	_											
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RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p

 D
 Disturbed sample
 V
 Water seep
 S

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)



SURFACE LEVEL: 16.50 AHD **EASTING:** 338319.11 **NORTHING:** 6250727.97 **DIP/AZIMUTH:** 90°/-- BORE No: BH125 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 1

all Description of Struta all of				DIF	'AZI		l: 90°/		SHEET 1 OF 1
0.2 TOPSOL - dark brown, fine to medium silly sand topsol, dry to most 0.1 0.2 0.2 0.1 1 TopSol - dark brown, fine to medium sand, dry to most 0.5 0.5 0.5 1 SAND - grey motted yellow-brown, fine to medium sand, dry to most 0.4 0.5 1 1.2m: as above but yellow-brown motted brown 0.5 0.5 2 2.0 Bore discontinued at 2.0m 0.5 - target depth reached		Description	.u		Sam	pling 8	& In Situ Testing		Well
0.2 TOPSOL - dark brown, fine to medium silly sand topsol, dry to most 0.1 0.2 0.2 0.1 1 TopSol - dark brown, fine to medium sand, dry to most 0.5 0.5 0.5 1 SAND - grey motted yellow-brown, fine to medium sand, dry to most 0.4 0.5 1 1.2m: as above but yellow-brown motted brown 0.5 0.5 2 2.0 Bore discontinued at 2.0m 0.5 - target depth reached			aphi -og	e	Ę	ole	Decute 9	ater/	Construction
102 TOPSOIL- dark brown, fine to medium sand, open in the medium sand, open	(m)		5 U	Typ	Depi	amp	Comments	3	Details
Participant Org SAND - dark brown and grey brown, fine to medium sand, dry to most (possibly filling) A 0.5 1 Org SAND - grey mottled yellow-brown, fine to medium sand, dry to most A 0.5 1 1.2m: as above but yellow-brown mottled brown A 10 1 2 20 Bore discontinued at 2.0m AE -20 3 - target depth reached - 4 - 4 4 - 5 - 5 5 - 6 - 6 6 - 7 - 7 7 - 6 - 7	0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil,	XX	A		0)			-
0.7 dy to most (possibly filling) dy to most. AVE 1.0 1 1.2m: as above but yellow-brown motiled brown AVE 1.0 2 20 Bore discontinued at 2.0m AVE - target depth reached AVE 20 3 3 4 4 4 4 4 4 4 4 4 4									
SAND - gry motified yellow-brown fine to medium sand, AE 10 1 1 1.2m. as above but yellow-brown motified brown AE 10 1 2 20 Bore discontinued at 2.0m - - - target depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - - - arget depth reached - - - -	F F	dry to moist (possibly filling)		A	0.5				
2 20 Image: continued at 2.0m AE 20 Image: continued at 2.0m		SAND - grey mottled yellow-brown, fine to medium sand,							
90 2 2.0 Bore discontinued at 2.0m A/E - 2.0 2 3				A/E	1.0				-1 [
2 2.0 Bore discontinued at 2.0m AE 20 2 3		1.2m: as above but yellow-brown mottled brown							-
Bore discontinued at 2.0m - arget depth reached -									-
Bore discontinued at 2.0m - arget depth reached -									
	2 2.0	Bore discontinued at 2.0m		-AVE-	-2.0-				-
	 	- target depth reached							
	[[
									-3
	- <u>8</u> -								
$ \frac{1}{2} $	4								-4
$ \frac{1}{2} $									
$ \frac{1}{2} $	-2-								
$ \frac{1}{2} $									
	5								-5
	- - - -								
	6								6
$ = 8 \\ = 8$									
$ = 8 \\ = 8$									
$ \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $	7								-7
$ \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $	ĒĒ								F I
$ \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $	- -								Į I
$ \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot $	<u>}</u>								
									Į I
	[~[

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shear vane (kPa)



 SURFACE LEVEL:
 16.10 AHD

 EASTING:
 338357.72

 NORTHING:
 6250849.98

 DIP/AZIMUTH:
 90°/-

BORE No: BH126 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 1

								H: 90'/		SHEET TOF T
		nth	Description	hic –		Sam		& In Situ Testing	ж	Well
RL	De (r	pth n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
-16	-		TOPSOIL - dark brown, fine to medium silty sand topsoil, trace gravel, dry to moist	M	A/E	0.1				-
	-	0.3	FILLING - yellow brown, fine to medium sand filling, dry to moist		A/E	0.5				
15	- - 1 -		1.3m: as above but grey-brown		A/E	1.0				- 1
14	- 2				A/E	2.0				-2
-	-		2.4m: as above but becoming grey-brown and dark brown							
13	-3	3.4			A/E	3.0				-3
	-		SAND - yellow-brown, fine to medium sand, moist							
12	-4	4.0	Bore discontinued at 4.0m - target depth reached	<u></u>	—A—	-4.0-				4
-	-									
	-5									-5
-	-									
10	-6									-6
	-									
- 6 - 1 - 1	-7 - -									-7
-										
-8	-									
-										-9
	-									
-	-									
L									1	

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 4.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shard ard penetration test

 E
 Environmental sample
 ¥
 Water level
 V
 Shara vane (kPa)



 SURFACE LEVEL:
 16.07 AHD

 EASTING:
 338330.67

 NORTHING:
 6250807.63

 DIP/AZIMUTH:
 90°/-

BORE No: BH127 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

								H: 90°/		SHEET 1 OF 1
\square			Description	<u>.</u>		Sam		& In Situ Testing	_	Well
RL	Dej (n	pth n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
16			TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	M	A/E	0.1				
15	- - - - - - - - 1	0.3	SAND - dark brown mottled yellow-brown, fine to medium sand with iron indurated pockets, dry to moist (possibly filling)		AÆ	0.5 1.0				- 1
	-	1.2 -	SAND - yellow-brown, fine to medium sand, moist							
Ŀ	-2	2.0			AVE-	-2.0-				2
14	-	2.0	Bore discontinued at 2.0m - target depth reached		,,,,	2.0				
13	- 3									-3
12	-4									
11	- 5									-5
10	- 6									6
- 6	-7									-7
	8									-8
	-9									-9
	-									

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PIL (A) Point load axial test Is(50) (MPa)

 BLK
 Block sample
 U
 Tube sample (x mm dia.)
 PL(A) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 Water level
 V
 Shear vane (kPa)



SURFACE LEVEL: 15.95 AHD EASTING: 338327.14 NORTHING: 6250830.2 DIP/AZIMUTH: 90°/-- BORE No: BH128 PROJECT No: 84944.01 DATE: 12/4/2017 SHEET 1 OF 1

					0	//		1: 90°/		SHEET 1 OF 1
	Dar	a.4ha	Description	hic		Sam		& In Situ Testing	2	Well
RL	Dep (n	סנח ו)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
			TOPSOIL - dark brown, fine to medium silty sand topsoil, moist	M	A/E	0.1				-
		0.3	FILLING - yellow-brown mottled dark brown, fine to medium sand filling, dry to moist		ΑÆ	0.5				
15	-1				A/E	1.0				-1 -1
		1.4	SAND - mottled yellow-brown, dark brown and grey-brown, fine to medium sand, dry to moist (possibly filling)							
14	-2		filling)		A/E	2.0				2
		2.2	SAND - yellow-brown, fine to medium grained sand, dry to moist							
13	- 3	3.0			-A/E-	_2 0				
		0.0	Bore discontinued at 3.0m - target depth reached		~~	0.0				
12										
	-4									
-1-	- 5									-5
										-
	-6									6
										-
-6	-7									7
00	-8									-8
	-9									-9
E										<u>-</u>

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 3.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Shear vane (kPa)



 SURFACE LEVEL:
 16.35 AHD

 EASTING:
 338293.77

 NORTHING:
 6250744.3

 DIP/AZIMUTH:
 90°/-

BORE No: BH129 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 1

					DIF			-: 90°/		SHEET 1 OF 1
	De	onth	Description	hic				In Situ Testing	er	Well
RL	Ue (r	epth m)	of Strata	Graphic Log	-	Depth	Sample	Results & Comments	Water	Construction Details
		0.3 -	TOPSOIL - dark brown, fine to medium silty sand topsoil, _ dry to moist	QQ	A/E	0.1				-
16		0.0	SAND - grey-dark brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5				
15	-1	1.2-	SAND - mottled grey-brown and yellow-brown sand with pockets of iron induration, moist		ΑÆ	1.0				
			pockets of Iron Induration, moist							
14	-2				A/E	2.0				-2
	- 3		2.5m: as above but grey-brown		А	3.0				-3
13		3.5-	SAND - yellow-brown, fine to medium sand with clay, wet							
	- - - 4	4.0	3.9m: as above but pale-grey			-4.0-				
12			Bore discontinued at 4.0m - target depth reached							
	- 5									-5 -
11-										
-	- 6									6
-9										
6	-7									7
	-8									-8
	- - - 9									-9
עם								CACINI	.	

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 4.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

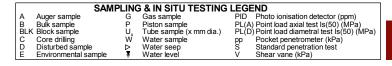
Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:





SURFACE LEVEL: 16.44 AHD EASTING: 338282.32 NORTHING: 6250716.51 DIP/AZIMUTH: 90°/-- BORE No: BH130 PROJECT No: 84944.01 DATE: 10/4/2017 SHEET 1 OF 1

					DIF			H: 90°/		SHEET 1 OF 1
			Description	jc		Sam		& In Situ Testing	5	Well
R	De (epth m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
Ē	-	0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	ХX	A/E	0.1				
16	-		SAND - yellow-brown mottled dark brown, fine to medium sand, dry to moist (possible filling)		A	0.5				
-	-1	1.3	1.0m: as above but dark brown		ΑÆ	1.0				-1
15	-	1.0	SAND - yellow-brown and grey-brown, fine to medium sand with clay, wet							
14	-2	2.0	Bore discontinued at 2.0m - target depth reached		-A/E-	-2.0-				2
13	-3									-3
-	-4									-4
12	-									
	-5									-5
-	-6									-6
										7
- - 6 -	-									
-	-8									-8
	-									

RIG: DT100

DRILLER: SS

LOGGED: RW

CASING: Uncased

TYPE OF BORING: Auger to 2.0m WATER OBSERVATIONS: No free groundwater observed REMARKS:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Cranbrook School ECI

CLIENT:

PROJECT:

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 V
 Water level
 V
 Shear vane (kPa)



CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

SURFACE LEVEL: 34.9 AHD **EASTING:** 338288 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 202 PROJECT No: 84944.02 DATE: 24 - 25/8/2017 SHEET 1 OF 3

		Description	Degree of Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities		-	-	In Situ Testing
	Depth (m)	of				Spacing (m)	B - Bedding J - Joint	Type	%	۵°	Test Results
	(,	Strata	FIS N M M	Ū	Ex Low Very Low Medium Very High Ex High	0.10	S - Shear F - Fault		Core Rec. %	R S S S	& Comments
E	0.1	TOPSOIL - grey-brown, silty sand		\mathbb{X}				D			
Ę	0.3	FILLING - grey-brown, silty sand		\bigotimes							
Ē		filling, moist		\bigotimes							
\$ -	0.8 1	FILLING - grey silty sand filling with sandstone gravel, moist		\bigotimes							
		FILLING - light grey, medium grained sand filling, damp		\bigotimes				s			2,1,1 N = 2
F				\bigotimes					1		
2				\bigotimes							
F	2			\bigotimes							
F				\bigotimes							
E				\bigotimes				s	1		1,2,3
3	3 3.0-			\bigotimes							N = 5
F	3 3.0	SAND - medium dense, yellow, medium grained sand, damp									
Ē											
F											
۶Ę	4										
Ē								s			4,6,7 N = 13
F	4.4	SAND - medium dense,							-		
Ē		orange-brown, medium grained sand, damp					Note: Unless otherwise stated, rock is fractured				
	5						along rough planar bedding dipping 0°- 10°				
F											
Ē	5.5 5.6	SANDSTONE - low strength, light						s			10,7/20mm refusal
	5.72	grey, fine to medium grained sandstone					5.6m: CORE LOSS: 120mm				bouncing PL(A) = 0.17
+	6	SANDSTONE - low and medium					5.88m: B0°- 5°, un, ro, cly, 1mm				
F		strength, slightly weathered, light grey and red and orange, medium					6.24m: J20°, un, ro, cln				
E		grained sandstone with trace of very low strength decomposed seams									PL(A) = 0.3
3	_										
Ē	7							С	96	92	
Ē											
-							7.65m: Ds, 50mm				
ī	8						,				PL(A) = 0.1
Ē							8.1, 8.15m: J70°, pl, ro,				
ł							cly, 5-10mm	<u> </u>			$PL(A) = 0.1^{-1}$
ţ	8.77	CANDETONE modium stronget									
	9	SANDSTONE - medium strength, fresh, unbroken then slightly									9.00-9.20m: U Sample
F		fractured, light grey, medium grained sandstone with some				╎╎┎┽┛	9.2m: J60°, pl, ro, cln	с	100	100	
ŧ		carbonaceous laminations and some low strength bands					9.2-9.4m: J60°, un, fe stn, he				PL(A) = 0.33
ł		-					^L 9.4-9.6m: J60°, un, fe stn, he				
it							h				

TYPE OF BORING: Hand tools to 1.0m; Solid flight auger (TC-bit) to 5.5m; Rotary (water) to 5.6m; NMLC-Coring to 28.1m

 $\label{eq:water} \textbf{WATER OBSERVATIONS:} \quad \text{No free groundwater observed whilst augering}$

REMARKS: Standpipe installed to 5.5m (screen 5.5-2.5m; blank 2.5-0.0m; gravel to 2.0m; bentonite to 0.3m; backfill to 0.2m; gatic cover; concrete plug

	SAM	IPLING	3 & IN SITU TESTING	LEGEND	
A	Auger sample	G	Gas sample	PID Photo ionisation detector (ppm)	
B	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	
BLF	K Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	Dolidias Partners
C	Core drilling	Ŵ	Water sample	pp Pocket penetrometer (kPa)	Douglas Partners
D	Disturbed sample	⊳	Water seep	S Standard penetration test	
E	Environmental sample	Ŧ	Water level	V Shear vane (kPa)	Geotechnics Environment Groundwater
Е	Environmental sample	ž	Water level	V Shear vane (kPa)	Geotechnics Environment Groundwater

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

SURFACE LEVEL: 34.9 AHD **EASTING:** 338288 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 202 PROJECT No: 84944.02 DATE: 24 - 25/8/2017 SHEET 2 OF 3

		Description	Degree of Weathering	о С	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & l	n Situ Testing
RL	Depth (m)	of		Graphic Log	Ex Low Very Low Medium High Ex High Ex High	Spacing (m)	B - Bedding J - Joint	Type	ore : %	RQD %	Test Results
	(,	Strata	H N N N N N N N N N N N N N N N N N N N	פֿ			S - Shear F - Fault	٦ _۲	Rec C	RS 8	& Comments
24	- 11	SANDSTONE - medium strength, fresh, unbroken then slightly fractured, light grey, medium grained sandstone with some carbonaceous laminations and some low strength bands <i>(continued)</i>					[•] 9.95m: B0°, pl, ro, cly, 2mm	С	100	100	PL(A) = 0.72 PL(A) = 0.65
23 1 1	-12						>>				1 ((x) = 0.00
	- 13							С	100	100	PL(A) = 0.59 PL(A) = 0.2
21	- 14						14.14m: B0°, pl, ro, cly, 5mm				PL(A) = 0.2
20	- 15										PL(A) = 0.52
	- 16							С	100	100	PL(A) = 0.88
18	- 17 17.2	SANDSTONE - low strength, moderately to slightly weathered, fractured, light grey and red, fine to medium grained sandstone with					16.9m: B0°, pl, ro, cly, 1mm 17.51m: B0°, pl, ro, fe stn				PL(A) = 0.19
	- 18	some medium and high strength, iron-cemented bands and traces of extremely low and very low strength seams		· · · · · · · · · · · · · · · · · · ·			18.23m: J60°- 90°, un, ro, cly, 5mm 18.28m: B0°- 10°, un,		400		
	- 19			· · · · · · · · · · · · · · · · · · ·			ro, cln 18.4-18.7m: J70°- 90°, un, ro, cly, 1mm, he 19.43m: B0°, pl, ro, fe ∎stn	С	100	94	PL(A) = 0.16 PL(A) = 0.73
15				 			19.5m: Cs, 20mm 19.58m: fg, 40mm				

 RIG:
 DT250
 DRILLER:
 GM
 LOGGED:
 JN
 CASING:
 HW to 5.5m

 TYPE OF BORING:
 Hand tools to 1.0m;
 Solid flight auger (TC-bit) to 5.5m;
 Rotary (water) to 5.6m;
 NMLC-Coring to 28.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 5.5m (screen 5.5-2.5m; blank 2.5-0.0m; gravel to 2.0m; bentonite to 0.3m; backfill to 0.2m; gatic cover; concrete plug

	SAN	IPLING	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
BLŁ	K Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)	1.7	Indialas Partners
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	/ /	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	/	
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
<u> </u>					· · /		

SURFACE LEVEL: 34.9 AHD **EASTING:** 338288 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 202 PROJECT No: 84944.02 DATE: 24 - 25/8/2017 SHEET 3 OF 3

	Dauth	Description	Degree of Weathering	jc	Rock Strength	Fracture Spacing	Discontinuities			-	n Situ Testing
RL	Depth (m)	of Strata	Degree of Weathering	Grapt	Very High Utbuards	(m) (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
14	20.3 • 21	SANDSTONE - medium and low strength, slightly weathered, slightly fractured, light grey and orange, medium grained sandstone with some extremely low strength bands and some very low strength decomposed seams					19.75m: B0°- 10°, un, ∖ro, fe stn 20.15m: J60°, pl, ro, fe ∖stn 20.38m: J0°- 45°, un, ro, cln	с	100		PL(A) = 1.05
13	- 22						21.42m: B5°, pl, ro, cln 21.75m: B5°, pl, ro, fe stn 22.12m: B10°, pl, ro, fe stn	с	100	98	FL(A) = 0.83
12	-23						22.85m: B0°- 10°, un, ro, fe stn, cly, 5mm 23.07m: Cs, 30mm 23.14m: B0°- 10°, un, ro, cln				PL(A) = 0.25
	- 24						23.77m: J20°, pl, ro, fe stn 24.04m: J20°, pl, ro, cln 24.08, 24.15m: J70°, pl, ro, cly co 24.26m: J30°, un, ro, cln 24.65m: J80°- 90°, un,	с	100	62	PL(A) = 0.91 PL(A) = 0.13
	-25 25.0-	SANDSTONE - low then medium strength, fresh, slightly fractured then unbroken, light grey, medium grained sandstone with some carbonaceous laminations					ro, cln 24.7m: Cs, 150mm 24.85m: Ds, 150mm 25.7, 25.76m: J60°, pl, ro, cly, 8mm	с	100	100	PL(A) = 0.29 PL(A) = 0.65
	- 27										PL(A) = 0.6
	-29	Bore discontinued at 28.1m - limit of investigation		<u>•;•;•;•</u> 1							
-0											

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 5.5m

TYPE OF BORING: Hand tools to 1.0m; Solid flight auger (TC-bit) to 5.5m; Rotary (water) to 5.6m; NMLC-Coring to 28.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 5.5m (screen 5.5-2.5m; blank 2.5-0.0m; gravel to 2.0m; bentonite to 0.3m; backfill to 0.2m; gatic cover; concrete plug

	SAM	PLIN	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)		Douglas Partners
BLł	K Block sample	U,	Tube sample (x mm dia.)	PL(C) Point load diametral test ls(50) (MPa)		Indialas Partners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
						 -	

SURFACE LEVEL: 34.1 AHD **EASTING:** 338314 **NORTHING:** 6250634 **DIP/AZIMUTH:** 90°/-- BORE No: 203 PROJECT No: 84944.02 DATE: 21 - 24/8/2017 SHEET 1 OF 3

$\left[\right]$		Description	Degree of Weathering	Rock Strength _{້ອ}	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
RL	Depth (m)	of	aphi	Ex Low Very Low Medium High Ex High Kater	Spacing (m)	B - Bedding J - Joint	Type	sre . %	RQD %	Test Results &
		Strata	N N N N N N N N N N N N N N N N N N N	Ex Low Very Low Medium High Ex High	0.01 0.10 1.00	S - Shear F - Fault	Γ	ပ်နို	R0%	∝ Comments
34	0.06 0.1/	PAVERS					A	/		
	0.15 0.2	PAVERS FILLING - yellow fine to medium grained sand filling, humid		\times			A			
t t								1		
ł	-1	FILLING - light grey, medium grained sand filling, damp		\times			A			
33		FILLING - grey silty sand filling with some tree roots and gravel, damp					s	1		1,1,1 N = 2
	1.4	FILLING - light grey, medium grained sand filling, damp						-		
		FILLING - brown, medium grained		$\left\{ \left\{ \left\{ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $						
-8-	-2	sand filling, damp		\times						
EE										
ŧŧ	2.5	SAND - loose, light grey, medium								1,1,1
ļļ		grained sand, damp					S			N = 2
3	- 3									
ŧŧ										
ĒĒ	-4									
-8-							s			2,3,4 N = 7
								-		N = 7
ł										
E	-5									
29										
}	5.5	SAND - medium dense, yellow,						-		
		medium grained sand, damp					s			3,8,7 N = 15
- 8	-6							-		
ĒĒ										
Ęţ										
52	-7	- becoming dense to very dense					<u> </u>	-		0 15 19
ŧŧ							S			9,15,18 N = 33
ļļ								1		
ĘĘ										
26	-8									
ĘĘ										
ŧŧ							s	1		12,25 refusal
ļ								1		reiusai
25	-9					Note: Unless otherwise				
ţţ						stated, rock is fractured along rough planar				
ļļ						bedding dipping 0°- 10°				
Ē	10.0									

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 5.5m; HQ to 10.0m MLC-Coring to 28.0m

TYPE OF BORING: Hand tools to 0.8m; Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 10.0m; NMLC-Coring to 28.0m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAM	IPLING	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Douglas Partners
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)		Indialas Partners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
	· · · ·				· · ·	_	

SURFACE LEVEL: 34.1 AHD **EASTING:** 338314 **NORTHING:** 6250634 **DIP/AZIMUTH:** 90°/-- BORE No: 203 PROJECT No: 84944.02 DATE: 21 - 24/8/2017 SHEET 2 OF 3

	D "	Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ∞ ∰	ic	Rock Strength	Fracture	Discontinuities		-	-	n Situ Testing
뭑	Depth (m)	of		Log	Ex Low Very Low Medium High Kery High Kery High Kery High Very High Kery High Kery High Kery High Kery High Kery	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	a D S D	Test Results &
			H M M M M M M M M M M M M M M M M M M M	0	Ex Low Very Low Medium Very Hig Ex High	0.01 0.10 0.50 1.00	S - Shear F - Fault	ŕ	õğ	Ϋ́ς	Comments
24	10.0	SANDSTONE - low then medium strength, moderately weathered, fractured, white and red fine to medium grained sandstone with traces of extremely low strength bands					10.16m: Cs, 10mm 10.28m: B0°- 10°, un, ro, cly, 5mm				PL(A) = 0.3 PL(A) = 0.18
23	-11	SANDSTONE - medium strength, slightly weathered then fresh, slightly fractured and unbroken, light grey, medium grained sandstone with some carbonaceous laminations and traces of extremely low strength bands and very low					11.05-11.18m: J70°, pl, \ro, cln 11.2m: B10°, pl, ro, cln	с	100	100	PL(A) = 0.63 11.74-11.92m: UCS Sample
3	- 12	strength decomposed seams					12.53m: B5°, pl, ro, cly,				PL(A) = 0.43
21	- 13						2mm				
20	- 14										PL(A) = 0.43
	- 15						14.73m: B5°, pl, ro, cly, 2mm	С	100	99	PL(A) = 0.47
18	- 16						15.72, 15.75, 15.82m: J70°- 90°, cu, he				PL(A) = 0.87
							16.62m: J30°, cu, ro, cln				PL(A) = 0.51
	- 17							с	100	100	
	- 18						18.1-18.3m: J60°- 90°, un, ro, partially he 18.47m: Cs, 10mm				PL(A) = 0.48
15	- 19							С	100	94	PL(A) = 0.74

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 5.5m; HQ to 10.0m NMLC-Coring to 28.0m

TYPE OF BORING: Hand tools to 0.8m; Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 10.0m; NMLC-Coring to 28.0m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAM	PLINC	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	P	Piston sample Tube sample (x mm dia.)		A) Point load axial test Is(50) (MPa) D) Point load diametral test Is(50) (MPa)		Douglas Partners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	1	Duyias rai liiti s
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	//	
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		📕 Geotechnics Environment Groundwater

SURFACE LEVEL: 34.1 AHD **EASTING:** 338314 **NORTHING:** 6250634 **DIP/AZIMUTH:** 90°/-- BORE No: 203 PROJECT No: 84944.02 DATE: 21 - 24/8/2017 SHEET 3 OF 3

		Description	Degree of Weathering	Rock	Fracture	Discontinuities	Sa		-	n Situ Testing
R	Depth (m)	of Strata	Weathering	Strength High High High High High High High Hig	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core ec. %	RQD %	Test Results &
-1-	- - - -	Slidid	HWW	E E HIGH				ŬŘ		Comments
13	-21	SANDSTONE - medium then low strength, slightly then moderately weathered, fractured, light grey and red, medium to coarse grained sandstone with some extremely low strength bands and some very low strength decomposed seams				20.76m: Ds, 140mm 21.13m: J20°, pl, ro, cln 21.44m: Cs, 10mm	С	100	94	PL(A) = 0.59 PL(A) = 0.54
12	- 22					21.87m: Ds, 10mm 21.9m: J0°- 45°, un, ro, cln 22.16m: B0°, pl, ro, cln 22.32m: J20°, pl, ro, cln 22.47m: B0°- 10°, un,				PL(A) = 0.23
11	- 23	SANDSTONE - high strength, fresh, slightly fractured, light grey fine to medium grained sandstone with some carbonaceous laminations			b I I I I I I I I I I I I I I I I I I I	22.4711. Bo 10°, uli, ro, fe stn 22.6m: Sz, 60mm 22.72-22.82m: J60°, pl, ro, cln 23.4m: J70°, un, ro, cly, 5mm	С	100	98	PL(A) = 1.12
10	- 24 - 24 - 24.65 - 24.65 - 25	SANDSTONE - medium strength, fresh, unbroken then slightly fractured, light grey medium grained								PL(A) = 1.01
	- 26	sandstone with a trace of carbonaceous laminations and some extremely low strength bands				25.3m: J30°, pl, ro, cln				PL(A) = 0.86
	-27 -27.2	SANDSTONE - high strength, fresh, fractured, light grey medium to coarse grained sandstone				26.78m: Cs, 10mm 27.1m: B0°, pl, ro, cly, 1-3mm 27.4m: Cz, 10mm	С	100	92	PL(A) = 0.39
	- 28 28.0	Bore discontinued at 28.0m - limit of investigation				27.77m: B0°, pl, ro, cly, 3mm 27.83-27.91m: B0°- 10°, un, ro, cln				PL(A) = 1.24
	- 29 - 29 									

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 5.5m; HQ to 10.0m NMLC-Coring to 28.0m

TYPE OF BORING: Hand tools to 0.8m; Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 10.0m; NMLC-Coring to 28.0m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SA	MPLIN	3 & IN SITU TESTING	LEG	END	1	
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Douglas Partners
BL	K Block sample	U,	Tube sample (x mm dia.)	PL([D) Point load diametral test Is(50) (MPa)		l Dollaise Partnere
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
•	•				· ·		

SURFACE LEVEL: 34.1 AHD **EASTING:** 338340 **NORTHING:** 6250642 **DIP/AZIMUTH:** 90°/-- BORE No: 204 PROJECT No: 84944.02 DATE: 16 - 18/8/2017 SHEET 1 OF 3

\square		Description	Degree of Weathering ≞ ≩ ≩ § ∞ ∰		Rock Strength	Fracture	Discontinuities	Sa	ampli	ing & I	n Situ Testing
R	Depth (m)	of		le b		Spacing (m)	B - Bedding J - Joint	ЭС	e %	RQD %	Test Results
	(11)	Strata	FR S S MAN	5 .	Very Low Medium Ex High		S - Shear F - Fault	Type	Re C	R0 %	& Comments
34	0.07 0.2	CONCRETE PAVERS	<u> </u>	أخخأ				A	-		
	0.2	FILLING - yellow fine to medium	1	\boxtimes					1		
		FILLING - grey silty sand filling with		\bigotimes				A	1		
E		a trace of roots and gravel, and some glass fragments, damp		\boxtimes							
-8	-1			\bigotimes				A			122
ĒĒ	1.2	FILLING - yellow-brown, medium grained sand filling, damp		\bigotimes				S			1,2,2 N = 4
	1.5	FILLING - grey, medium grained							1		
		sand, damp	B	\boxtimes							
-8	-2			\bigotimes							
ĒĒ				\bigotimes							
-				\bigotimes							3,3,6
ĒĒ	2.7	FILLING - light grey, medium grained sand filling, damp		X				S			N = 9
- <u>10</u>	-3	grained sand minig, damp		\otimes					1		
				\bigotimes							
				\bigotimes							
				\bigotimes							
-8	-4 4.0	SAND - loose, yellow medium		×				_			3.3.4
		grained sand, moist						S			3,3,4 N = 7
59	-5										
Ē	5.5	SAND - medium dense then dense,						<u> </u>	1		5,9,11
		yellow medium grained sand						S			N = 20
-81	-6										
 	-										
5	• 1			· · · ·				s	1		6,10,15 N = 25
ŧ ŧ								5			N = 25
- ²⁸	-8										
 				····							
ĒĒ								s	1		8,13,13
Ę				••••				5			N = 26
52	-9										
Ę				· · ·							
				••••							
Ē											

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM/SS

LOGGED: JN

CASING: HW to 7.5m; HQ to 17.6m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 19.8m; NMLC-Coring to 28.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 28.2m (blank 28.2-19.2m; screen 19.2-16.2m; blank 16.2-0.0m; cave-in to 10.0m; bentonite to 9.5m; gravel to 0.2m; gatic cover; concrete plug

	SAMPLIN	IG & IN SITU TESTIN	G LEGEND	
A Auger sample	G	Gas sample	PID Photo ionisation detector (ppm)	
B Bulk sample	P	Piston sample	PL(A) Point load axial test Is(50) (MPa)	Douglas Partners
BLK Block sample	U	, Tube sample (x mm dia.)	 PL(D) Point load diametral test ls(50) (MPa) 	Dolidias Partners
C Core drilling	W	Water sample	pp Pocket penetrometer (kPa)	
D Disturbed sample	⊳	Water seep	S Standard penetration test	
E Environmental sa	nple 📱	Water level	V Shear vane (kPa)	Geotechnics Environment Groundwater

SURFACE LEVEL: 34.1 AHD **EASTING:** 338340 **NORTHING:** 6250642 **DIP/AZIMUTH:** 90°/-- BORE No: 204 PROJECT No: 84944.02 DATE: 16 - 18/8/2017 SHEET 2 OF 3

		Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ፼ ፼	ic.	Rock Strength ់ត្រ	Fracture	Discontinuities				In Situ Testing
R	Depth (m)	of		raph Log	Strength Neny Low Very Low Neddium Meddium Neddium	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	d °	Test Results &
		Strata	HW HW FS SW	G		0.05 0.10 1.00	S - Shear F - Fault	Ţ	ပိမ္မ	R ~	Comments
24		SAND - medium dense then dense, yellow medium grained sand (continued)						S	_		13,19,25/130mm refusal
23	11								-		
22	12							S	-		12,20,21 N = 41
21	13							S	-		16,23,23 N = 46
20	14								-		40.40.45
19	15							S	-		10,13,15 N = 28
18	16							S	-		14,16,22 N = 38
17	17								-		
16	18							S			14,21,23 N = 44
15	19						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S	-		15,15,9 N = 24
	19.4 - 19.8 -	SANDSTONE - extremely low strength, orange, fine to medium grained sandstone with some medium strength iron-cemented		·····				С	100	84	

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM/SS

LOGGED: JN

CASING: HW to 7.5m; HQ to 17.6m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 19.8m; NMLC-Coring to 28.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 28.2m (blank 28.2-19.2m; screen 19.2-16.2m; blank 16.2-0.0m; cave-in to 10.0m; bentonite to 9.5m; gravel to 0.2m; gatic cover; concrete plug

	SAM	PLIN	3 & IN SITU TESTING	LEG	END									
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)									
В	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)			oug	_					
BLI	< Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)							Jar	TN	arc
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)				110	13		aı		51 J
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	' /		•						
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		d Ge	otechnics	: I E	Enviro	onm	nent I	Groun	dwater
						_					•••••		010411	amator

SURFACE LEVEL: 34.1 AHD **EASTING:** 338340 **NORTHING:** 6250642 **DIP/AZIMUTH:** 90°/-- BORE No: 204 PROJECT No: 84944.02 DATE: 16 - 18/8/2017 SHEET 3 OF 3

		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	In Situ Testing
RL	Depth (m)	of			Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core *c. %	RQD %	Test Results &
		Strata	HW MW FS FR	EX High	0.01	3 - Sileai F - Fault	-	0 %	Ľ	
12	20.8 - 21 - 22	bands SANDSTONE - medium strength, highly weathered, fractured, orange and red, medium and medium to coarse grained sandstone with some extremely low strength bands and some low strength decomposed seams (continued) SANDSTONE - medium strength, moderately then slightly weathered, slightly fractured, light grey and orange, medium and medium to coarse grained sandstone				20.04m: J45°, un, ro, fe stn 20.1m: J45°- 70°, un, ro, fe stn, cly, 1mm 20.12m: B0°- 10°, un, ro, fe stn 20.37m: Cs, 30mm 20.37m: Cs, 20mm 20.56m: B10°, pl, ro, cly, 1mm 20.63m: Cs, 10mm 20.7m: Ds, 80mm 21.72m: B0°- 10°, un, ro, cly co	С	100	84	20.10-20.28m: UCS Sample PL(A) = 0.66 PL(A) = 0.59
	-23					23.1m: B5°, pl, ro, cly co	С	100	100	PL(A) = 0.67
-						23.35m: B0°- 10°, un, ro, fe stn				PL(A) = 0.69
	- 24 					23.9, 23.96m: Ds, 10mm 24.23m: Ds, 20mm 24.23-24.57m: J80°- 90°, un, ro, fe stn, cly, 10mm	с	91	85	
- 6	- 25	SANDSTONE - medium strength, fresh, fractured, light grey, medium grained sandstone with some carbonaceous laminations and some extremely low strength bands				24.57m: CORE LOSS: 150mm 25.2-25.5m: J70°, un, he 25.26m: Cs, 10mm				PL(A) = 0.75
	-26					_ 26.42m: Cs, 10mm]^26.5m: J30°- 60°, cu, he	С	100	86	PL(A) = 0.61
	26.75 - - 27 	SANDSTONE - medium strength, slightly weathered, unbroken, light grey and brown, fine to medium grained sandstone				26.57m: Cs, 30mm 26.6-26.73m: J45°- 90°, cu, ro, cly, 10-30mm				PL(A) = 0.13 PL(A) = 0.73
9	28.2 -	Bore discontinued at 28.2m - limit of investigation								

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM/SS

LOGGED: JN

CASING: HW to 7.5m; HQ to 17.6m

TYPE OF BORING: Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 19.8m; NMLC-Coring to 28.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 28.2m (blank 28.2-19.2m; screen 19.2-16.2m; blank 16.2-0.0m; cave-in to 10.0m; bentonite to 9.5m; gravel to 0.2m; gatic cover; concrete plug

SAN	IPLIN	G & IN SITU TESTING	i LEG	END	1		
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	1		
3 Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)			Douglas Partners
3LK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)		1.	N DALIAISE Partnere
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			Doug ias Fai tricis
D Disturbed sample	⊳	Water seep	S	Standard penetration test		17	
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwater
					-	_	

SURFACE LEVEL: 27.4 AHD **EASTING:** 338380 **NORTHING:** 6250685 **DIP/AZIMUTH:** 90°/-- BORE No: 205 PROJECT No: 84944.02 DATE: 15 - 16/8/2017 SHEET 1 OF 3

		Description	Degree of Weathering ≞ ≩ ≩ § ∞ ∰	υ	Rock Strength ক্র	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
님	Depth (m)	of	weathening !	aphi Log	Very Low Medium High Kery High Kater	Spacing (m)	B - Bedding J - Joint	ЭС	е%.	Ω.	Test Results
	(11)	Strata	A M M M M M M M M M M M M M M M M M M M	ອ_	Very High Very High Ex High	(m)	S - Shear F - Fault	Type	Core Rec. %	as 8	& Comments
	0.02	PAVERS						A			
27		FILLING - yellow-brown, fine to medium grained sand filling with some fine igneous gravel, damp		\bigotimes							
	-1	FILLING - grey silty sand filling, damp		X				_A			1,1,3
26	1.3-	FILLING - light grey, medium grained sand filling, damp		\bigotimes				S			N = 4
25	-2			\bigotimes							
ĒĒ	2.8			\bigotimes				s			4,5,5 N = 10
	-3	SAND - medium dense, orange-brown, medium grained sand, damp									N - 10
	3.5-	SAND - dense, grey, medium grained sand, moist									
i i	-4							s			28,25/130mm
53	4.2-	SAND - medium dense, yellow, medium grained sand									refusal
21	-5							S			7,10,15 N = 25
; ;	.										
	-7	7.0m: becoming dense to very dense						S			10,13,17 N = 30
	-8										
- 19-	- - - -							s			10,14,16 N = 30
Ē	-9			····							

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 4.0m; HQ to 13.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 4.0m; Rotary (mud) to 20.5m; NMLC-Coring to 23.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 23.0m (blank 23.0-20.5m; screen 20.5-17.5m; blank 17.5-0.0m; cave-in to 13.0m; bentonite to 13.5m; gravel to 0.1m; gatic cover; concrete plug

	SAM	MPLIN	G & IN SITU TESTING	G LEG	END		
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	3 Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
	3LK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)	1.	Nuniniae Partnere
	C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	/ /	Dugias Faithers
	D Disturbed sample	⊳	Water seep	S	Standard penetration test		
	E Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
-							

SURFACE LEVEL: 27.4 AHD **EASTING:** 338380 **NORTHING:** 6250685 **DIP/AZIMUTH:** 90°/-- BORE No: 205 PROJECT No: 84944.02 DATE: 15 - 16/8/2017 SHEET 2 OF 3

\square		Description	Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ	U	Rock Strength	Discontinuities	Sa	ampli	ng & I	n Situ Testing
RL	Depth (m)	of	vveathering	aphi og		B - Bedding J - Joint				
	(m)	Strata	HW MW FS FR	ΰ	Strength Hacking Spacing (m) (m) (m) (m) (m) (m) (m) (m)	S - Shear F - Fault	Type	Re. C	RQD %	& Comments
-	-	SAND - medium dense, yellow, medium grained sand <i>(continued)</i>					s			13,15,23 N = 38
1	-									N - 30
	-									
È	-11									
16	.									
Ē								-		11 24 31
	- -						S			11,24,31 N = 55
	- 12									
15	-									
ŀ				 						
-	- 13									
-							s			11,14,16 N = 30
14	-									
				 · · · ·						
	- 14									
13										
	-						s			14,14,19 N = 33
ŀ	- 15									N - 00
-	-									
12										
	.									
	- 16						S			18,27 refusal
1										i ciusai
E										
-	- 17									
-	.									
- 10							S			17,25/130mm
ŀ							J			refusal
	- 18									
-6										
	.									
	- 19									
	19.25	SAND - dense, light grey, medium		 			S			12,14,23 N = 37
-00		grained sand								
				$ \cdot \cdot \cdot \cdot$						

RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 4.0m; HQ to 13.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 4.0m; Rotary (mud) to 20.5m; NMLC-Coring to 23.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 23.0m (blank 23.0-20.5m; screen 20.5-17.5m; blank 17.5-0.0m; cave-in to 13.0m; bentonite to 13.5m; gravel to 0.1m; gatic cover; concrete plug

	SAN	IPLIN	G & IN SITU TESTING	LEG	END		
1	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
E	3 Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
E	3LK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.1	N DAIIdiae Partnere
0	C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	1	D ugius rai licis
1	D Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
-						 _	

SURFACE LEVEL: 27.4 AHD **EASTING:** 338380 **NORTHING:** 6250685 **DIP/AZIMUTH:** 90°/-- BORE No: 205 PROJECT No: 84944.02 DATE: 15 - 16/8/2017 SHEET 3 OF 3

$\left[\right]$		Description	Degree of Weathering ≞ ≩ ≩ § ∞ ∰	<u>ല</u>	Rock Strength	Fracture	Discontinuities				n Situ Testing
묍	Depth (m)	of		Log	Strength Very Low Very Low Neddium Medium Nedvin	Spacing (m)	B - Bedding J - Joint	Type	sre %	RQD %	Test Results
	(,	Strata	H M M M M M M M M M M M M M M M M M M M] פ			S - Shear F - Fault		ပိမ္မ	SR S⊗	& Comments
-		SAND - dense, light grey, medium					Note: Unless otherwise				
		grained sand (continued)					stated, rock is fractured along rough planar				
	20.5 20.62-	SANDSTONE - very low strength,			╌╏╘╧╧┓╎╎╎╎╎		bedding dipping 0°- 10°				PL(A) = 0.07
; ;	20.02	slightly weathered, fractured, light grey, fine to medium grained									
ĒĒ	-21	sandstone with some carbonaceous					20.97m: B10°, pl, ro, cly,				
		laminations SANDSTONE - medium strength,					8mm				
-0-		slightly weathered, light grey and									PL(A) = 0.91
ļ		orange, medium grained sandstone with traces of extremely low strength									
EE	-22	bands and some very low strength									DL(A) = 0.97
	- 22	seams						С	100	92	PL(A) = 0.87
-0-							22.25m: Cs, 20mm 22.27-22.29m: J (x3)				
ĒĒ							10°, pl, ro, fe stn 22.57m: Ds, 90mm				00 70 00 00 00
							°22.57m: Ds, 90mm				22.78-23.00m: UCS sample
	-23										
Ē						┊┊┍╝┊│	23.3m: J45°, pl, ro, cln				
ŀ	23.6	D									PL(A) = 0.74
	20.0	Bore discontinued at 23.6m - limit of investigation									
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RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: JN

CASING: HW to 4.0m; HQ to 13.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 4.0m; Rotary (mud) to 20.5m; NMLC-Coring to 23.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Standpipe installed to 23.0m (blank 23.0-20.5m; screen 20.5-17.5m; blank 17.5-0.0m; cave-in to 13.0m; bentonite to 13.5m; gravel to 0.1m; gatic cover; concrete plug

	SAN	/IPLIN(G & IN SITU TESTING	LEG			
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	B Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
	BLK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)	1.1	N DAIIdias Partners
	C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		Dugias Faithers
	D Disturbed sample	⊳	Water seep	S	Standard penetration test		
	E Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
-						 _	

TEST PIT LOG

SURFACE LEVEL: 34.1 AHD **EASTING:** 338315 **NORTHING:** 6250632 PIT No: 206 PROJECT No: 84944.02 DATE: 28/8/2017 SHEET 1 OF 1

Г			Description	0		Sam	npling	& In Situ Testing				
RL	De	epth m)	of	Graphic Log	e				Water	Dynamic F (blow	Penetrometer s per 150mm)	Test
	, u	,	Strata	Ъ_	Type	Depth	Sample	Results & Comments	5			20
-\$	_	0.05 0.07	PAVERS									
-	-	0.12	FILLING - poorly compacted, grey cement stabilised sand									
ł	-		FILLING - poorly compacted, yellow medium grained sand							· 卢		:
ļ												
ł	-		FILLING - poorly compacted, grey medium grained sand filling with sandstone gravel and ceramic pipe pieces,									
ł			damp									
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33												
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ł	-											
ţ	-	1.5	Pit discontinued at 1.5m									
ł	-		- limit of reach of excavator							וי		
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RIG: 1.8t excavator - 300mm bucket to 1.5m

LOGGED: JN

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

CLIENT: PROJECT:

REMARKS:

	SAN	IPLING	S & IN SITU TESTING	G LEGE	END
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
В	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)
	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)
C	Core drilling		Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)
-					

☑ Sand Penetrometer AS1289.6.3.3☑ Cone Penetrometer AS1289.6.3.2



TEST PIT LOG

SURFACE LEVEL: 33.5 AHD EASTING: 338336 NORTHING: 6250644

PIT No: 207 **PROJECT No:** 84944.02 DATE: 28/8/2017 SHEET 1 OF 1

Г			Description	0		Sam	iplina 8	& In Situ Testing			
RL	D	epth	Description of	Graphic Log	e				Water	Dynamic Penetromet (blows per 150m	er Test
		(m)	Strata	U U U U U	Type	Depth	Sample	Results & Comments	≥	5 10 15	20
\vdash		0.03	CONCRETE PAVERS /				0				:
ł	ŀ		CONCRETE	Q Q A							
Ţ	[0.2	FILLING - poorly compacted, grey and brown sand filling with sandstone gravel and tree roots, humid								
ŀ	ŀ		with sandstone gravel and tree roots, humid								
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t	Į	1.4									
32		1.4	Pit discontinued at 1.4m								
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RIG: 1.8t excavator - 300mm bucket to 1.4m

LOGGED: JN

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

 SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 P
 Piston sample
 PI(A) Point load axial test Is(50) (MPa)

 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 W
 Water seep
 S
 Standard penetration test

 Worter level
 V
 Shear vane (kPa)

 A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample

Sand Penetrometer AS1289.6.3.3 □ Cone Penetrometer AS1289.6.3.2



SURFACE LEVEL: 30.5 AHD **EASTING:** 338371 **NORTHING:** 6250655 **DIP/AZIMUTH:** 90°/-- BORE No: 208 PROJECT No: 84944.02 DATE: 18 - 19/9/2017 SHEET 1 OF 3

Γ			Description	Degree of Weathering ≧ ≩ ≩ ≳ ∞ ଝ	0	Rock Strength _{কৈ}	Fracture	Discontinuities	Sa	amplir	na & I	n Situ Testing
R	. C	Depth	of	Weathering	og		Spacing					
ľ	1	(m)	Strata	2222 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Gra	Ex Low Very Low Medium High Ex High Ex High Ex High Mater	0.10 0.10 1.00 0.50 (W)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQI %	&
╞	-	0.05	ASPHALT	H H H H H H H H H H H H H H H H H H H			10.00					Comments
00	-	0.1	FILLING - dark grey roadbase gravel filling, damp		\bigotimes				A			
-		0.8	FILLING - grey sand filling with some fine to medium sandstone gravel, damp		\bigotimes							
	-1		SAND - medium dense, yellow medium grained sand, humid						A S			3,4,5 N = 9
-62	3-									-		
-	-2											
ŀ	-											
-87 -87	1								S			3,5,8
ŀ	-3		3.0m: becoming moist						3			N = 13
Ē	Ē											
27	i - -											
-	4									-		5.0.0
26									S			5,6,8 N = 14
-	1											
ŀ	-5											
22	-											
Ē	Ē								S			6,8,11 N = 19
-	-6											
24	i -											
Ē	-											
ŀ	Ę											
23	2											
ŀ	-8											
-	ŀ								S			8,9,12 N = 21
-8									5	-		N = 21
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RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 5.65m; HQ to 18.35m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 18.35m; NMLC-Coring to 25.0m WATER OBSERVATIONS: No free groundwater observed whilst augering **REMARKS**:

	SAMPLIN	G & IN SITU TESTING	LEGEND	
A Auger sam	iple G	Gas sample	PID Photo ionisation detector (ppm)	
B Bulk samp BLK Block sam		Piston sample Tube sample (x mm dia.)	PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa)	Douglas Partners
C Core drillin		Water sample	pp Pocket penetrometer (kPa)	
D Disturbed	sample D	Water seep	S Standard penetration test	
E Environme	ntal sample 📱	Water level	V Shear vane (kPa)	Geotechnics Environment Groundwate

SURFACE LEVEL: 30.5 AHD **EASTING:** 338371 **NORTHING:** 6250655 **DIP/AZIMUTH:** 90°/-- BORE No: 208 PROJECT No: 84944.02 DATE: 18 - 19/9/2017 SHEET 2 OF 3

		Description	Degree of Weathering ≧ ≩ ≩ ≷ ∞ ଝ	υ	Rock Strength 5	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
R	Depth (m)	of	weathening	aphi Log	Ex Low Very Low Medium High Very High Ex High Water	Spacing (m)	B - Bedding J - Joint				Test Results
	(11)	Strata	HW HW SSW FR	<u>5</u> _	KEX Lov Very L High Ex Hig	0.010	S - Shear F - Fault	Type	ပိ မို	RQD %	& Comments
20	- 11	SAND - medium dense, yellow medium grained sand, humid (continued)									
- <u>1</u> -	-							s			8,10,12 N = 22
18	- 12										
	- 13										
17	- 14										
-9	-	14.5m: becoming dense						S	-		10,12,20 N = 32
15	- 15 										
14	- 16										
	- 17						Nete Union attaction				
13	- 18						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
12-	18.35	SANDSTONE - very low and very low to low strength, highly weathered, fractured and slightly fractured, light grey-brown medium					18.35m: CORE LOSS: 450mm				
	- 19 -	grained sandstone with a medium strength band						С	77	60	
	- - - -										PL(A) = 0.16

RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 5.65m; HQ to 18.35m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 18.35m; NMLC-Coring to 25.0m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

	SAM	PLINC	3 & IN SITU TESTING	LEG								
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)							
B	Bulk sample	Р	Piston sample) Point load axial test Is(50) (MPa)						Dow	tners
BLF	Block sample	U	Tube sample (x mm dia.)	PL(L	0) Point load diametral test Is(50) (MPa)	1.		1010				ners
C	Core drilling	VV	Water sample	рр	Pocket penetrometer (kPa)	/ /						
D	Disturbed sample	⊳	Water seep	s	Standard penetration test		-		· .			
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geoteo	hnics	1	Enviro	onment	Groundwater

 SURFACE LEVEL:
 30.5 AHD

 EASTING:
 338371

 NORTHING:
 6250655

 DIP/AZIMUTH:
 90°/-

BORE No: 208 PROJECT No: 84944.02 DATE: 18 - 19/9/2017 SHEET 3 OF 3

		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
R	Depth (m)	of	raphi	Strength High Wedium	Spacing (m)	B - Bedding J - Joint	Type	sre : %	RQD %	Test Results &
	()		G BR G	Ex Low High Ex High	0.01 0.10 0.50	S - Shear F - Fault	Τy	ပိမ္မ	R0 %	Comments
10	20.35 20.6	SANDSTONE - very low and very low to low strength, highly weathered, fractured and slightly fractured, light grey-brown medium grained sandstone with medium				20m: Ds, 50mm 20.1-20.3m: J70°- 90°, un, ro, cln 20.3m: Ds, 50mm 20.35m: CORE LOSS: 250mm	с	77	60	PL(A) = 0.42
	-21	SANDSTONE - medium strength, slightly weathered, slightly fractured, light grey and brown medium grained sandstone with some			L	20.6m: J70°, un, ro, cln 20.9m: B0°- 5°, un, ro, cln				PL(A) = 0.43 PL(A) = 0.52
	-22	extremely low and very low strength bands				21.5m: J80°, pl, ro, cln 21.6m: B10°, pl, ro, cln	с	92	87	
	-23					22.4m: Cs, 10mm 22.5m: Cs, 20mm 22.85m: J50°, pl, cly,				PL(A) = 0.48
						10mm 23.15-23.7m: B (x3) 0°- 5°, cly, 10mm				PL(A) = 0.46
	- 24					23.75m: J70°, he/ti 24.15m: J50°, pl, ro, fe	с	100	79	PL(A) = 0.52 24.00-24.20m: UCS Sample
- 9	-25 25.0	Bore discontinued at 25.0m				24.5m: J45°, pl, ro, cln				
		- limit of investigation								
	-26									
	- 27									
	-28									
	-29									

RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 5.65m; HQ to 18.35m

TYPE OF BORING: Solid flight auger (TC-bit) to 5.5m; Rotary (mud) to 18.35m; NMLC-Coring to 25.0m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAM	PLINC	3 & IN SITU TESTING	LEG			
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	P	Piston sample) Point load axial test Is(50) (MPa)		Douglas Partners
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(L	0) Point load diametral test Is(50) (MPa)		 Doublas Pariners
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)		Dougius i ui uicis
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	11	
Е	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater

SURFACE LEVEL: 34.0 AHD **EASTING:** 338329 **NORTHING:** 6250630 **DIP/AZIMUTH:** 90°/-- BORE No: 210 PROJECT No: 84944.02 DATE: 19 - 20/9/2017 SHEET 1 OF 3

		Description	Degree of Weathering ≧ ≩ ≩ § ∞ ∰	ы	Rock Strength ត្រ	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
RL	Depth	of	vveathering	ių g	Very Low Very Low Medium High Very High Kery High Very High Very High Very High Very High Very Low Ver	Spacing (m)	B - Bedding J - Joint			-	-
	(m)	Strata	H H M M M M M M M M M M M M M M M M M M	5 -	Very H Very H Very H Ex High		S - Shear F - Fault	Type	Core Rec. %	R0%	& Comments
8	• 0.1	_ASPHALT	ШТ≥ойи			00 01					Comments
	.	PAVERS									
Ē	0.4	FILLING - light grey crushed		\boxtimes							
	0.7	sandstone filling, damp FILLING - yellow medium grained		\bigotimes							
33 -	-1 1.0	_sand filling, humid		\bigotimes							
		SAND - yellow medium grained									
Ē		sand, moist									
Ę											
32	-2										
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RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 9.0m; HQ to 18.5m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 9.0m; Rotary (mud) to 18.75m; NMLC-Coring to 18.75m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 Remarks:

	SAMI	PLING	3 & IN SITU TESTING	LEG	END			
A A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
	Bulk sample Block sample	P	Piston sample) Point load axial test Is(50) (MPa)			Douglas Partners
	Core drilling	Ŵ	Tube sample (x mm dia.) Water sample	PL(L DD	Point load diametral test Is(50) (MPa) Pocket penetrometer (kPa)	1	1	Douglas Parlners
DI	Disturbed sample	⊳	Water seep	S	Standard penetration test			
EE	Environmental sample	¥	Water level	V	Shear vane (kPa)			Geotechnics Environment Groundwate

SURFACE LEVEL: 34.0 AHD EASTING: 338329 NORTHING: 6250630 **NORTHING:** 6250630 **DIP/AZIMUTH:** 90°/-- **BORE No:** 210 **PROJECT No:** 84944.02 **DATE:** 19 - 20/9/2017 SHEET 2 OF 3

		Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ∞ ∰	ic	Rock Strength	e Discontinuities	Sa	ampli	ng & I	n Situ Testing
Ч	Depth (m)	of		Sraph Log	Strength by the streng	B - Bedding J - Joint	Type	ore c. %	RQD %	Test Results &
4		Strata	FR SW HW FR	0		S - Shear F - Fault	F	йğ	а С	Comments
23	11	SAND - yellow medium grained sand, moist <i>(continued)</i>								
22	12									
21	13									
20	14									
	15									
	16									
	17									
10	18					Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
12	18.75 - 19 19.1 - 19.27	SANDSTONE - medium strength highly to moderately weathered, fractured and slightly fractured, light grey-brown medium grained sandstone				19.1m: CORE LOSS: 170mm 19.27-19.4m: Ds 19.5m: B10°, fe	с	88	48	PL(A) = 0.4
		49.1-19.6m: very low strength				19.5m: B10°, fe 19.55m: J55°, he/ti 19.62m: B0°, cly, 20mm				PL(A) = 0.5

RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 9.0m; HQ to 18.5m

TYPE OF BORING: Solid flight auger (TC-bit) to 9.0m; Rotary (mud) to 18.75m; NMLC-Coring to 18.75m WATER OBSERVATIONS: No free groundwater observed whilst augering **REMARKS:**

	SAM	PLINC	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B BLK	Bulk sample Block sample	Р U.,	Piston sample Tube sample (x mm dia.)		A) Point load axial test Is(50) (MPa) D) Point load diametral test Is(50) (MPa)		Douglas Partners
C	Core drilling Disturbed sample	Ŵ	Water sample Water seep	pp`	Pocket penetrometer (kPa) Standard penetration test		Buyias Pai liici
Ē	Environmental sample	¥	Water level	v	Shear vane (kPa)	Υ	Geotechnics Environment Groundwat

 SURFACE LEVEL:
 34.0 AHD

 EASTING:
 338329

 NORTHING:
 6250630

 DIP/AZIMUTH:
 90°/-

BORE No: 210 PROJECT No: 84944.02 DATE: 19 - 20/9/2017 SHEET 3 OF 3

		Description	De	gre	e of	Graphic Log		R Stre	ock	(1th			Frac	ture	e	Discontinuities	Sa	ampli	ng & I	n Situ Testing
RL	Depth (m)	of	000	aun	sing	aphi				<u>le</u>	/ate		Spac (n	cing 1)	3	B - Bedding J - Joint	e	е%.	D	Test Results
	(,	Strata	N N	MM	S E	ō	E E E	l l Vey I	Mediu		≚ >	0.01	0.05	0.50	1.00	S - Shear F - Fault	Type	ပိမ္စ	RQD %	& Comments
Ē	20.1	Bore discontinued at 20.1m					-				-	L	┓╷╷			19.87m: J80°, pl, ro, fe 19.92m: J70°, un, ro, fe 20.0-20.07m: fg 20.07m: J50°, pl, ro, fe				
ŀ	-	- limit of investigation	ļ	i i	ij.		Ιį	ij	İ	ij		ļ	ij		L	20.0-20.07m: fg				
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RIG: Explora 130

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: JS

LOGGED: JN/SI

CASING: HW to 9.0m; HQ to 18.5m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 9.0m; Rotary (mud) to 18.75m; NMLC-Coring to 18.75m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 Remarks:

SAN	IPLINC	3 & IN SITU TESTING	LEG				
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
B Bulk sample	P	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Douglas P	
BLK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)			erther
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		B UUMIAS F	
D Disturbed sample	⊳	Water seep	S	Standard penetration test			
E Environmental sample	ž	Water level	V	Shear vane (kPa)		Geotechnics Environme	ent Groundwate

SURFACE LEVEL: 33.7 AHD EASTING: 338331 **NORTHING:** 6250647 **DIP/AZIMUTH:** 90°/--

BORE No: 211 **PROJECT No:** 84944.02 **DATE:** 19 - 20/9/2017 SHEET 1 OF 2

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	Depth	Description	Wea	gree of athering ≧ ≳ ፼ ፼	pic pic		Stre	ock engt	h	fer	e e	Fractı. Spaci	ng		ntinuities				In Situ Testing
R	(m)	of			Grap	N		Medium High		Na		(m))	B - Bedding S - Shear	J - Joint F - Fault	Type	Sore	RQD %	Test Results &
		Strata	N N N	N S E	<u> </u>	Ϋ́		μ Ε	ĮŽĮŽ	i i	0.0	0.10	10.0	0 - Oncar	1 - 1 4010	-	۳ ۳	ш.	Comments
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RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: SI

CASING: HW to 9.0m; HQ to 15.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 9.0m; Rotary (mud) to 18.9m; NMLC-Coring to 20.0m WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

	SAN	IPLIN	G & IN SITU TESTING	LEG	END	1	
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	1	
B	Bulk sample K Block sample	P	Piston sample Tube sample (x mm dia.)		A) Point load axial test Is(50) (MPa) D) Point load diametral test Is(50) (MPa)		Douglas Partners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		υσυμίας Γαι μιςις
ΙĽ	Disturbed sample	Ŗ	Water seep	S	Standard penetration test		
E	Environmental sample	ŧ	Water level	v	Shear vane (kPa)		Geotechnics Environment Groundwater

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

SURFACE LEVEL: 33.7 AHD **EASTING:** 338331 **NORTHING:** 6250647 **DIP/AZIMUTH:** 90°/-- BORE No: 211 PROJECT No: 84944.02 DATE: 19 - 20/9/2017 SHEET 2 OF 2

_		Description	De	egre eathe	e of erina	ic	5	Rc Stre	ock ength	ı	5	Frac	ture	Discontinuities			-	n Situ Testing
U U	epth (m)	of				Graphic Log			Т. 5 1:	ul Hĝi	Nate	Spao (n	ר)	B - Bedding J - Joint	Type	ore 2. %	RQD %	Test Result
			N N H	MW WW	S E	Ű	Ex Lo		High	EX Hi		0.05	0.50	S - Shear F - Fault	Ļ	ပိမ္ရွိ	Я°,	Comments
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- 18	3													Note: Unless otherwise				
ļ														stated, rock is fractured along rough planar				
F										ļ			ii	bedding dipping 0°- 10°				
2																		
- 19	18.9	SANDSTONE - medium strenath.	+i-	i i			ļ		l i	-	H	- <u> </u>	<u> </u>	18.95m: J45° & 90°, st,	<u> </u>			
-		SANDSTONE - medium strength, slightly weathered, slightly fractured, light grey-brown, medium to coarse]¢		ו וי ן			L		\ ro, fe				
Ē		grained sandstone with clay band at											 	19.07-19.15m: Cs 19.27m: B10°, fe	с	100	85	PL(A) = 0.6
<u>t</u>		19.07m		į					ľ	į			j					PL(A) = 0.5
F	20.0													19.75m: B0°, fe				FL(A) = 0.5
	DT25	Bore discontinued at 20.0m 0 DRILI		~								ED:	~	CASING: HV		0		45.0-

WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

SAN	IPLING & IN SITU TESTING	G LEGEND	
A Auger sample	G Gas sample	PID Photo ionisation detector (ppm)	
B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample	P Piston sample U _x Tube sample (x mm dia.) W Water sample ▷ Water seep ¥ Water level	PL(A) Point load axial test Is(50) ⁽ (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa)	Douglas Partners Geotechnics Environment Groundwater

SURFACE LEVEL: 34.3 AHD **EASTING:** 338324 **NORTHING:** 6250648 **DIP/AZIMUTH:** 90°/-- BORE No: 212 PROJECT No: 84944.02 DATE: 18/9/2017 SHEET 1 OF 2

П		Description	D	egre	e of	Graphic Log		F Str	Roc	:k		П		ract	uro		Disco	ontinuities	50	molir	20.8	n Situ Testing
R	Depth	Description of	We	eath	ering	phic		Str 2	ren	gth		Water	S	Spaci	ing	-					-	-
Ľ.	(m)	Strata	2 2	< 2	> ~	Gra	Flow	S S			E High	Ň	5	ິ(m ສຸຊ)		Bedding Shear	g J - Joint F - Fault	Type	Core tec.	RQD %	Test Results &
$\left \right $		SOIL NOT LOGGED	⊇ ₹ 	53	 € E E		Ш.	212	1 S	1 1 1	<u> </u>		0.0		0:50					Ľ		Comments
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RIG: DT250

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: GM

LOGGED: SI

CASING: HW to 8.0m; HQ to 14.2m NMLC-Coring to 15.8m

TYPE OF BORING: Hand tools to 0.8m; Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 14.25m; NMLC-Coring to 15.8m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAN	IPLIN	3 & IN SITU TESTING	LEG	END						
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
B	Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)		Doug				
BLł	Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)	1.					nore
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		DUUY				
D	Disturbed sample	⊳	Water seep	S	Standard penetration test						
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	I Envi	ronme	ent 🤆	Groundwater
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SURFACE LEVEL: 34.3 AHD EASTING: 338324 **NORTHING:** 6250648 **DIP/AZIMUTH:** 90°/--

BORE No: 212 **PROJECT No:** 84944.02 DATE: 18/9/2017 SHEET 2 OF 2

		Description	Degree c Weatherin	of na .≌	Rock Strength	Frac	cture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
RL	Depth (m)	of		raph.	Strength Low Low Medium High Very High	spa spa (r	ncing m)	B - Bedding J - Joint	Type	ore 2. %	RQD %	Test Results &
			ES M M E	щ С	Ex L Very Very	0.01	0.50	S - Shear F - Fault	Ê	ъğ	Ϋ́	Comments
24		SOIL NOT LOGGED (continued)										
23	11											
32	12											
	13											
21	14							Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
50	14.25			 								
	15	SANDSTONE - low then medium strength, slightly weathered, slightly fractured, light grey-brown medium grained sandstone						14.5m: J60°, pl, ro, cln ∖ 14.88-14.91m: Ds ∖ 14.95m: J60°, pl, ro, cln	с	100	96	PL(A) = 0.25 PL(A) = 0.6
	16	Bore discontinued at 15.8m - limit of investigation										
	17											
16 1 1	18											
	19											
<u> </u>	: DT25		. ER : GM			.OGGED:		Casing: HW	<u> </u>			

DRILLER: GM LOGGED: SI CASING: HW to 8.0m; HQ to 14.2m RIG: DT250 TYPE OF BORING: Hand tools to 0.8m; Solid flight auger (TC-bit) to 8.5m; Rotary (mud) to 14.25m; NMLC-Coring to 15.8m WATER OBSERVATIONS: No free groundwater observed whilst augering **REMARKS:**

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

	SAM	IPLIN	G & IN SITU TESTING	LEG	END								
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)								
1		Р	Piston sample		A) Point load axial test Is(50) (MPa)							Partners	
1	BLK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)	41.					-	Partners	
(Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		A 1 🗖	D Vu	<u> </u>		•	гаі шсі з	,
	D Disturbed sample	⊳	Water seep	S	Standard penetration test	·//			-				
1	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		- G	Geotechni	CS	l Env	iroı	nment Groundwater	r
-						 							

SURFACE LEVEL: 34.0 AHD **EASTING:** 338345 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 251 PROJECT No: 84944.02 DATE: 23/1/2018 SHEET 1 OF 3

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		Description	Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ	<u>ic</u>	Rock Strength	5	Fracture	Discontinuities	Sa			In Situ Testing
ᆋ	Depth (m)	of		Log	Strength	Vate	Spacing (m)	B - Bedding J - Joint	g	Core Rec. %	Q.,	Test Results
	(,	Strata	FIS N MW	ū	Very Lov Very Lov			S - Shear F - Fault	Type	ပိမ္မ	RO N %	& Comments
8	0.05	ASPHALT /		$\times \times$		Ħ			A			
	0.3	FILLING - brown, medium to coarse		\bigvee								
F I		sand filling with some roadbase gravel, humid				i			A			
F		SAND - light brown, fine sand with a										
5		trace of crushed sandstone gravel,										
33-	-1 1.0	humid (possible filling)				i	ii ii		A	1		4.5.5
E		SAND - medium dense, light brown, fine grained sand, moist							S			4,5,5 N = 10
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E				···:					S			5,7,9 N = 16
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`		SAND - dense, light brown, fine to medium grained sand							s			14,17,22 N = 39
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RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 10.0m; HQ to 20.2m

TYPE OF BORING: Solid flight auger (TC-bit) to 7.0m; Rotary to 20.2m; NMLC-Coring to 22.55m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	S	ampling	6 & IN SITU TESTING	3 LEGE	END			
А	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
В	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)			
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test ls(50) (MPa)		Dougla)(
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		Buddia	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			
E	Environmental samp	ole ₹	Water level	V	Shear vane (kPa)		Geotechnics El	nv



SURFACE LEVEL: 34.0 AHD **EASTING:** 338345 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 251 PROJECT No: 84944.02 DATE: 23/1/2018 SHEET 2 OF 3

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뷥	Depth (m)	of		Loc	Strength	Nat	(m)	B - Bedding J - Joint	Type	ore c. %	RQD %	Test Results &
7		Strata	F S S M A M A M A M A M A M A M A M A M A	0	FX L Very Very FX High	-	0.05 0.10 1.00	S - Shear F - Fault	F	ũã	Ϋ́ς	Comments
		SAND - dense, light brown, fine to medium grained sand <i>(continued)</i>							s			17,22,25
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												16,22,24
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									s			14,17,19 N = 36
<u> </u>	19.5	SANDSTONE - extremely low								-		
ĒĒ		strength, brown, medium grained sandstone										
ŀŀ		sandstone										

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 10.0m; HQ to 20.2m

TYPE OF BORING:Solid flight auger (TC-bit) to 7.0m;Rotary to 20.2m;NMLC-Coring to 22.55mWATER OBSERVATIONS:No free groundwater observed whilst augeringREMARKS:

SAMPLING & IN SIT	U TESTING LEGEND	
A Auger sample G Gas sample	e PID Photo ionisation detector (ppm)	
B Bulk sample P Piston sam		Douglas Partners
	e (x mm dia.) PL(D) Point load diametral test ls(50) (MPa)	Doudlas Partners
C Core drilling W Water sam		
D Disturbed sample ▷ Water seep		
E Environmental sample 📱 Water level	V Shear vane (kPa)	Geotechnics Environment Groundwater

SURFACE LEVEL: 34.0 AHD **EASTING:** 338345 **NORTHING:** 6250632 **DIP/AZIMUTH:** 90°/-- BORE No: 251 PROJECT No: 84944.02 DATE: 23/1/2018 SHEET 3 OF 3

$\begin{array}{c c c c c c c c c c c c c c c c c c c $	00 85	In Situ Testing Test Results & Comments PL(A) = 0.77 PL(A) = 1.57
20.2 SANDSTONE - medium and medium to high strength, moderately then moderately to slightly weathered, light grey and brown, medium to coarse grained sandstone 21.22m: B0°, fe, cly, 10mm 21.4m: J40°, pl, ro, fe, cly 22.03m: B10°, fe 21.22m: B0°, fe, cly, 10mm 21.4m: J40°, pl, ro, fe, cly 22.03m: B10°, fe 21.22m: B0°, fe, cly, 10mm 21.4m: J40°, pl, ro, fe, cly 22.03m: B1°, fe, cly, 10mm 22.17-22.26m: Ds 22.31m: J45° & 85°, st,		PL(A) = 0.77
20.2 SANDSTONE - medium and medium to high strength, moderately then moderately to slightly weathered, light grey and brown, medium to coarse grained sandstone 21.22m: B0°, fe, cly, 10mm 21.4m: J40°, pl, ro, fe, cly 10mm 21.4m: J40°, pl, ro, fe, cly 22.03m: B0°, cly, 10mm 22.17-22.26m: Ds 22.31m: J45° & 85°, st, 1000 1000 1000 1000 1000 1000 1000 10		PL(A) = 0.77
SANUS Forder - friedulin and medium to high strength, moderately then moderately to slightly weathered, light grey and brown, medium to coarse grained sandstone Image: Comparison of the strength of the strengt of the strength of the strength of the strengt	00 85	
222 22 22 22 22 22 22 22 22 22	00 85	PL(A) = 1.57
Image: Second second		
		PL(A) = 0.5
[Bore discontinued at 22.55m		
- limit of investigation		
$\begin{bmatrix} & & & & & & & \\ -\varphi - 24 & & & & & & \\ \end{bmatrix} \begin{bmatrix} & & & & & & & \\ + 1 & & & & & \\ -\varphi - 24 & & & & & \\ \end{bmatrix} \begin{bmatrix} & & & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & & \\ + 1 & & & \\ + 1 & & & \\ + 1 & & & \\ + 1 & & & \\ + 1 & & & \\ + 1 & & \\ $		
$\begin{bmatrix} 1 \\ -\infty \end{bmatrix} = \begin{bmatrix} 1$		
$\begin{bmatrix} & & & & & & \\ -\infty & -28 & & & & & \\ \end{bmatrix}$		

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 10.0m; HQ to 20.2m

TYPE OF BORING: Solid flight auger (TC-bit) to 7.0m; Rotary to 20.2m; NMLC-Coring to 22.55m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

SAM	PLIN	G & IN SITU TESTING	LEG	END											
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)											
B Bulk sample	Р	Piston sample	PL(A	A) Point load axial test Is(50) (MPa)											
BLK Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)	1	L°		77/					CT	ne	rc
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			Doug	41		5		a	G		J
D Disturbed sample	⊳	Water seep	S	Standard penetration test				•							
E Environmental sample	¥	Water level	V	Shear vane (kPa)			Geotechnic	8	ΙF	nvirc	nm	ent l	Gri	ound	vater
· · · · · · · · · · · · · · · · · · ·						_	000100111110					0 <i>11</i> 1	0/0	Jana	rato,

SURFACE LEVEL: 34.7 AHD **EASTING:** 338329 **NORTHING:** 6250618 **DIP/AZIMUTH:** 90°/-- BORE No: 252 PROJECT No: 84944.02 DATE: 22/1/2018 SHEET 1 OF 2

_										
		Description	Degree of Weathering Japa 2 & S & £ ⊕ Degree of Degree of Degree of Degree of Ueathering	Rock Strength	Fractu	ure Discor	ntinuities			In Situ Testing
묍	Depth (m)	of	aphone		ispaci Spaci (m)) B - Bedding	J - Joint	e e s	0	Test Results
	(11)	Strata	Gr Gr	Strength Kery High Medium Very High	0.00 0.10 0.10		F - Fault	Core %	RQD %	& Comments
H	0.05	ASPHALT /				11		A	·	Commenta
	.	FILLING - brown to red-brown, sand		\otimes						
		filling with some roadbase gravel		X				A		
-2			! ! ! ! !	凵!!!!!						
				\otimes						
[-1			🗙 i i i i i i	i ii	ii	<u> </u>	<u>A</u> _/		6.7.7
	1.3	SAND - medium dense, light brown		<u> </u>				s		6,7,7 N = 14
	:	to brown, fine to medium grained sand, slightly silty, moist					-			
-8	.	sand, slightly slity, moist								
	-2									
						ii l				
E										
33-								s		6,7,7 N = 14
								<u> </u>		N = 14
	-3						Γ			
[]										
-20										
	-4									
	.				l i ii	ii l		s		5,8,9
										N = 17
- 20			i i i i i		i ii	ii				
ſ										
	-5									
F							_	_		
8								s		6,10,11 N = 21
	-6						_			11 - 21
						ii l				
5										
-8-										
	7					ii	F	\neg		7.0.40
								s		7,8,12 N = 20
F F				.						
57										
t i	-8									
t t										
F,							F			10 11 13
26								s		10,11,13 N = 24
E	-9									
25										
E										

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 10.0m; HQ to 13.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 7.0m; Rotary to 13.0m; NMLC-Coring to 16.08m WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

SAME	PLIN	G & IN SITU TESTING	LEGF	END		
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B Bulk sample	Р	Piston sample) Point load axial test Is(50) (MPa)		Douglas Partners
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.	Doudlas Darthers
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D Disturbed sample	⊳	Water seep	S	Standard penetration test		
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
· · ·						

SURFACE LEVEL: 34.7 AHD **EASTING:** 338329 **NORTHING:** 6250618 **DIP/AZIMUTH:** 90°/--

BORE No: 252 PROJECT No: 84944.02 DATE: 22/1/2018 SHEET 2 OF 2

	Description	Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
Depth (m)	of	Vedulering	Log		Spacing (m)	B - Bedding J - Joint	e	e.	0	Test Result
(11)	Strata	Degree of Weathering ﷺ ≩ ≩ ਨੇ № ∰	<u>ق</u>	Very Low Very Low Meduum Meduum Very High Kater Katigh		S - Shear F - Fault	Type	ပိ ပိ	RQD %	& Comments
-11	SAND - medium dense, light brown to brown, fine to medium grained sand, slightly silty, moist (continued)						S			10,11,14 N = 25
11.3	SAND - dense, orange-brown, fine to medium grained sand with some clay (possibly extremely weathered sandstone)						s			10,12,23 N = 35
- 12						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
- 13 13.0 -	SANDSTONE - medium strength, slightly weathered then fresh, slightly fractured, light grey, medium grained sandstone					13.0-13.2m: J70°- 90°, cu/un, ro, cln, ti 13.33-13.37m: Cs 13.58m: B5°, fe				PL(A) = 0.
- 14						14.11-14.2m: B (x2) 0°- 5°, fe	с	100	97	
- 15						14.9m: B10°, cly vn, ti 15.78m: B0°, cbs co,				PL(A) = 0.8
- 16 - 16.08 -	Bore discontinued at 16.08m - limit of investigation					1mm ∖15.78m: J30°, pl, ro, cln _⁄				PL(A) = 0.5
- 17										
- 18										
- 19										
- - - -										

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

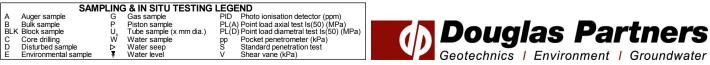
Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 10.0m; HQ to 13.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 7.0m; Rotary to 13.0m; NMLC-Coring to 16.08m WATER OBSERVATIONS: No free groundwater observed whilst augering **REMARKS:**



Geotechnics | Environment | Groundwater

SURFACE LEVEL: 26.6 AHD **EASTING:** 338358 **NORTHING:** 6250672 **DIP/AZIMUTH:** 90°/-- BORE No: 253 PROJECT No: 84944.02 DATE: 23 - 24/1/2018 SHEET 1 OF 2

Π		Description	Degree of Weathering ™ ₹ ≸ § © ₩ ₩	Rock Strength	Fracture	Discontinuities	Sa	ampling &	In Situ Testing
ᆋ	Depth (m)	of		Strength Mater Nation No. 100 Conception No. 100 Co	Spacing (m)	B - Bedding J - Joint	e	Rec. %	Test Results
	(11)	Strata	Gr Gr Gr	Ex Low Very Low Medium Very High Very High Ex High	0.10	S - Shear F - Fault	Type	S S S S	& Comments
26	0.6 -	FILLING - dark grey, fine grained silty sand filling, humid							
ĒĒ	1	SAND - loose, light grey, fine to medium grained sand, moist					S		1,2,2 N = 4
25	2 2.0	SAND - medium dense, light							N - 4
24		grey-brown, fine to medium grained sand					S		4,5,7 N = 12
	3						3		N = 12
23	4						S		6,8,10 N = 18
	5								IN - 10
	6						S		7,11,15 N = 26
20	7								
							S		6,11,16 N = 27
18 1 1 1	8 8.0-	SAND - dense, light brown, medium grained sand, slightly silty, with a trace of organic clay					S		8,14,25 N = 39
	9								N = 39

RIG: XC

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: Terratest

LOGGED: SI/RB

CASING: HQ to 10.0m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 1.5m; Rotary to 16.18m; NMLC-Coring to 18.43m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 No free groundwater observed whilst augering

	SAM	IPLIN	3 & IN SITU TESTING	LEG	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
B	Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
B	LK Block sample	U,	Tube sample (x mm dia.)	PL(I	D) Point load diametral test Is(50) (MPa)		Nuninise Partnere
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		Douglas Faithers
	Disturbed sample	⊳	Water seep	S	Standard penetration test	11	
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
-						 	

SURFACE LEVEL: 26.6 AHD EASTING: 338358 **NORTHING:** 6250672 **NORTHING:** 6250672 **DIP/AZIMUTH:** 90°/--

BORE No: 253 PROJECT No: 84944.02 **DATE:** 23 - 24/1/2018 SHEET 2 OF 2

	Description	Degree of	Rock	Fracture	Discontinuities	6	amoli	na 8. I	n Situ Testing
Dept		Degree of Weathering	Strength	Spacing					Test Results
(m)	Strata	ER Sw MW FR Gra	Strength Strength High Wedium Wedium High Strength	0.01 0.10 0.100 1.00 1.00	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec.	RQD %	Comments
	SAND - dense, light brown, medium grained sand, slightly silty, with a trace of organic clay <i>(continued)</i>		<u> </u>			s			10,15,25 N = 40
₽ - - 11 11 -	1.0 SAND - very dense, light brown, fine to medium grained sand								
<u>e</u> - -						s			16,33,43 N = 76
- 12 - - -									
- 13						s	_		17,23,32 N = 55
2									
- 14 - - -							-		15,30/140mr
- 15						S	-		refusal
-					Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
-16 16	SANDSTONE - very low strength,					S	-		30,30/35mm
- 16.	¹⁸ light brown and orange-brown, medium grained sandstone SANDSTONE - medium strength, highly and slightly weathered, slightly fractured, light grey-brown,				16.6m: B20°, cly, 5mm				refusal PL(A) = 0.75
- 17	and very low strength bands				16.83m: B20°, cly co, 2mm 16.94m: B0°, cly, 5mm 17.0-17.2m: Ds	с	100	78	
- 18					17.55-17.6m: Cs 17.64 & 17.85m: B (x2) 10°, cly vn, ti				PL(A) = 0.83
- - - -	43 Bore discontinued at 18.43m - limit of investigation			 + + + + + + + +	18.18-18.21m: Cs				PL(A) = 0.9
- 19									
XIG: XC	C DRILL	.ER: Terratest	 	OGGED: SI/RB	CASING: HG	to 10).0m		

DRILLER: Terratest RIG: XC TYPE OF BORING: Solid flight auger (TC-bit) to 1.5m; Rotary to 16.18m; NMLC-Coring to 18.43m WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

	SAM	PLING	3 & IN SITU TESTING	LEGE	END
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
В	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test ls(50) (MPa)
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)

Douglas Partners Geotechnics | Environment | Groundwater

CLIENT: PROJECT:

Cranbrook School Additional Investigation LOCATION: Victoria Road, Bellevue Hill

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

CLIENT:

PROJECT:

 SURFACE LEVEL:
 25.8 AHD

 EASTING:
 338334

 NORTHING:
 6250671

 DIP/AZIMUTH:
 90°/-

BORE No: 254 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 1 OF 2

			Degree of		Rock		Freeture	Disect	tiouition	0			
	Depth	Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ፼ ፼	à hic	Very Low Very High Very High Ker High Ker High Ker High Ker High Ker High Ker High Ker High Ker High Ker	D	Fracture Spacing		tinuities		-		In Situ Testing Test Results
뭑	(m)	of		с g		_ <	(m)	B - Bedding S - Shear	J - Joint F - Fault	Type	Sore	RQD %	&
		Strata	H M S S H M S S H M S S H M S S S S S S	<u> </u>		0.01	0.05 0.10 1.00	5 - Sriear	F - Fault	-	0 8	Ľ.	Comments
	-	SILTY SAND - dark brown, fine silty sand, dry		·i·i		ľ							
F				$\cdot \cdot $									
	- 0.5	SAND - very loose, grey, fine grained sand, dry											
25	-	granied sand, dry											
	- 1					l							112
È Ì	-			••••		Ì	11 11			S			1,1,2 N = 3
E						l							
24	-					Ì	11 11						
F F	- -2 2.0			<u> </u>									
	-	SILTY SAND - medium dense, dark brown, fine grained silty sand		·[·]		j	ii ii						
[]				• [•]									
ŀ	-			$\cdot \cdot $		ļ	ii ii			s			4,6,6
23				$\cdot \cdot $									N = 12
Ē	-3			$\cdot \cdot $		li.	ii ii						
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	-			$\cdot \cdot $		li	ii ii						
52	-			$\cdot \cdot $									
	-4 -4 4.1			• • •		į							
ŀ		SAND - medium dense, pale yellow, fine grained sand								S			5,10,13 N = 23
ŀ	-					į	11 11						
5	-												
	- -5 5.0			<u></u>		Ì	ii ii						
	-	SAND - dense, pale yellow, fine grained sand				l							
Ē						Ì	11 11						
	-									s			8,13,18
-2	-												N = 31
Ē	-6					ľ							
	-												
	-					ľ							
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	-7										-		40.47.04
 	-									s			10,17,21 N = 38
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[]						ľ	11 11						
ŧ.	-									s			11,18,20 N = 38
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 	-												
-9	-					l	ii ii						
ш													

RIG: XC

DRILLER: Terratest

LOGGED: SI/RB/LJH

CASING: HQ to 12.5m

TYPE OF BORING: Solid flight auger (TC-bit) to 1.45m; Rotary to 12.7m; NMLC-Coring to 15.4m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

ĺ	SAM	PLIN	G & IN SITU TESTING	LEG	END	1	
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
	B Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		Douglas Partners
	BLK Block sample	U,	Tube sample (x mm dia.)	PL([D) Point load diametral test Is(50) (MPa)		Dolidiae Parthere
	C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
	D Disturbed sample	⊳	Water seep	S	Standard penetration test		
	E Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotechnics Environment Groundwater
•	· · · · ·				· · · ·		

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

SURFACE LEVEL: 25.8 AHD **EASTING:** 338334 **NORTHING:** 6250671 **DIP/AZIMUTH:** 90°/-- BORE No: 254 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 2 OF 2

Τ		Description	Degree of	Rock Strength	Fracture	Discontinuities	0	amoli	na 8.	In Situ Testing
뉟	Depth	Description of	Weathering	Strength	Spacing					
	(m)	Strata	Degree of Weathering	Strength Nedium Nedium Nedium Nedium Nedium Nedium	0.100 0.100 1.000 0.50 (W)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQC %	& Comments
15	·11	SAND - dense, pale yellow, fine grained sand <i>(continued)</i>					S			11,21,24 N = 45
14	11.5 · · 12	SANDSTONE - extremely low strength, brown, medium grained sandstone				Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S			17,30,30/130mr refusal
12 13	12.7 ·	SANDSTONE - low to medium and medium strength, highly to moderately weathered then fresh, slightly fractured, light grey and brown, medium to coarse grained sandstone with some extremely low and very low strength bands				12.88-12.92m: Ds 13.42m: B5°, cly co, 2mm 13.58m: B0°, fe				PL(A) = 0.3 PL(A) = 0.45
11	· 14 · 15					14.07m: B20°, cly vn,m ti 14.4m: B10°, fe 14.45m: J45° & 70°, st, ro, fe 14.55-14.57m: Ds 14.65-14.72m: Cs	С	100	91	PL(A) = 0.32 PL(A) = 0.91
10 10 10 10 10 10 10 10 10 10 10 10 10 1	15.4 - • 16	Bore discontinued at 15.4m - limit of investigation								
8	· 17									
	19									

 RIG: XC
 DRILLER: Terratest
 LOGGED: SI/RB/LJH

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 1.45m; Rotary to 12.7m; NMLC-Coring to 15.4m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:

SAMPLING & IN SITU TESTING LEGEND A Auger sample G Gas sample Plo B Bulk sample P Piston sample Pl(A) Point bad axial test Is(50) (MPa) BLK Block sample U Tube sample (x mm dia.) PL(A) Point bad axial test Is(50) (MPa) C C core drilling W Water sample P Pocket penetrometer (kPa) D Disturbed sample P Water seep S Standard penetration test E Environmental sample Water level V Shear vane (kPa)

SURFACE LEVEL: 16.4 AHD **EASTING:** 338382 **NORTHING:** 6250756 **DIP/AZIMUTH:** 90°/-- BORE No: 256 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 1 OF 2

		Description	Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
ᆋ	Depth (m)	of		Log	Very Low Very Low Nedium High Ex High Ex High Ex High	Spacing (m)	B - Bedding J - Joint	Type	. %	RQD %	Test Results
	(,	Strata	FIS N M M M M M M M M M M M M M M M M M M	Ū	Ex Lov Very L Mediu Ex High 0.01	0.100	S - Shear F - Fault	Ϋ́	ပိမ္မ	SR %	& Comments
16	0.4	FILLING - dark grey-brown, silty sand filling with a trace of fine		\bigotimes				A			
	0.8	grained sand with a trace of roadbase gravel, humid (possible filling)						A	-		
15	1.5	SAND - very loose, brown, fine to medium grained sand, moist						S	-		1,0,2 N = 2
	2	SAND - loose, grey, fine sand with some silt, moist									
14											
	3							S	-		1,2,2 N = 4
13	-										
iż	4 4.0	SAND - medium dense, light grey then yellow-brown, fine to medium grained sand, moist						s	-		4,4,6 N = 10
	5										
;=								s	-		4,6,9 N = 15
10	6										
	7							S	-		4,8,12 N = 20
8	8 8.0	SAND - medium dense, brown, medium grained sand, slightly silty									
	9							S			8,13,15 N = 28
, , , , , , , , , , , , , , , , , , ,											

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 7.0m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 7.0m;
 Rotary to 11.5m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:

	SAMP	PLIN	G & IN SITU TESTING	LEG	END								
	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)								
	3 Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)							Partn	
	3LK Block sample	U,	Tube sample (x mm dia.)	PL(C	0) Point load diametral test ls(50) (MPa)	11		78				Partn	org
	C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		Puu	11		20		гаі ш	CI J
	D Disturbed sample	⊳	Water seep	S	Standard penetration test	11	-						
	E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	s	1	Fnvi	iroi	nment Groui	ndwater
-							000100111100	-	÷.,				, an aron

SURFACE LEVEL: 16.4 AHD **EASTING:** 338382 **NORTHING:** 6250756 **DIP/AZIMUTH:** 90°/-- BORE No: 256 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 2 OF 2

_											
		Description	Degree of Weathering Degree of Ugp Jic Ugp Jic Ugg Ji		Rock Strength	Fracture	Discontinuities			-	n Situ Testing
Ъ	Depth (m)	of	aph	2 8	ate ate	Spacing (m)	B - Bedding J - Joint	е	е %	D	Test Results
	(11)	Strata	Gr Ss W H W	5-	Ex Low Very Low Medium High Ex High Ex High Ex High	0.05 0.10 0.50 1.00	S - Shear F - Fault	Type	Core Rec. %	RQ %	& Comments
	_	SAND - medium dense, brown,				1 11					
ŧ	-	medium grained sand, slightly silty (continued)						S			9,11,14 N = 25
-9	-	(commed)									
F	-										
E											
Ł		CLAYEY SAND - medium dense, orange-brown, medium grained		·/.,							
-2	-	clayey sand		·/.							
È	-			·/.		ii ii					13,10,9
F	-			·/.				S			N = 19
Ē	- 12 ^{11.95}	Bore discontinued at 11.95m									
E	_	- limit of investigation									
-4	-										
ŧ	-										
Ē	- 12										
E	- 13										
ŧ	-					ii ii					
F	-										
Ē	-14					ii ii					
E	_										
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RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 7.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 7.0m; Rotary to 11.5m **WATER OBSERVATIONS:** No free groundwater observed whilst augering **REMARKS:**

		SAMP	LINC	3 & IN SITU TESTING	LEGE	IND								
	A Augers	ample	G	Gas sample	PID	Photo ionisation detector (ppm)								
	B Bulk sa	nple	Р	Piston sample) Point load axial test Is(50) (MPa)			_ /					
	BLK Blocks	ample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)				26		/ar	The	Arc
	C Core d	illing	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		Doug		$a_{\mathbf{J}}$				<i>,</i> J
	D Disturb	ed sample	⊳	Water seep	S	Standard penetration test	11		· .					
	E Enviror	mental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	1	Envir	onm	ient	Ground	lwater
•								22220000000					u	

SURFACE LEVEL: 16.3 AHD **EASTING:** 338302 **NORTHING:** 6250763 **DIP/AZIMUTH:** 90°/-- BORE No: 257 PROJECT No: 84944.02 DATE: 25/1/2018 SHEET 1 OF 2

		Description	Degree of Weathering ≞ ≩ ≩ ≳ ഇ ഇ	0	Rock Strength	re Discontinuities	Sa	ampli	ng & I	n Situ Testing
님	Depth	of	vveathering	hide bo	Strength a Spacir	ng				-
	(m)	Strata	H H K M K F S K	_ بق _	Strength Mean Mean Mean Mean Mean Mean Mean Mean	S - Shear F - Fault	Type	ပ္က ပ္လ	RQD %	& Comments
		FILLING - brown, fine grained silty					A			Continionto
9	0.4	sand filling, humid					A			
	0.4	SAND - loose, grey-brown, fine to medium grained sand, slightly silty,					<u> </u>	1		
		moist					A			
	1							-		
15							s			2,2,3 N = 5
Ē										
						ii l				
	2									
4										
							s			1,1,1 N = 2
	3							-		N - 2
-2-										
: -										
	4									
	4						s			2,4,4
-9-	4.5									N = 8
	4.5	SAND - medium dense, light grey to light grey-brown, fine to medium				ii l				
	_	grained sand, moist								
	5									
								1		3,6,10
							s			N = 16
-	6]		
<u>e</u>										
	6.5	SANDSTONE - very low strength,								
		grey-brown, fine to medium grained sandstone								
	7 7.05	SANDSTONE - medium to high then					s	-		20/20mm refusal
- - 0		high strength, slightly weathered then fresh, slightly fractured and				 7.31m: B20°, pl, ro, fe				PL(A) = 0.93
		unbroken, light grey, medium								FL(A) = 0.95
		grained sandstone								
E	8									
										PL(A) = 1.04
							с	100	100	1 L(r.y = 1.04
	9									
										PL(A) = 1.3

RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 7.0m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 7.0m; Rotary to 7.05m; NMLC-Coring to 12.2m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 No

	S	SAMPLING	& IN SITU TESTING	G LEGE	ND		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)		
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test ls(50) (MPa))	
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sam	ple 📱	Water level	V	Shear vane (kPa)		



SURFACE LEVEL: 16.3 AHD **EASTING:** 338302 **NORTHING:** 6250763 **DIP/AZIMUTH:** 90°/-- BORE No: 257 PROJECT No: 84944.02 DATE: 25/1/2018 SHEET 2 OF 2

Г	1		Description	Degree of Weathering ﷺ ≩ ≩ ଛ ଝ ଝ		Rock Strength	Fracture	Discontinuities	Sa	amnli	na &	In Situ Testing
R		Depth	Description of	Weathering	phic 2g	Strength Medium High EXLow Low Medium High EXLow Medium Mediu	Spacing					
ľ		(m)	Strata	222200	Ľ g	Ex Low Very Lov Medium Ex High Ex High	(m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core	RQD %	&
╞	-		SANDSTONE - medium to high then	H H N N N N N N N N N N N N N N N N N N						<u>Ľ</u>	-	Comments
- 9		11	high strength, slightly weathered then fresh, slightly fractured and unbroken, light grey, medium grained sandstone <i>(continued)</i>					10.84m: B0°, cly co,				PL(A) = 1.4
								2mm 11.57m: B5°, cbs cly,	С	100	100	PL(A) = 1.4
ŀ	Ę,	12						1mm				
-4	-	12.2 -	Bore discontinued at 12.2m - limit of investigation									
F	[C C									
	F	13										
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RIG: Scout 4

CLIENT:

PROJECT:

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

DRILLER: RKE

LOGGED: SI

CASING: HW to 7.0m

 TYPE OF BORING:
 Solid flight auger (TC-bit) to 7.0m; Rotary to 7.05m; NMLC-Coring to 12.2m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:
 No

		SAMP	LINC	3 & IN SITU TESTING	LEGE	IND								
	A Auger	sample	G	Gas sample	PID	Photo ionisation detector (ppm)								
	B Bulks		Ρ	Piston sample) Point load axial test Is(50) (MPa)		Dou			-			
	BLK Block	sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.						rt n	IOTS
	C Core of	rilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)			H I			Га		
	D Distur	ed sample	⊳	Water seep	S	Standard penetration test	11							
	E Enviro	nmental sample	Ŧ	Water level	V	Shear vane (kPa)		deotechnic	S	I En	viro	nment	I Grou	undwater
•							 		•				, 0,00	and an area

Cranbrook School

LOCATION: Victoria Road, Bellevue Hill

Additional Investigation

CLIENT:

PROJECT:

SURFACE LEVEL: 16.1 AHD **EASTING:** 338339 **NORTHING:** 6250822 **DIP/AZIMUTH:** 90°/-- BORE No: 258 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 1 OF 2

	Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities				n Situ Testing
Depth (m)	of	Degree of Weathering ﷺ ≩ ≩ ଲ ଝ ੴ	Strength Ker Low Low Medium Medium Medium Ker High	Spacing (m)	B - Bedding J - Joint	Type	sre %	RQD %	Test Result
()	Strata	M M M M M M M M M M M M M M M M M M M	Ex Lo Very I Medit	0.01 0.50 0.50	S - Shear F - Fault	<u>≻</u>	с я	R ~	& Comments
	FILLING - dark grey to black, fine silty sand filling with a trace of concrete gravel, damp					A			
1	SAND - very loose then loose, dark grey and light brown, fine sand with some silt, moist (possible filling)					S	-		3,0,1 N = 1
2									
3						s	-		1,1,1 N = 2
4									
4						S			1,1,1 N = 2
5 5.3	SAND - loose to medium dense, orange-brown, fine to medium sand with a trace of organic clay, wet					S	-		1,2,4 N = 6
7						s	-		1,4,6 N = 10
8							-		N - 10
9						s	-		8,9,9 N = 18
9.45	SANDSTONE - very low strength, orange-brown, fine to medium grained sandstone					s			20/20mm

WATER OBSERVATIONS: No free groundwater observed whilst augering REMARKS:

	SAM	PLIN	3 & IN SITU TESTING	LEGEND	
A	Auger sample	G	Gas sample	PID Photo ionisation detector (ppm)	
В	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)	Douglas Partners
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	Dolidiae Partnere
С	Core drilling	Ŵ	Water sample	pp Pocket penetrometer (kPa)	
D	Disturbed sample	⊳	Water seep	S Standard penetration test	
E	Environmental sample	Ŧ	Water level	V Shear vane (kPa)	Geotechnics Environment Groundwater
	· · · · ·				

Cranbrook School

Additional Investigation

Victoria Road, Bellevue Hill

CLIENT: PROJECT:

LOCATION:

SURFACE LEVEL: 16.1 AHD **EASTING:** 338339 **NORTHING:** 6250822 **DIP/AZIMUTH:** 90°/-- BORE No: 258 PROJECT No: 84944.02 DATE: 24/1/2018 SHEET 2 OF 2

Rock Degree of Weathering Fracture Sampling & In Situ Testing Discontinuities Description Graphic Strength Spacing Water Depth Core Rec. % RQD % 8 Very Low Low Medium Very High Ex High Test Results 뉟 of Type B - Bedding J - Joint (m) (m) 8∣ & S - Shear F - Fault Strata 0.05 Comments SANDSTONE - medium strength, moderately to slightly weathered, slightly fractured, light grey-brown to red-brown, medium grained 10.02 refusal sandstone PL(A) = 0.5410.85 10.8m: CORE LOSS: Ť 11 10.95 50mm С 97 94 10.85-10.9m: Cs 10.9m: CORE LOSS: 50mm 11.05-11.08m: Cs 11.4m: J45°, un, ro, fe 11.5-11.9m: some coarse sand and PL(A) = 0.7quartz gravel 11.85m: J45°, pl, ro, fe 11.9-11.93m: some ¹² 12.08 PL(A) = 0.81 Bore discontinued at 12.08m quartz gravel - limit of investigation 1 I I 1 I I I T 13 14 I 15 16 T 17 18 19 Т

RIG: Explora 130

DRILLER: JS

LOGGED: SI

CASING: HQ to 10.0m

 TYPE OF BORING:
 Solid flight auger (T-bit) to 10.02m;
 NMLC-Coring to 18.08m

 WATER OBSERVATIONS:
 No free groundwater observed whilst augering

 REMARKS:

	SAM	PLIN	G & IN SITU TESTING								
1	A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
E	Bulk sample	P	Piston sample) Point load axial test Is(50) (MPa)		Doug				-
16	BLK Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is(50) (MPa)	1.1		125			ITS.
0	C Core drilling	W	Water sample	рр	Pocket penetrometer (kPa)			1143	– –		
1	Disturbed sample	⊳	Water seep	S	Standard penetration test		_				
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geotechnics	s Envir	onment	Groundv	Nater





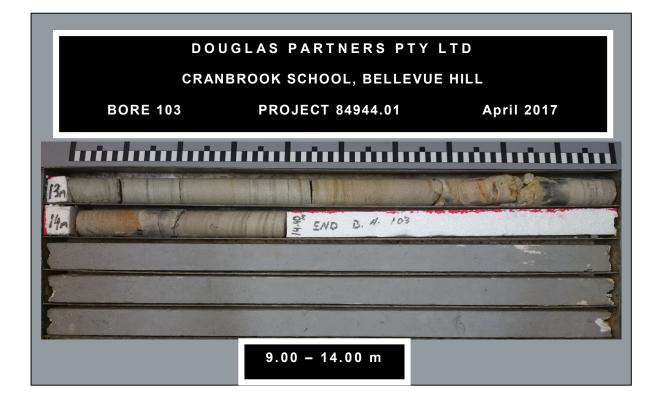






BORE: 102	PROJECT: 84944.01	APR 2017
Douglas Partner Geotechnics Environment Groundwat	Core Box No.: 2	
Б <u>л</u> 17. актори (11. 11. 11. 11. 11. 11. 11. 11. 11. 11	ENR B.H 10	2
	in in	
	16.0 – 17.45m	

			PARTNERS SCHOOL, BE			
BC	ORE 103		JECT 84944.		-∟ April 2017	
		T KC				l
		duin	hundhun		<u>a ha ha a</u>	
84944.01 B	is with the	R.H 103	Start Carie 8:50			
9m						
10-	444					
16-				<u>I III III</u>		
12-11						
		4	.90 – 9.00 m			



BOR	RE: 104	PROJE	CT: 8494	4.01	APR 2017	
	las Partn Environment Grour	(Core Box No.:	84944.01 0 - 10.00m 1		
84944.01	CRAN BROD	K SCHOQL	BH 104	START : 6.8	in U-	
		111	1		-	
1m						
		6.8 -	- 10.0m			

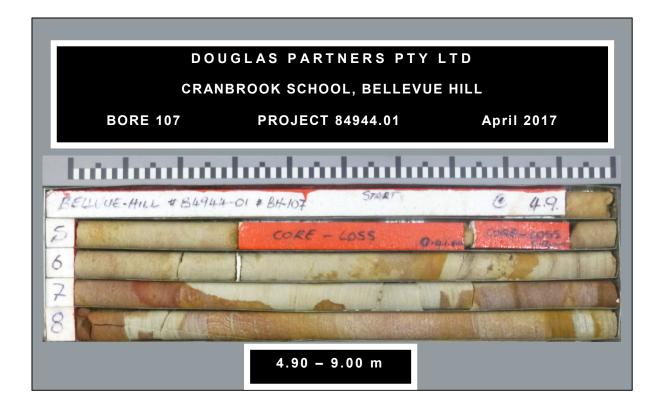
	BORE: 104	PROJ	ECT: 84944.01	APR 201	7
	Douglas Partne Geotechnics Environment Ground		Project No: 8494 BH ID: 104 Depth: 10.00 – Core Box No.: 2	4.01 12·40	
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2m			and a second	A	
			and the second		
		_			
		10).0 – 12.4m		

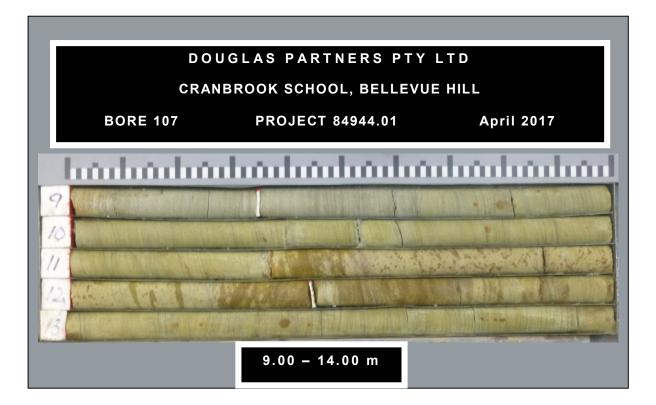
	E: 105	PROJECT	: 84944.01	APR 2017	,
		ers BH Dep Cor	ject No: 84944. ID: 105 tht: 13.00 - 15. e Box No.: 2		
34944.01 Beller	vue Hill BH	105 Start	Core \$ 4.1m -	- 15.48 m	a sta
om Start 41m	and all				
	Mr. all				P & VI
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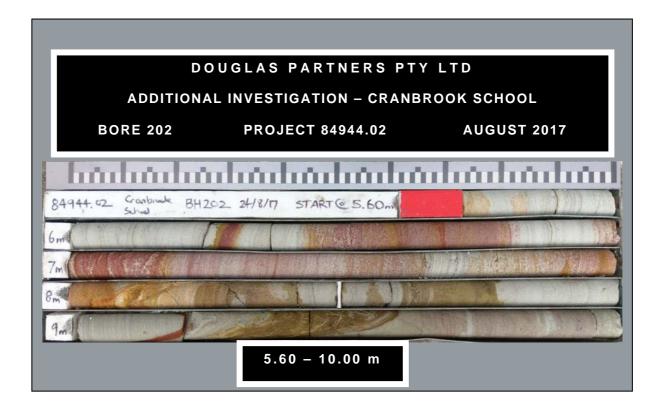
BORE: 105	PROJECT: 84944.01	APR 2017
Douglas Partne	Core Box No.: 2	
<u>*</u>		
	8.0 - 13.0m	

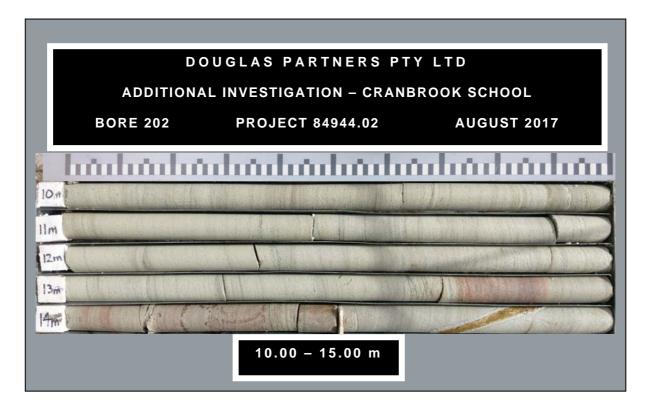




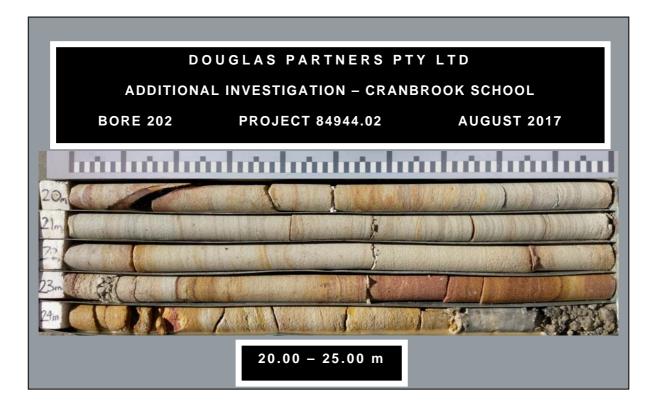






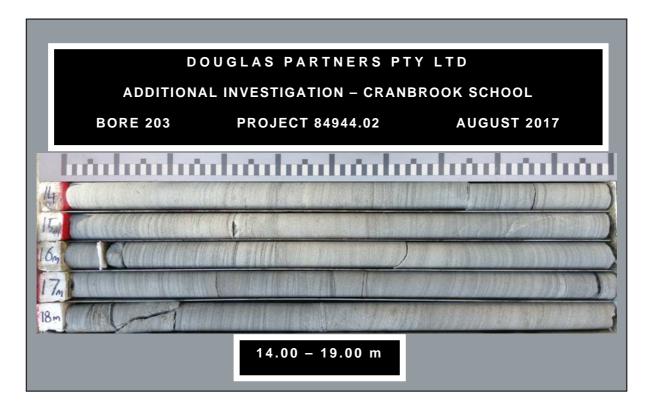


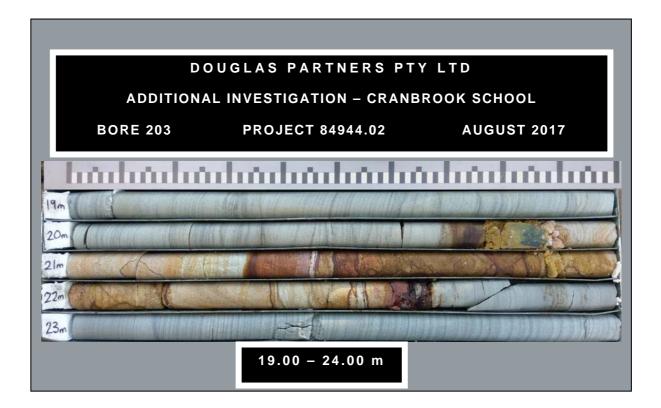


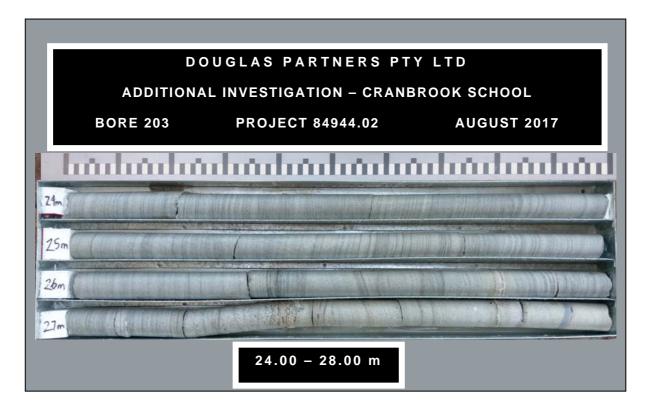




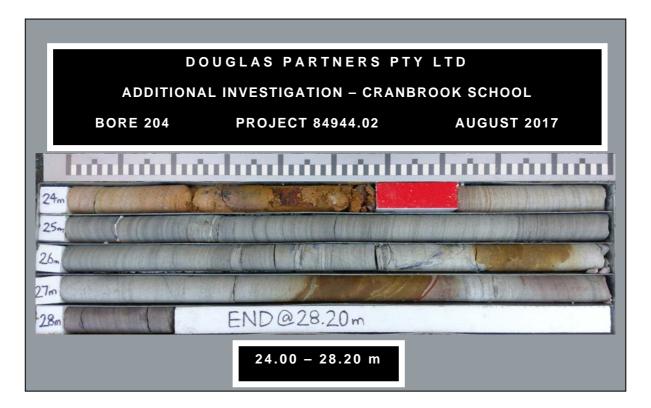


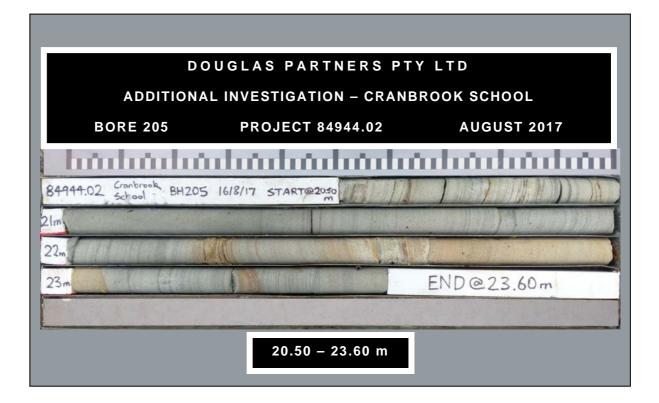




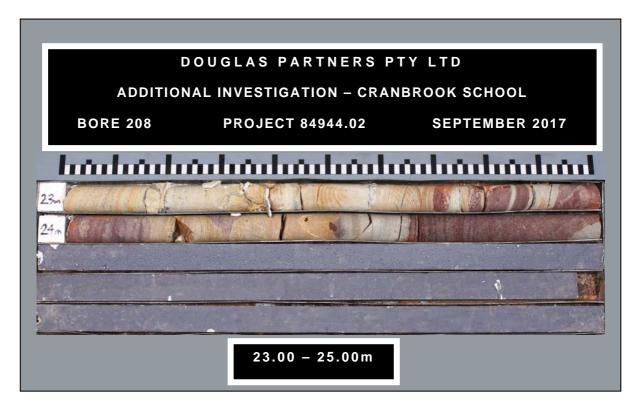


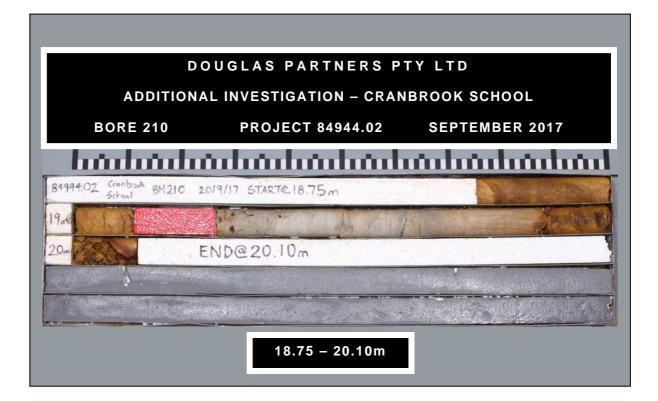


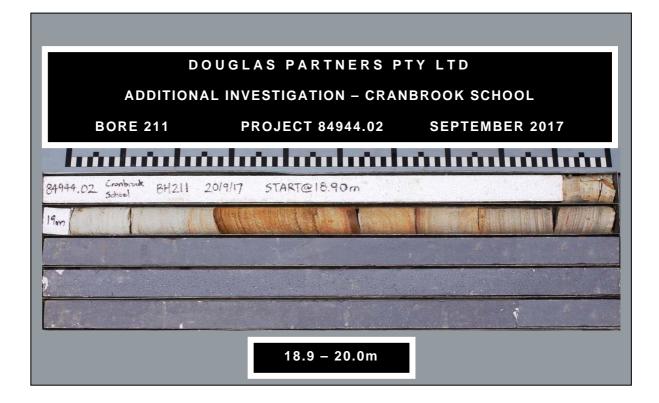


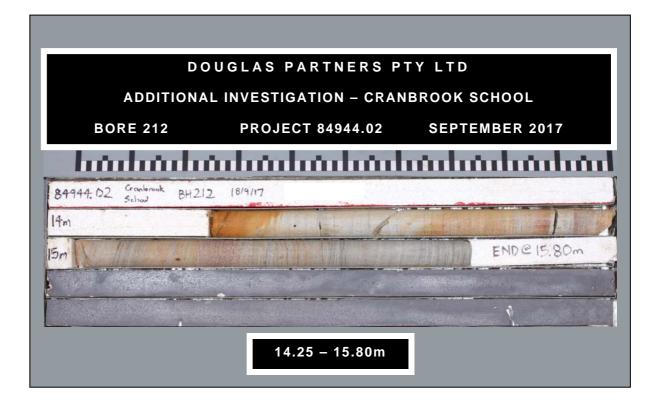














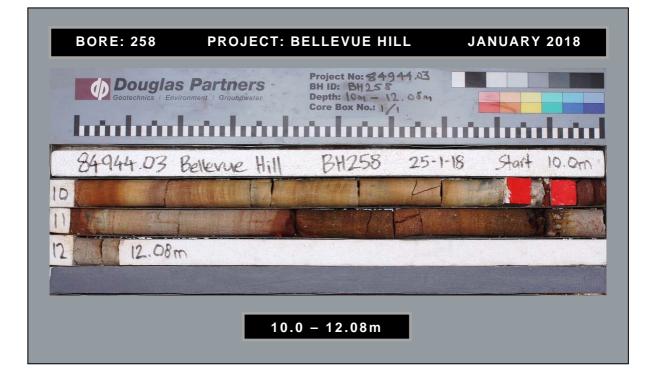












Appendix D

CPT Results

CLIENT: CRANBROOK SCHOOL

PROJECT: STAGE 1 DEVELOPMENT

LOCATION: VICTORIA ROAD, BELLEVUE HILL

REDUCED LEVEL: 16.50

COORDINATES:

CPT1 Page 1 of 1 DATE 1/7/2015

PROJECT No: 84944

		Cone Resistance q _c (MPa)						Sleeve Friction f _s (kPa)									Friction Ratio R _f (%)					
Depth (m)	C	2 1	, 0 2 1	20 3 T 2.0 3	0 4 	0 50	0	100	200	300	0 4	00	500	Soil Behaviour Type		0 2	4	6 8	10	Dep (m)		
(m) 0 1 -	0.	.0 1	.0 2	2.0 3	.0 4	.0 5.0								SILTY SAND and SAND: Loose		$\left\{ \right\}$				(m)		
2 -			States of										_			~				- 2		
3 -	×⊡				<u> </u>	10000000000000000000000000000000000000								CLAY: Firm to Very Stiff	3.69					- 3		
4 - 5 -		End at 4.	18m q _c :	= 60.2											4.18		~			- 4		
6 -																				- 6		
7 -																				-7		
8 - 9 -																				- 9		
10 -																				- 1		
11 -																				- 1		
13 -																				- 1		
14 -													_							- 1		
15 -																				-1		
16 - 17 -																				- 1		
18 -																				- 1		
19 - 20 -																				-1		

REMARKS: HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; GROUNDWATER OBSERVED AT 3.7 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P\84944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT1.CP5
Cone ID: 120631
Type: I-CFXY-10

ConePlot Version 5.9.1 © 2003 Douglas Partners Pty Ltd **Douglas Partners** Geotechnics | Environment | Groundwater

CLIENT: CRANBROOK SCHOOL

PROJECT: STAGE 1 DEVELOPMENT

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VICTORIA ROAD, BELLEVUE HILL LOCATION:

REDUCED LEVEL: 16.10

COORDINATES:

CPT2 Page 1 of 1

DATE 1/7/2015 PROJECT No: 84944

Cone Resistance q_c (MPa) Sleeve Friction Friction Ratio f_s (kPa) R_f (%) 2 10 0 10 20 30 40 50 0 100 200 300 400 500 ò 4 6 8 Depth (m) Depth Soil Behaviour Type 2.0 4.0 (m) 1.0 30 5.0 0.0 г0 SAND and SILTY SAND: Loose 2 3.74 SAND: Loose to Medium Dense 6 8 9.71 SAND: Dense 10.05 10 CLAY and CLAYEY SAND: Very Stiff to Hard 11 11.00 End at 11.00m q_c = 63.6 12 13 14 15 16 17 18 19

REMARKS: HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; GROUNDWATER OBSERVED AT 9.4 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\84944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT2.CP5 Cone ID: 120631 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: STAGE 1 DEVELOPMENT

LOCATION: VICTORIA ROAD, BELLEVUE HILL

REDUCED LEVEL: 16.60

COORDINATES:

CPT3 Page 1 of 1

DATE 1/7/2015

PROJECT No: 84944

ç	Cone Resi q _c (MPa)	2	0 3	30 4	10 5	50 C	Sleeve f _s (kPa)	00	200	300	40	0	500			0 0	ction F (%) 2 4	6	8 1
0.	0 1.0	2	0 3	8.0 4		1 1 5.0								Soil Behaviour Type					
	3	and a second second second second second second second second second second second second second second second]	2							CLAYEY SAND: Loose			>		
	\sum				•••••••		5							SAND: Medium Dense	0.47	1			
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		لسح							\geq										
<u>Z</u>	End at 6.08	m a ₂ -	22.6						>					SILTY CLAY: Very Stiff to Hard	5.84	-	P	+	+
		·· 40 -																	
						$\left \right $							_				+	+	+
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				<u> </u>									-			-	+	+	+
				<u> </u>									_				$\left \right $	\square	
]							1						
				1												1			

REMARKS: HOLE DISCONTINUED DUE TO BENDING; GROUNDWATER OBSERVED AT 5.9 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P\%4944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT3.CP5
Cone ID: 120631
Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: STAGE 1 DEVELOPMENT

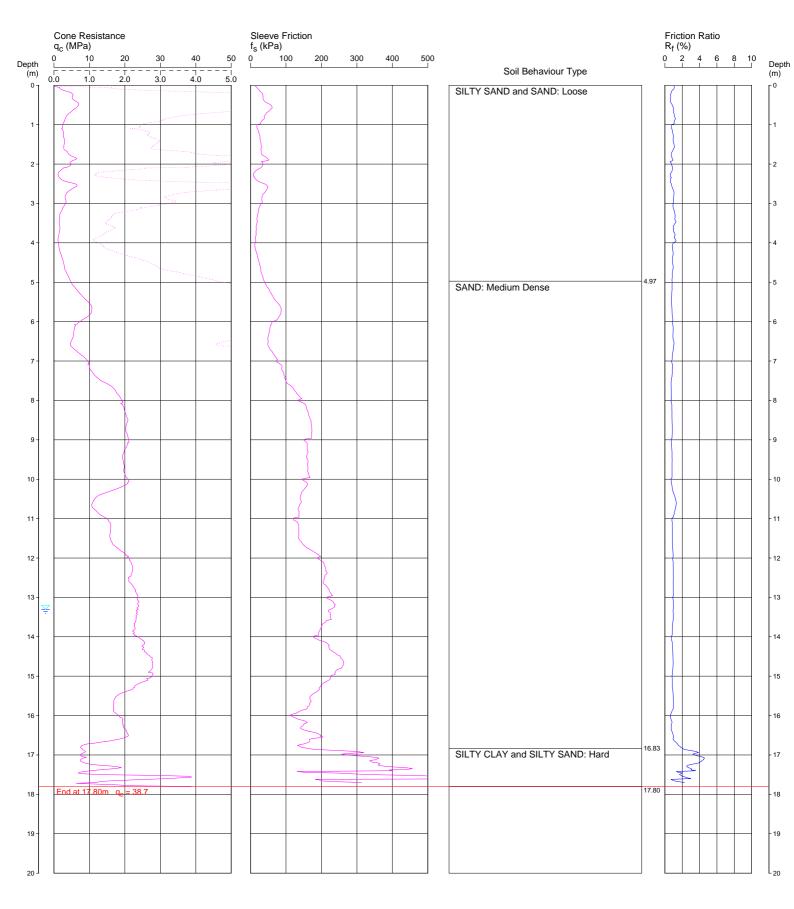
LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT4 Page 1 of 1

DATE 1/7/2015 PROJECT No: 84944

COORDINATES:

REDUCED LEVEL: 16.35



REMARKS: HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; HOLE COLLAPSE AT 13.3 m AFTER WITHDRAWAL OF RODS.

 File:
 P:\84944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT4.CP5

 Cone ID:
 120631
 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

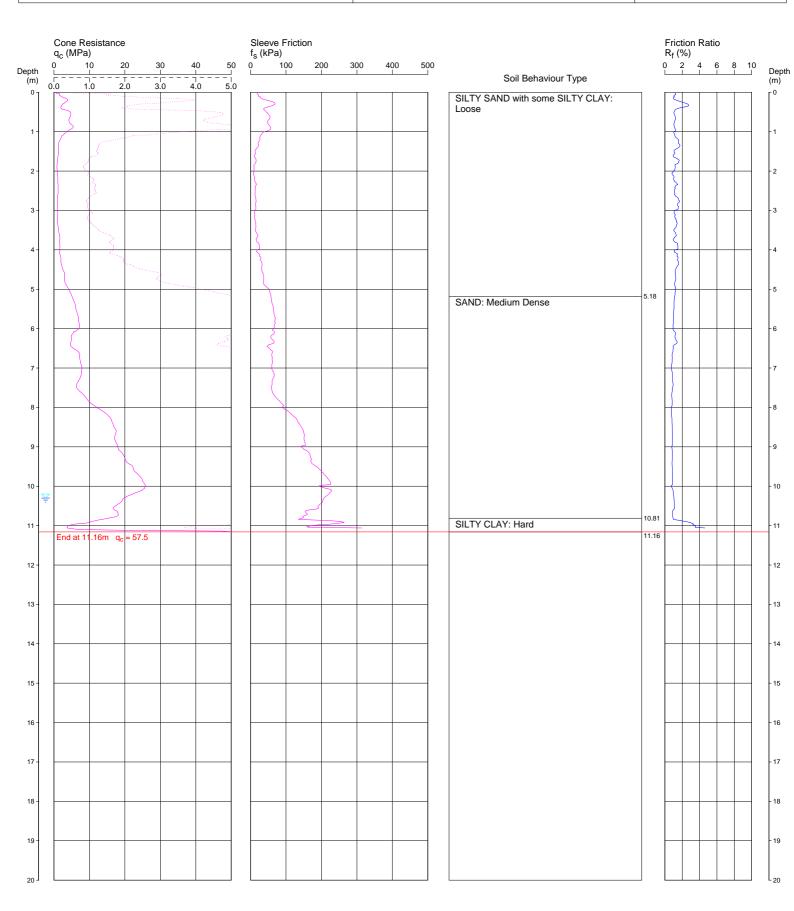
PROJECT: STAGE 1 DEVELOPMENT

VICTORIA ROAD, BELLEVUE HILL LOCATION:

CPT5 Page 1 of 1 DATE 1/7/2015

PROJECT No: 84944

REDUCED LEVEL: 16.40



REMARKS: HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; HOLE COLLAPSE AT 10.3 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\84944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT5.CP5 Cone ID: 120631 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: STAGE 1 DEVELOPMENT

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT6 Page 1 of 1

 DATE
 1/7/2015

 PROJECT No:
 84944

COORDINATES:

REDUCED LEVEL: 22.90

Cone Resistance q _c (MPa)			f _s (Sleeve Friction f _s (kPa)										tion F %)						
0	10 1.0		20 2.0	30 3.0	40 	50 1 5.0	0	10	0 2	200	300	40	0 50	00	Soil Behaviour Type		0 :	24	6	8 10
0.0	1.0)	2.0	3.0	4.0	5.0		~							DUMMY CONE USED SAND: Loose to Medium Dense	0.16	5			
				<			($\left \right $			
					1. Sec	an an an an an an an an an an an an an a		5												
															SAND: Medium Dense to Dense	- 3.22				
]																		
		\sum							\sum											
											-									
									<		5				CLAY and SILTY CLAY: Very Stiff to Hard	- 7.41				
Er	and at 8.5	2m q _c	= 60.7													8.52			<u>~</u>	
_																				
_																				
_																				
																	-			
																	-			+

REMARKS: DUMMY CONE USED FROM 0.0 TO 0.2 m DEPTH TO PENETRATE CONCRETE SLAB; HOLE DISCONTINUED DUE TO CONE TIP REFUSAL; HOLE COLLAPSE AT 6.6 m DEPTH AFTER WITHDRAWAL OF RODS.



File: P:\84944.00 - BELLEVUE HILL Cranbrook School\4.0 Field Work\4.1 Logs\CPT Results\CPT6.CP5
Cone ID: 120631
Type: I-CFXY-10

CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

CPT 101 Page 1 of 1

DATE 12/04/2017

PROJECT No: 84944.01

COORDINATES:

REDUCED LEVEL:16.13

Cone Resistance q _c (MPa)	Sleeve Friction f _s (kPa)		R _f (%)	n Ratio	0 10	
Depth $\begin{pmatrix} 0 & 10 & 20 & 30 & 40 & 50 \\ (m) & - & - & - & - & - & - & - & - & - & $	0 100 200 300 400 500 Soil Behaviour Type			4 6	8 10	Dept (m)
	FILLING: Very Loose to Loose sand					- 1 - 2 - 3
	SILTY SAND with some SAND: Very Loose to Loose	- 3.20				- 4 - 5 - 6
	SAND: Medium Dense	-7.70				- 7 - 8 - 9
	SAND: Dense	- 10.80				- 10 - 11 - 12 - 13
14 - End at 14.24m q _c = 49.2	CLAY with some SILLY CLAY: Very Stiff to	- 13.80 14.24	-			- 14
15						- 15 - 16
17-						- 17 - 18
19-						- 19

REMARKS: TEST DISCONTINUED DUE TO CONE TIP REFUSUAL; GROUNDWATER WAS NOT OBSERVED DUE TO HOLE COLLAPSE AT 9.0 m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 101.CP5
Cone ID: 120620
Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

CPT 102 Page 1 of 1

DATE 12/04/2017 PROJECT No: 84944.01

COORDINATES:

REDUCED LEVEL:16.28

Cone Resistance q _c (MPa)	Sleeve Friction f _s (kPa)			R _f (%	on Rat			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Soil Behaviour Type	C I) 2	4	6 8	10	C (
		FILLING: Loose sand		$\left\{ \right.$				[
		SILTY SAND with some SAND: Very Loose to Loose	0.80	۲+ ۲			_	-
								-
				}			_	
						++	_	
				}		+		
				} }			_	
		SAND: Medium Dense to Dense	6.80					
				Į				
End at 11.54m q _c = 63.6			11.54	}				
						+		
						+		
						+	_	
						+	_	

REMARKS: TEST DISCONTINUED DUE TO CONE TIP REFUSUAL; GROUNDWATER WAS NOT OBSERVED DUE TO HOLE COLLAPSE AT 7.0 m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 102.CP5
Cone ID: 120620
Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

CPT 103

Page 1 of 1

DATE 11/04/2017 PROJECT No: 84944.01

COORDINATES:

REDUCED LEVEL:16.75

Cone Resistance q _c (MPa) 0 10 20 30 40 50	Sleeve Friction f _s (kPa) 0 100 200 300 400 50	o Soil Behaviour Type		Friction R _f (%)	4 6 8	10
0.0 1.0 2.0 3.0 4.0 5.0		FILLING: Loose sand				
		SAND: Medium Dense	0.50			
				}		-
				Í		
						_
	5			< S		
End at 8.68m q _c = 21.2			8.68			
						_
						-
						_
						\neg
						\neg

REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE BENDING ON ROCK GROUNDWATER WAS OBSERVED AT 8.5 m DEPTH AFTER WITHDRAWAL OF RODS

 Water depth after test: 8.50m depth (assumed)

 File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 103.CP5

 Cone ID: 120620
 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT 104 Page 1 of 1

DATE 12/04/2017 PROJECT No: 84944.01

REDUCED LEVEL:16.34

Cone Resistance q_c (MPa) th $\begin{array}{c c} 0 & 10 & 20 & 30 \\ \hline - & - & - & - & - & - & - & - & - & - &$	40 50 0 10	riction	500	Friction Ratio R _f (%) 0 2 4 6 8 10
0.0 1.0 2.0 3.0		00 200 300 400	500 Soil Behaviour Type	
			SAND: Very Loose	
End at 5.74m q _c = 11.2				5.74

REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE BENDING IN POSSIBLE ROCK NO GROUNDWATER WAS OBSERVED DUE TO HOLE COLLAPSE AT 4.2 m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 104.CP5
Cone ID: 120620
Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

REDUCED LEVEL:16.54

COORDINATES:

CPT 105 Page 1 of 1

DATE 11/04/2017

PROJECT No: 84944.01

	Cone Resistance q _c (MPa) 0 10 20 30 40 50	Sleeve Friction f _s (kPa) 0 100 200 300 400 500		Friction Ratio R _f (%) 0 2 4 6 8 10					
Depth (m)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Soil Behaviour Type				Depth (m)			
0		FILLING: Very Loose sand]	5					
1-		SAND with some SILTY SAND: Very Loose to Loose	- 0.60	}					
2 - 3 -						-2			
4 -	¥			M		4			
	End at 4.10m q _c = 47.1		4.10						
5 -						- 5			
6 -						- 6			
7 -						-7			
8 -						- 8			
9 -						- 9			
10 -					_	- 10			
11 -						- 11			
12 -						- 12			
13-						- 13			
14 -						- 14			
15 -						- 15			
16 -					+	- 16			
17 -						- 17			
18 -						- 18			
19 - 20 -						- 19			

REMARKS: TEST DISCONTINUED DUE TO CONE TIP REFUSUAL; GROUNDWATER WAS OBSERVED AT 4.0 m DEPTH AFTER WITHDRAWAL OF RODS

 Water depth after test: 4.00m depth (assumed)

 File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 105.CP5

 Cone ID: 120620
 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT 108

Page 1 of 1

DATE 11/04/2017 PROJECT No: 84944.01

COORDINATES:

REDUCED LEVEL:16.44

Cone Resistance q _c (MPa) 0 10 20	30 40 50	f _s (kPa) 0 0 100 200	300 400 500			R _f (%) 0 2 4	6 8 1(
0.0 1.0 2.0	3.0 4.0 5.0	0		Soil Behaviour Type			
	~			SAND: Loose			
				SAND: Medium Dense	2.50		
				SAND: Medium Dense to Dense	4.00		
End at 13.00m q _c = 50				CLAY: Very Stiff to Hard	12.50		
							+

REMARKS: TEST DISCONTINUED DUE TO CONE TIP REFUSAL; NO GROUNDWATER WAS OBSERVED AFTER WITHDRAWAL OF RODS

File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 108.CP5
Cone ID: 120620
Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT 109

Page 1 of 1 DATE

11/04/2017 PROJECT No: 84944.01

COORDINATES:	
COORDINATES.	

REDUCED LEVEL:16.51

	Cone Resistance q _c (MPa)	Sleeve Friction f _s (kPa)		Friction Ratio R _f (%)
Depth (m)		0 100 200 300 400 500	Soil Behaviour Type	0 2 4 6 8 10
0			SAND: Loose	
2 - 3 - 4 -			SAND: Medium Dense	-2
5 - 6 - 7 -			SAND: Medium Dense to Dense	4.80
8-			SILLY CLAY: Very Stiff to Hard	8.08
9 -	End at 8.08m q _c = 47.6		c	
10 -				-10
12 -				-12
13 -				-13
14 - 15 -				-14
16 -				-16
17 -				-17
18 - 19 -				- 18
20				

REMARKS: TEST DISCONTINUED DUE TO CONE TIP REFUSUAL; GROUNDWATER WAS OBSERVED AT 7.8 m DEPTH AFTER WITHDRAWAL OF RODS

 Water depth after test: 7.80m depth (assumed)

 File: P:\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 109.CP5

 Cone ID: 120620
 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT 110 Page 1 of 1

DATE

12/04/2017 PROJECT No: 84944.01

REDUCED LEVEL:16.22

Cone Resistance q _c (MPa)	Sleeve Friction f _s (kPa)	Friction Ratio R _f (%)
0 10 20 30 40 50 	0 100 200 300 400 500 Soil Behaviour Type	0 2 4 6 8
	SILTY SAND: Very Loose to Loose	
End at 8.10m q _c = 33.4	CLAY and SILTY SAND / SANDY SILT: Soft to Very Stiff	7.30

REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE BEND ON POSSIBLE ROCK; GROUNDWATER WAS OBSERVEED AT 7.85 m DEPTH AFTER WITHDRAWAL OF RODS

 Water depth after test: 7.85m depth (assumed)

 File: P\\84944.01 - BELLEVUE HILL Cranbrook School ECI\4.0 Field Work\CPT Results\CPT 110.CP5

 Cone ID: 120620
 Type: I-CFXY-10



CLIENT: CRANBROOK SCHOOL

PROJECT: ADDITIONAL INVESTIGATION

LOCATION: VICTORIA ROAD, BELLEVUE HILL

CPT208

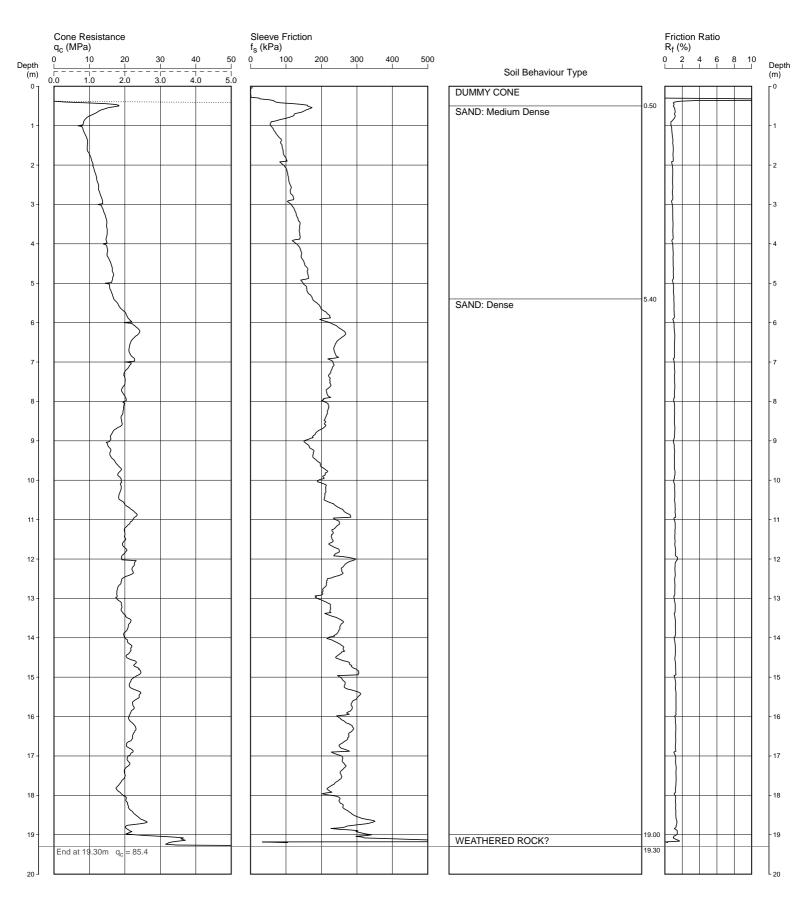
Page 1 of 1

 DATE
 18/09/2017

 PROJECT No:
 84944.02

COORDINATES:

REDUCED LEVEL:30.53



REMARKS: DUMMY CONE USED FROM 0.0 TO 0.5 m DEPTH, TEST DISCONTINUED DUE TO CONE TIP REFUSAL NO WATER OBSERVED IN CPT HOLE TO AT LEAST 10 m AFTER WITHDRAWAL OF RODS

File: P:\84944.02 - BELLEVUE HILL Cranbrook Additional\4.0 Field Work\CPT\CPT208.cpt
Cone ID: 120634 Type: I-CFXY-10





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

Results of Dynamic Penetrometer Tests

Client	Cranbrook School	Project No.	84944.02
Project	Stage 3 Investigations	Date	11/05/2018
Location	Cranbrook School, Bellevue Hill	Page No.	1 of 2

Test Location	1A	1B	2	3	4	5	6		
RL of Test (AHD)	33.9	33.9	31.5	30.0	27.0	22.7	21.8		
Depth (m)				Pei	netration Blows/1		ce		
0 - 0.15	E	E	E	1	E	E	E		
0.15 - 0.30				2					
0.30 - 0.45		\checkmark	\downarrow	2					
0.45 - 0.60		3	2	2	\downarrow				
0.60 - 0.75		2	2	3	2				
0.75 - 0.90	\downarrow	3	1	2	2	\checkmark	\checkmark		
0.90 - 1.05	3	3	2	4	4	10	2		
1.05 - 1.20	2	6	4	6	6	15	1		
1.20 - 1.35	5	5	15/70	18	3	9	2		
1.35 - 1.50	11	5	В	В	17/100	4	3		
1.50 - 1.65	5	4			В	5	4		
1.65 - 1.80	4	8				8	1		
1.80 - 1.95	5	6				6	2		
1.95 - 2.10	5	5				8	1		
2.10 - 2.25	8	6				7	6		
2.25 - 2.40	6	4				4	8		
2.40 - 2.55	D	4				6	8		
2.55 - 2.70		2				6	6		
2.70 - 2.85		6				9	10		
2.85 - 3.00		5				11	11		
3.00 - 3.15		5				8	10		
3.15 - 3.30		4				8	10		
3.30 - 3.45		6				5	9		
3.45 - 3.60		8/20				7	12		

Test Method

AS 1289.6.3.2, Cone Penetrometer AS 1289.6.3.3, Flat End Penetrometer

Tested ByJDBChecked ByLJH

Remarks

R = Refusal, 25/110 indicates 25 blows for 110 mm penetration

B = Bouncing, E = Excavated, D = Discontinued (Test 6 did not encounter rock)



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Results of Dynamic Penetrometer Tests

Client	Cranbrook School	Project No.	84944.02
Project	Stage 3 Investigations	Date	11/05/2018
Location	Cranbrook School, Bellevue Hill	Page No.	2 of 2

Test Location	1A	1B	2	3	4	5	6		
RL of Test (AHD)	33.9	33.9	31.5	30.0	27.0	22.7	21.8		
Depth (m)				Per	netration Blows/1	Resistan	ce		
3.60 - 3.75		В				11	10		
3.75 - 3.90						8	8		
3.90 - 4.05						15	10		
4.05 - 4.20						12	12		
4.20 - 4.35						15/50	16		
4.35 - 4.50						В	14		
4.50 - 4.65							19		
4.65 - 4.80							11		
4.80 - 4.95							13		
4.95 - 5.10							22		
5.10 - 5.25							16		
5.25 - 5.40							8/100		
5.40 - 5.55							D		
5.55 - 5.70									
5.70 - 5.85									
5.85 - 6.00									
6.00 - 6.15									
6.15 - 6.30									
6.30 - 6.45									
6.45 - 6.60									
6.60 - 6.75									
6.75 - 6.90									
6.90 - 7.05									
7.05 - 7.20									

Test Method

AS 1289.6.3.3, Flat End Penetrometer

Remarks

R = Refusal, 25/110 indicates 25 blows for 110 mm penetration

B = Bouncing, E = Excavated, D = Discontinued (Test 6 did not encounter rock)

Checked By

LJH



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

Results of Dynamic Penetrometer Tests

Client	Cranbrook School	Project No.	84944.02
Project	Stage 4 Investigations	Date	20/07/2018
Location	Cranbrook School, Bellevue Hill	Page No.	1 of 1

Test Location	401	402						
RL of Test (AHD)	Base of	f footing						
Depth (m)			Pei	netration Blows/1	Resistan	се		
0 - 0.15	0	0						
0.15 - 0.30	0	2						
0.30 - 0.45	1	1						
0.45 - 0.60	1	1						
0.60 - 0.75	2	1						
0.75 - 0.90	2	1						
0.90 - 1.05	3	2						
1.05 - 1.20	3	3						
1.20 - 1.35	3	3						
1.35 - 1.50	3	3						
1.50 - 1.65	3	3						
1.65 - 1.80	4	4						
1.80 - 1.95	6	4						
1.95 - 2.10	5							
2.10 - 2.25	6							
2.25 - 2.40	8							
2.40 - 2.55								
2.55 - 2.70								
2.70 - 2.85								
2.85 - 3.00								
3.00 - 3.15								
3.15 - 3.30								
3.30 - 3.45								
3.45 - 3.60								

AS 1289.6.3.2, Cone Penetrometer

Tested ByRKChecked ByPMO

Remarks

Appendix E

Laboratory Test Results

ι	JNIAX		RESSIVE S	TRENG	TH O	F ROCK RE	EPORT	
Client:	Douglas P	artners		Source:	202 9-9.2m	า		
Address:	PO Box 47	2 West Ryde NSW 168	5	Sample Description:	: Sandstone			
Project:	Cranbrook	School (84944.02)		Report No.:	S27795-UCS			
Job No.:	S17389			Lab No.:	S27795			
Test Proce	edure:	□ AS4133 4.2.1 ✓ AS4133 4.2.2	Rock strength tests - Determination of Rock strength tests - Determination of			-		
Sampling:		Sampled by Client				Date Sampled:	Unknown	
Preparatio	on:	Prepared in accordance v	vith the test method					
Date	te Tested 28/09/2017 Machine Type Matest Sample Storage Conditions Wrapped					Wrapped		





Before Test

After Test

TEST RESULTS Moisture Length/ Load at Average Specimen Compressive Strength Duration of Content at Description of Failure Specimen Condition Diameter Diameter Fracture Height (MPa) Test (Sec) Time of (mm) Ratio (kN) (mm) Test (%) 52.10 135.6 2.60 As received Mixed mode 614 5 6.8 2.28 Notes: Authorised Signatory: The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full. ٠ 2 NATA 1 5/10/2017 NATA Accredited Laboratory Number: 14874 Chris Lloyd Date: Macquarie Geotechnical MACQUARIE U8 10 Bradford Street GEOTECH Alexandria NSW 2015

ι	JNIAX		RESSIVE S	TRENG	TH O	F ROCK RE	PORT	
Client:	Douglas P	artners		Source:	203 11.74-	11.92m		
Address:	PO Box 47	2 West Ryde NSW 168	5	Sample Description:	n: Sandstone			
Project:	Cranbrook	School (84944.02)		Report No.:	S27796-UCS			
Job No.:	S17389			Lab No.:	S27796			
Test Proce	edure:	□ AS4133 4.2.1 ✓ AS4133 4.2.2	Rock strength tests - Determination of Rock strength tests - Determination of			-		
Sampling:		Sampled by Client				Date Sampled:	Unknown	
Preparatio	on:	Prepared in accordance w	with the test method					
Date	Tested	28/09/2017	Machine Type	Matest	Sample	Storage Conditions	Wrapped	





Before Test

After Test

TEST RESULTS Moisture Length/ Load at Average Specimen Compressive Strength Duration of Content at Specimen Condition Description of Failure Diameter Diameter Fracture Height (MPa) Test (Sec) Time of (mm) Ratio (kN) (mm) Test (%) 51.80 135.7 2.62 As received Mixed mode 607 16 7.5 7.59 Notes: Authorised Signatory: The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full. ٠ 2 NATA 1 5/10/2017 NATA Accredited Laboratory Number: 14874 Chris Lloyd Date: Macquarie Geotechnical MACQUARIE U8 10 Bradford Street GEOŢECH Alexandria NSW 2015

Client:	Douglas P	artners		Source:	204 20.1-20.28m				
Address:	PO Box 47	72 West Ryde NSW 168	5	Sample Description:	Sandstone				
Project:	Cranbrook	s School (84944.02)		Report No.:	: S27797-UCS				
Job No.:	S17389			Lab No.:	S27797				
Test Proc		AS4133 4.2.2	Rock strength tests - Determination Rock strength tests - Determination		ength - Rock Strength < 50 Mpa				
Sampling:		Sampled by Client	with the test method		Date Sampled:	Unknown			
Preparatio	on: Tested	Prepared in accordance 28/09/2017	Machine Type	Matest	Sample Storage Conditions	Wrapped			
See. 3									
			-						

Before Test



TEST RESULTS Moisture Load at Average Specimen Length/ Compressive Strength Duration of Content at Specimen Condition Description of Failure Diameter Diameter Fracture Height (MPa) Test (Sec) Time of (mm) Ratio (kN) (mm) Test (%) 51.80 97.2 1.88 As received Mixed mode 612 23 3.1 10.9 Test specimen length to diameter ratio falls outside of standard limitations of 2.5-3.0. Notes: Authorised Signatory: The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full. ٠ 0 NATA 5/10/2017 NATA Accredited Laboratory Number: 14874 Chris Lloyd Date: Macquarie Geotechnical MACQUARIE U8 10 Bradford Street GEOTECH Alexandria NSW 2015

ι	JNIA)	(IAL COMP	RESSIVE S	TRENG	TH OF ROCK RE	PORT		
Client:	Douglas P	Partners		Source:	205 22.78-23m			
Address:	PO Box 47	72 West Ryde NSW 168	35	Sample Description:	Sandstone			
Project:	oject: Cranbrook School (84944.02)				S27798-UCS			
Job No.:	S17389			Lab No.:	S27798			
Test Proce	edure:	□ AS4133 4.2.1 ✓ AS4133 4.2.2	Rock strength tests - Determination of Rock strength tests - Determination of					
Sampling:		Sampled by Client			Date Sampled:	Unknown		
Preparatio	on:	Prepared in accordance	with the test method					
Date	Tested	28/9/17	Machine Type	Matest	Sample Storage Conditions	Wrapped		





Before Test

After Test

TEST RESULTS Moisture Length/ Load at Average Specimen Compressive Strength Duration of Content at Description of Failure Specimen Condition Diameter Diameter Fracture Height (MPa) Test (Sec) Time of (mm) Ratio (kN) (mm) Test (%) 51.80 134.8 2.60 As received Mixed mode 614 24 9.4 11.3 Notes: Authorised Signatory: The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full. ٠ 2 NATA 1 5/10/2017 NATA Accredited Laboratory Number: 14874 Chris Lloyd Date: Macquarie Geotechnical MACQUARIE U8 10 Bradford Street GEOŢECH Alexandria NSW 2015

ι	JNIAXIA		RESSIVE S	TRENG	TH O	F ROCK RE	EPORT
Client:	Douglas Partne	rs		Source:	208 24-24.	2m	
Address:	PO Box 472 We	5	Sample Description:	Sandstone			
Project:	Cranbrook Scho		Report No.:	S27799-UCS			
Job No.:	S17389		Lab No.:	S27799			
Test Proce	edure: □ ☑	AS4133 4.2.1 AS4133 4.2.2	Rock strength tests - Determination of Rock strength tests - Determination of			-	
Sampling:	Sampling: Sampled by Client					Date Sampled:	Unknown
Preparatio	on: Prep	ared in accordance v	with the test method				
Date	Tested	ested 28/09/2017 Machine Type Matest Sample Storage Conditions Wrapped					Wrapped





Before Test

After Test

TEST RESULTS Moisture Length/ Load at Average Specimen Compressive Strength Duration of Content at Description of Failure Specimen Condition Diameter Diameter Fracture Height (MPa) Test (Sec) Time of (mm) Ratio (kN) (mm) Test (%) 51.70 134.5 2.60 As received Mixed mode 606 26 4.0 12.4 Notes: Authorised Signatory: The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full. ٠ 2 NATA 1 5/10/2017 NATA Accredited Laboratory Number: 14874 Chris Lloyd Date: Macquarie Geotechnical MACQUARIE U8 10 Bradford Street GEOŢECH Alexandria NSW 2015

Client Reference: 84944.01, Bellevue Hill

						1
Misc Inorg - Soil						
Our Reference:	UNITS	165477-1	165477-2	165477-3	165477-4	165477-5
Your Reference		BH101	BH101	BH102	BH102	BH103
	-					
Depth		0.5	4.0	0.5	2.0	0.1
Date Sampled		12/04/2017	12/04/2017	12/04/2017	12/04/2017	11/04/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
pH 1:5 soil:water	pH Units	6.4	6.1	6.2	6.0	5.3
Electrical Conductivity 1:5	μS/cm	22	8	27	9	200
soil:water						
			1		[1
Misc Inorg - Soil						
Our Reference:	UNITS	165477-6	165477-7	165477-8	165477-9	165477-10
Your Reference		BH103	BH104	BH105	BH111	BH111
Depth		1.0	1.0	1.0	0.45-0.5	2.9-3.0
Date Sampled		11/04/2017	12/04/2017	10/04/2017	13/04/2017	13/04/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
pH 1:5 soil:water	pH Units	5.7	5.8	6.5	6.3	6.1
Electrical Conductivity 1:5 soil:water	µS/cm	31	11	18	12	10
Misc Inorg - Soil						
Our Reference:	UNITS	165477-11	165477-12	165477-13	165477-14	165477-15
Your Reference		BH112	BH113	BH114	BH115	BH116
	-					
Depth		0.5	1.0-1.05	1.0	0.1	1.0
Date Sampled		11/04/2017	13/04/2017	11/04/2017	11/04/2017	11/04/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
pH 1:5 soil:water	pH Units	5.6	6.1	6.0	6.1	6.4
Electrical Conductivity 1:5	μS/cm	64	12	13	32	14
soil:water	r	-		-		
						·
Misc Inorg - Soil						
Our Reference:	UNITS	165477-16	165477-17	165477-18	165477-19	165477-20
Your Reference		BH117	BH118	BH119	BH120	BH121
Depth		1.95-2.0	0.1-0.15	0.5	0.5	1.0
Date Sampled		13/04/2017	13/04/2017	10/04/2017	11/04/2017	12/04/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
	pH Units	6.1	5.8	5.8	8.0	6.6
pH 1:5 soil:water	priorito					
pH 1:5 soil:water Electrical Conductivity 1:5	µS/cm	14	27	12	130	12

Client Reference: 84944.01, Bellevue Hill

Misc Inorg - Soil Our Reference: Your Reference Depth Date Sampled	UNITS 	165477-21 BH122 1.0 11/04/2017	165477-22 BH123 0.5 11/04/2017	165477-23 BH124 0.1 10/04/2017	165477-24 BH125 0.5 10/04/2017	165477-25 BH126 2.0 12/04/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
pH 1:5 soil:water	pH Units	6.6	6.4	6.2	6.1	6.4
Electrical Conductivity 1:5 soil:water	µS/cm	18	15	28	17	8
Misc Inorg - Soil						
Our Reference:	UNITS	165477-26	165477-27	165477-28	165477-29	165477-30
Your Reference		BH127	BH128	BH129	BH129	BH130
Depth Date Sampled Type of sample		0.5 11/04/2017 Soil	1.0 12/04/2017 Soil	0.5 10/04/2017 Soil	2.0 10/04/2017 Soil	0.1 10/04/2017 Soil
Date prepared	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date analysed	-	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
pH 1:5 soil:water	pH Units	5.9	6.2	6.0	6.1	5.7
Electrical Conductivity 1:5 soil:water	µS/cm	13	11	16	15	25



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 customerservice@envirolab.com.au www.envirolab.com.au

CERTIFICATE OF ANALYSIS 176470

Client Details	
Client	Douglas Partners Pty Ltd
Attention	Julian Ng
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details	
Your Reference	84944.02, Bellevue Hill
Number of Samples	10 soils
Date samples received	26/09/2017
Date completed instructions received	26/09/2017

Analysis Details

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

Samples were analysed as received from the client. 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.

Report Details	
Date results requested by	04/10/2017
Date of Issue	29/09/2017
NATA Accreditation Number 29	01. 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 *

<u>Results Approved By</u> Priya Samarawickrama, Senior Chemist

Authorised By

کھ

David Springer, General Manager



Client Reference: 84944.02, Bellevue Hill

Soil Aggressivity						
Our Reference		176470-1	176470-2	176470-3	176470-4	176470-5
Your Reference	UNITS	BH202 / 1.00- 1.45	BH202 / 5.50- 5.67	BH203 / 2.50- 2.95	BH203 / 7.00- 7.45	BH204 / 10.00- 10.45
Date Sampled		24/08/2017	24/08/2017	21/08/2017	23/08/2017	16/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	5.2	4.8	5.5	6.2	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	14	23	74	22	53
Chloride, Cl 1:5 soil:water	mg/kg	<10	10	20	10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	<10	20	89	<10	<10

Soil Aggressivity						
Our Reference		176470-6	176470-7	176470-8	176470-9	176470-10
Your Reference	UNITS	BH204 / 17.50- 17.95	BH205 / 4.00- 4.45	BH205 / 13.00- 13.45	BH208 / 1.00- 1.45	BH208 / 11.25- 11.70
Date Sampled		17/08/2017	15/08/2017	15/08/2017	18/09/2017	18/09/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	7.0	6.4	6.9	6.3	7.0
Electrical Conductivity 1:5 soil:water	µS/cm	20	27	18	26	17
Chloride, Cl 1:5 soil:water	mg/kg	<10	<10	<10	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	<10	<10	<10	26	<10

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. 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 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.

Client Reference: 84944.02, Bellevue Hill

QUALITY	QUALITY CONTROL: Soil Aggressivity								Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	5.2	5.1	2	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	14	21	40	101	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	<10	<10	0	97	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	<10	<10	0	103	[NT]

Client Reference: 84944.02, Bellevue Hill

Result Definiti	ons
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 Contro	ol 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.
Australian Drinking	Water Guidelines recommend that Thermotolerant Coliform Faecal Enterococci. & E Coli levels are less than

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

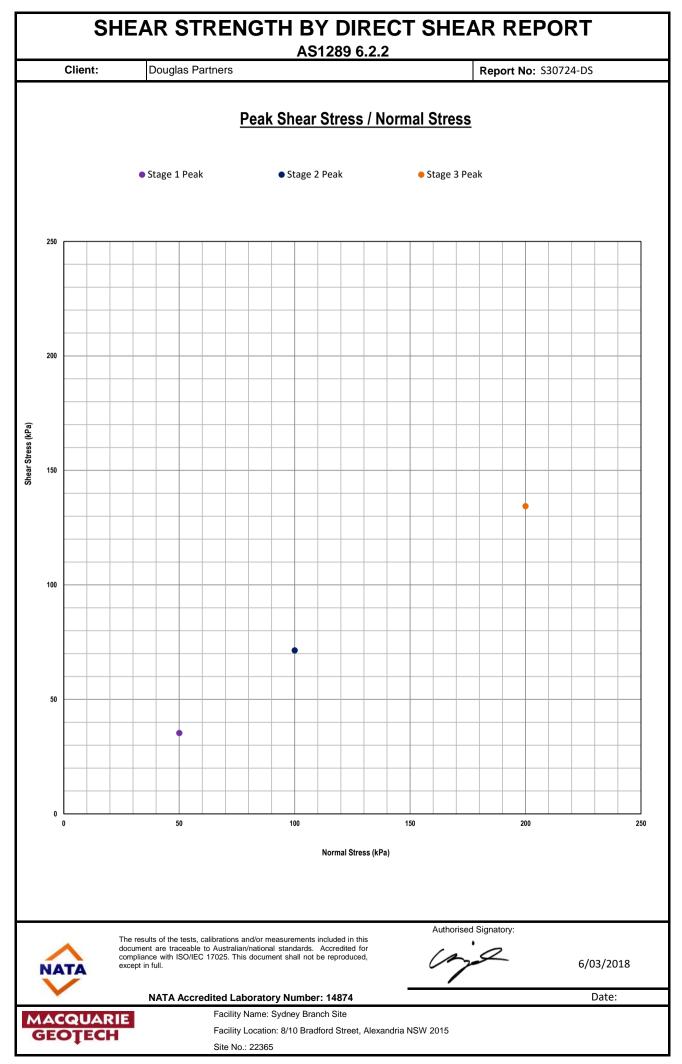
In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

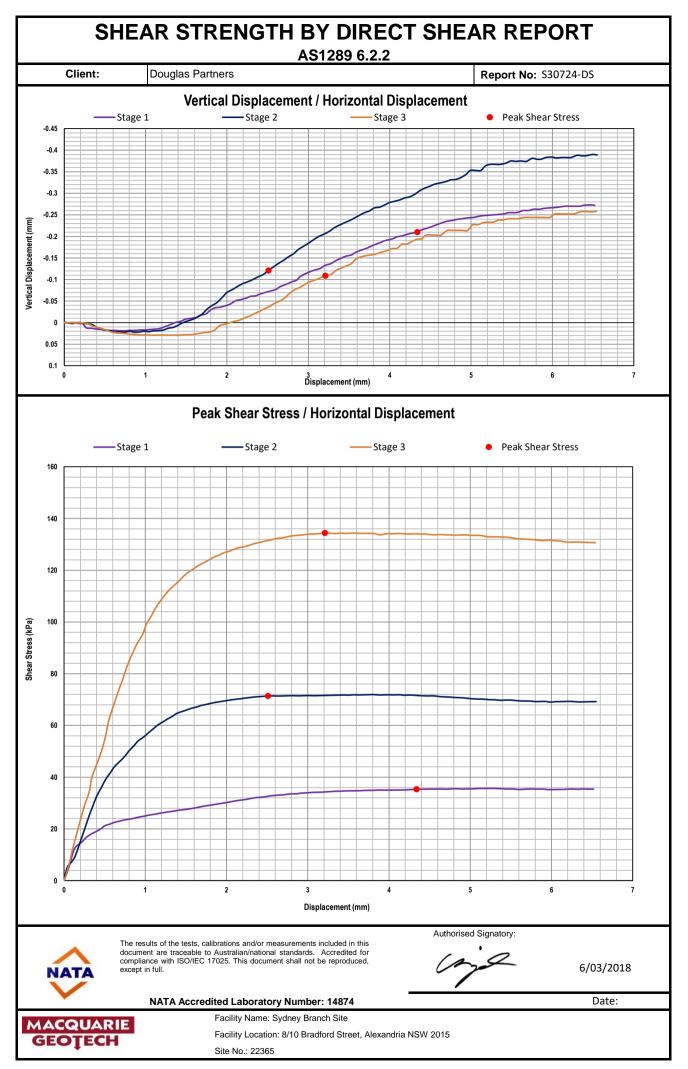
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

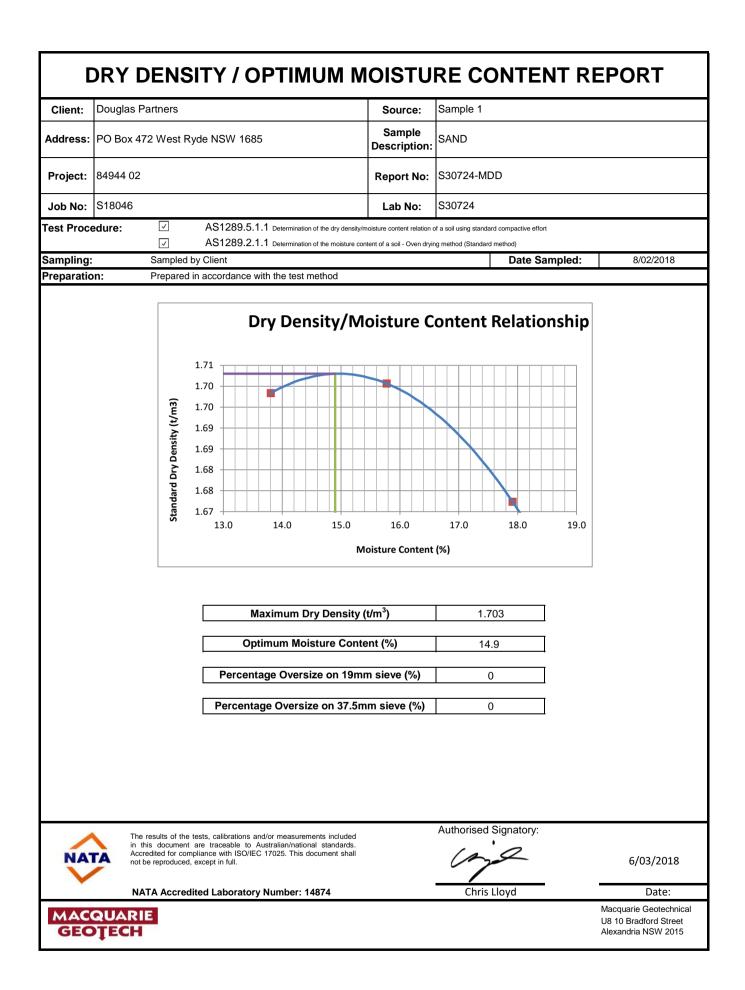
Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

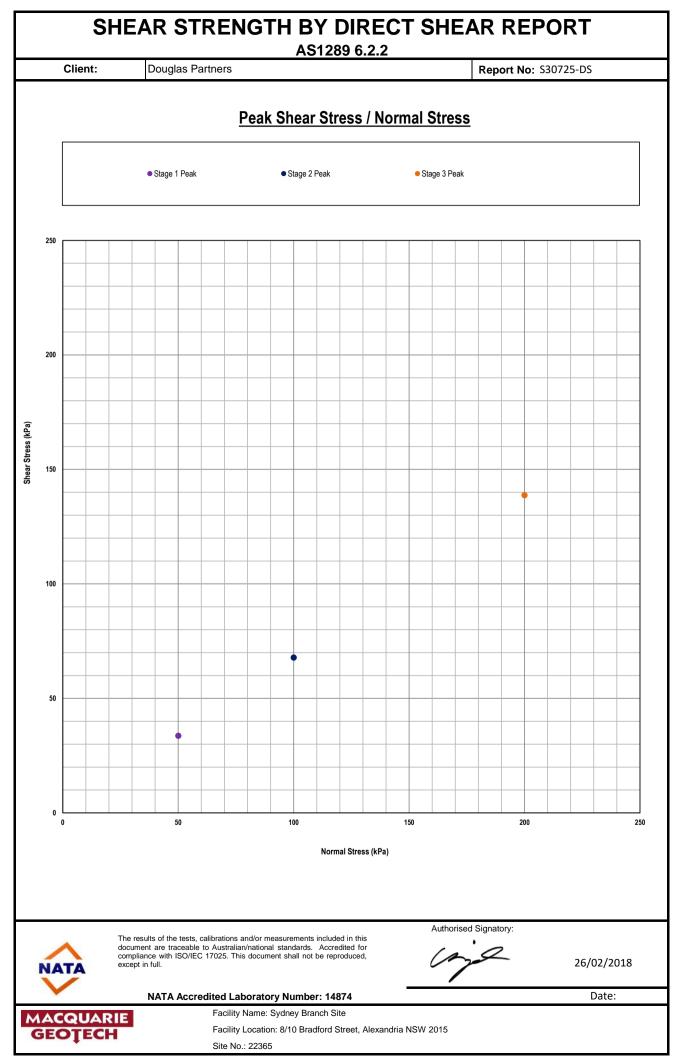
SH	EAR STR	ENG	THBY I AS128		SHE	AR REI	PORT	
Client:	Douglas Part	ners			rce:	Sample 1		
Address:	PO Box 472	West Ryde N	ISW 1685	685 Sample Description:		SAND		
Project:	84944 02			Report No.:		S30724-DS		
Job No.:	S18046			Lab	No.:	S30724		
Test Procedure:		S1289 6.2.2	2 Soil strength and consolidat	ion tests - Determination of t	he shear strength of a soil -	Direct shear test using a she	ar box	
Sampling:	Sampled by Cl	ient		Date Sample	ed:	08.02.18		
Preparation:	Prepared in ac	cordance with	the test method					
			Test D	Details				
Remo	oulding Details:		95% Standar	d Compactior	n @ 100% Op	otimum Moistu	re Content	
Da	ate Tested:		27.02.18					
Size of	Shear Box (mm)		100mm squa	re				
Tes	t Parameter		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Specimen Dimensions (mm):			100 x 100	100 x 100	100 x 100	-	-	-
Rate of Strain (mm/min):			0.05	0.05	0.05	-	-	-
Placement Moisture Content (%):			14.9	14.9	14.9	-	-	-
Placement Wet Density (t/m ³):			1.86	1.86	1.86	-	-	-
Placement Dry Density (t/m ³):			1.62	1.62	1.62	_	-	-
		•	Peak	Values				
Normal Stress at No	minated Displace	ment (kPa)	-	_	_	<u> </u>	_	_
Shear Stress at No	minated Displacer	nent (kPa)	_	_	_	_	_	_
Normal Stress at	Peak Shear Stres	s (kPa)	50.0	100.0	200.0	-	-	-
Peak Shear Stress (kPa)		35.3	71.4	134.4	_			
Normal Stress at Constant Volume (kPa)		-	-	-	-	-	_	
	t Constant Volume	. ,		_			_	
		. ,	Residua	l Values				
Normal Stress at No	minated Displace	ment (kPa)	Residue	i vulues				
Shear Stress at No			-	-	-	-	-	-
Normal Stress at R		, ,	-	-	-	-	-	-
	Shear Stress (kPa		-	-	-	-	-	-
	t Constant Volume	,	-	-	-	-	-	-
	t Constant Volume	,	-	-	-	-	-	-
Chical Chicas a		, (Ki ŭ)	E allowa E	-	-	-	-	-
			Failure E	nvelopes	Peak	Values	Residua	I Values
			Frictio	n Angle (°)		-		•
At Displac	ement			sion (kPa)		-		
				Correlation	2	- 3.3	-	
Shear St	ress			n Angle (°) sion (kPa)		3.3 3.8		-
				orrelation	0.9	9994	-	
				n Angle (°)		-		-
At Constant	Volume			sion (kPa) Correlation	-		-	
	ne results of the tests, cali ccument are traceable to mpliance with ISO/IEC 17 ccept in full.	Australian/nationa	easurements include	d in this lited for	Authorise	d Signatory:	6/03/	2018
	NATA Accredi		ry Number: 148				Da	ite:
MACQUARIE GEOŢECH			Sydney Branch Sit n: 8/10 Bradford S 5		NSW 2015			

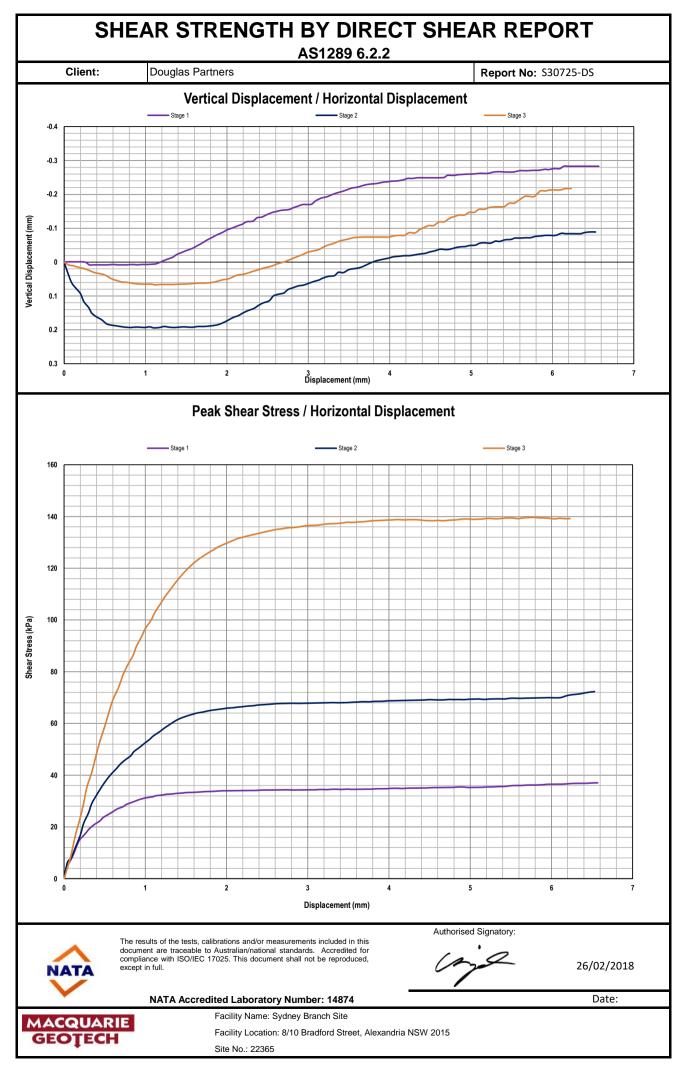


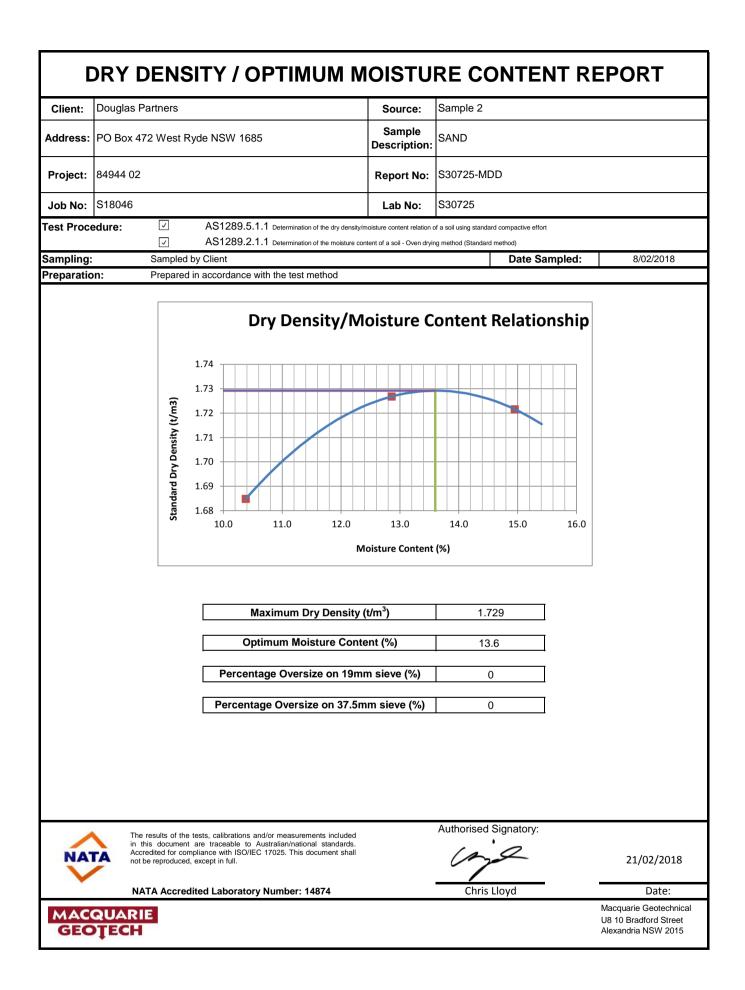




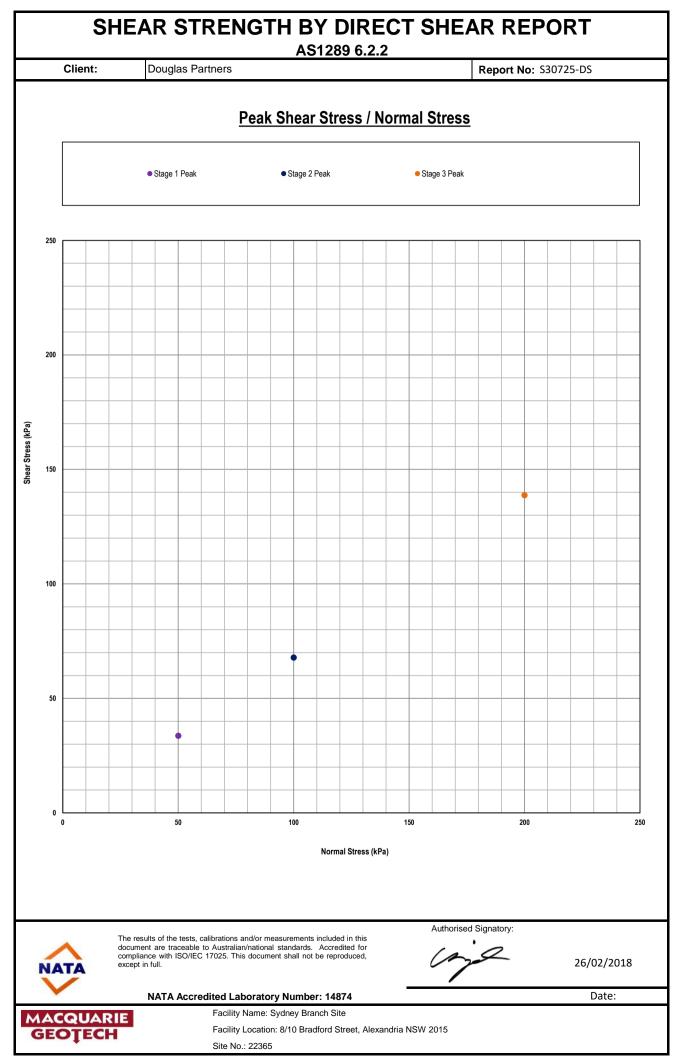
SH	EAR STR	ENG		DIREC 9 6.2.2	F SHE	AR REI	PORT	
Client:	Douglas Part	ners			irce:	Sample 2		
Address:	PO Box 472	West Ryde N	ISW 1685	SW 1685 Sample Description:		SAND		
Project:	84944 02			Report No.:		S30725-DS		
Job No.:	S18046			Lab	No.:	S30725		
Test Procedure:		S1289 6.2.2	2 Soil strength and consolidat	ion tests - Determination of t	he shear strength of a soil	- Direct shear test using a she	ar box	
Sampling:	Sampled by Cl	ient		Date Sample	ed:	08.02.18		
Preparation:	Prepared in ac	cordance with	the test method					
			Test D	Details				
Remo	oulding Details:		95% Standar	d Compactior	n @ 100% Op	otimum Moistu	re Content	
Da	ate Tested:		22.02.18					
Size of	Shear Box (mm)		100mm squa	re				
Tes	t Parameter		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Specimen Dimensions (mm):			100 x 100	100 x 100	100 x 100	-	-	-
Rate of Strain (mm/min):			0.05	0.05	0.05	-	-	-
Placement Moisture Content (%):			13.6	13.6	13.6	-	-	-
Placement	Wet Density (t/m	³):	1.86	1.86	1.86	_	_	_
	Dry Density (t/m ³	,	1.64	1.64	1.64			
	(111	,-		Values	1.04			
Normal Stress at No	minated Displace	ment (kPa)						
Shear Stress at Nominated Displacement (kPa)			-	-	-	-	-	-
	Peak Shear Stres			100.0		-		
		5 (III U)	50.0	100.0	200.0	-	-	-
Peak Shear Stress (kPa)		33.7	67.8	138.7	-	-	-	
Normal Stress at Constant Volume (kPa) Shear Stress at Constant Volume (kPa)		-	-	-	-	-	-	
Shear Shess a		(KFa)		-	-	-	-	-
Normal Strees at No			Residua	I Values	1			1
Normal Stress at No			-	-	-	-	-	-
Shear Stress at No		()	-	-	-	-	-	-
Normal Stress at R			-	-	-	-	-	-
	Shear Stress (kPa	,	-	-	-	-	-	-
	t Constant Volume	,	-	-	-	-	-	-
Shear Stress at	t Constant Volume	e (kPa)	-	-	-	-	-	-
			Failure E	nvelopes	-		•	
			Friatio	n Angle (°)	Peak	Values	Residua	al Values
At Displace	ement			sion (kPa)		-		-
-				Correlation		-	-	
•				n Angle (°)		4.6		-
Shear St	ress			sion (kPa) Correlation	0.0		-	
				n Angle (°)		-		-
At Constant	Volume			sion (kPa)		-		-
			(Correlation		-		-
	the results of the tests, cali bournent are traceable to mpliance with ISO/IEC 1: ccept in full.	Australian/nationa 025. This docum	al standards. Accred ent shall not be repr	lited for oduced,	Authorise	d Signatory:		2/2018
MACQUARIE GEOŢECH	_	Facility Name:	ry Number: 148 Sydney Branch Sit n: 8/10 Bradford S	e	NSW 2015		Da	ite:

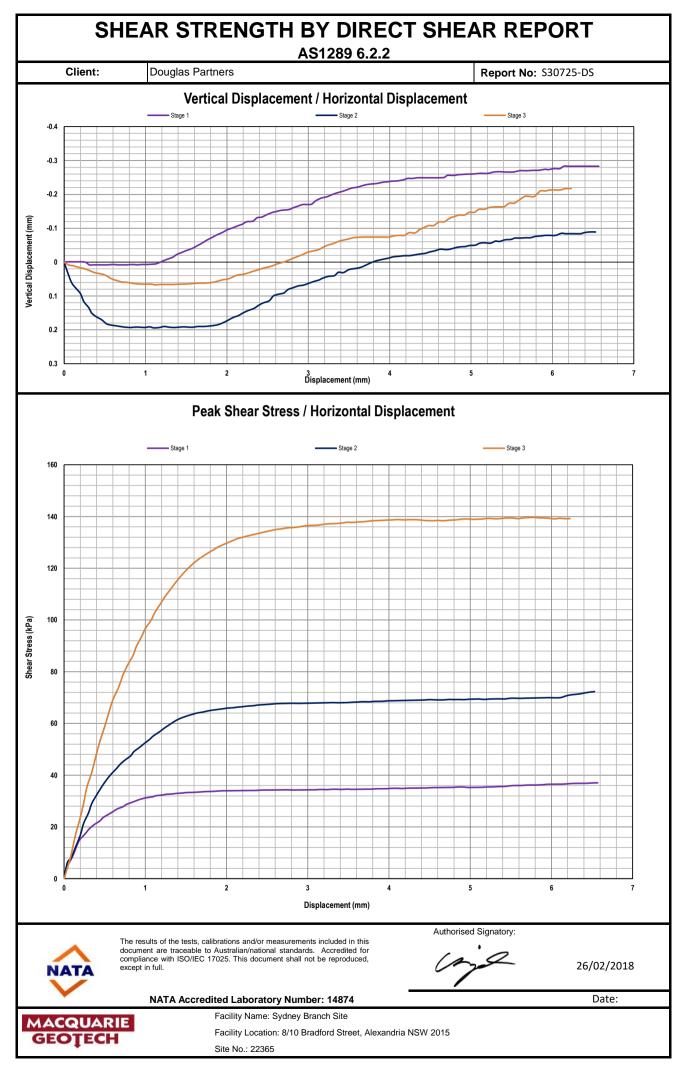


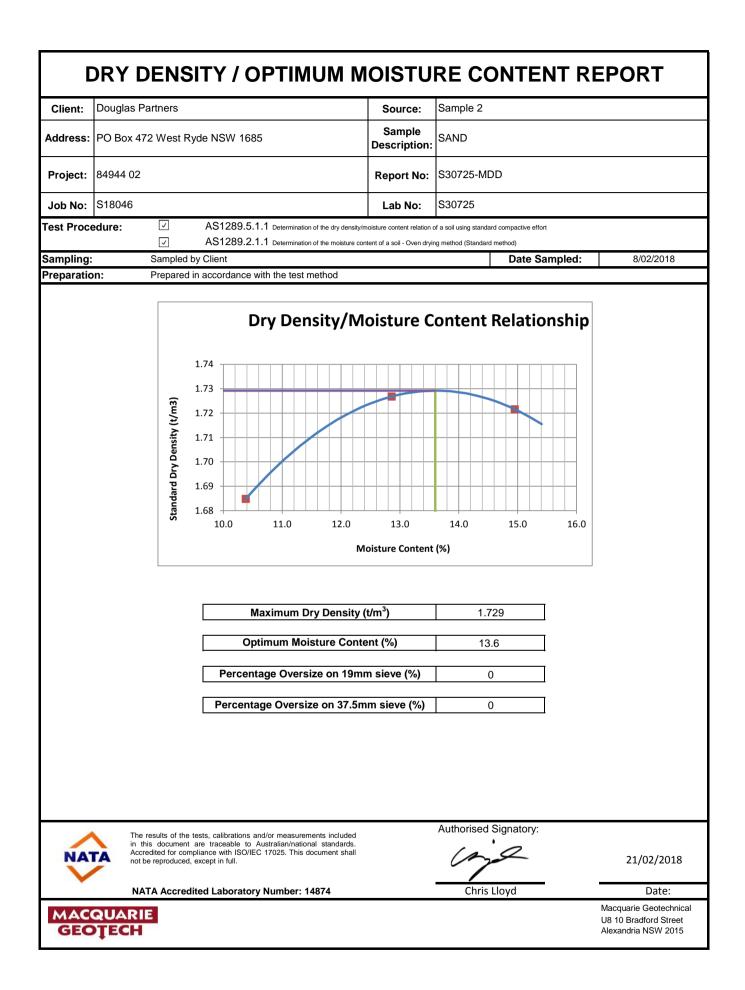




SH	EAR STR	ENG		DIREC 9 6.2.2	F SHE	AR REI	PORT	
Client:	Douglas Part	ners			irce:	Sample 2		
Address:	PO Box 472	West Ryde N	ISW 1685	Sample Description: SAND		SAND		
Project:	84944 02			Report No.:		\$30725-DS		
Job No.:	S18046			Lab	No.:	S30725		
Test Procedure:		S1289 6.2.2	2 Soil strength and consolidat	ion tests - Determination of t	he shear strength of a soil	- Direct shear test using a she	ar box	
Sampling:	Sampled by Cl	ient				Date Sample	ed:	08.02.18
Preparation:	Prepared in ac	cordance with	the test method					
			Test D	Details				
Remo	oulding Details:		95% Standar	d Compactior	n @ 100% Op	otimum Moistu	re Content	
Da	ate Tested:		22.02.18					
Size of	Shear Box (mm)		100mm squa	re				
Tes	t Parameter		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Specimen	Dimensions (mm):	100 x 100	100 x 100	100 x 100	-	-	-
Rate of S	Strain (mm/min):		0.05	0.05	0.05	-	-	-
Placement N	loisture Content (%):	13.6	13.6	13.6	-	-	-
Placement	Wet Density (t/m	³):	1.86	1.86	1.86	_	_	_
	Dry Density (t/m ³	,	1.64	1.64	1.64	_		
	(111	,-		Values	1.04			
Normal Stress at No	minated Displace	ment (kPa)						
Shear Stress at No		. ,	-	-	-	-	-	-
	Peak Shear Stres			100.0		-		
		5 (III U)	50.0	100.0	200.0	-	-	-
Peak Shear Stress (kPa)		33.7	67.8	138.7	-	-	-	
Normal Stress at Constant Volume (kPa)		-	-	-	-	-	-	
Shear Stress at Constant Volume (kPa)			-	-	-	-	-	
Normal Strees at No			Residua	I Values	1			1
Normal Stress at No			-	-	-	-	-	-
Shear Stress at No		()	-	-	-	-	-	-
Normal Stress at R			-	-	-	-	-	-
	Shear Stress (kPa	,	-	-	-	-	-	-
	t Constant Volume	,	-	-	-	-	-	-
Shear Stress at	t Constant Volume	e (kPa)	-	-	-	-	-	-
			Failure E	nvelopes	-		•	
			Friatio	n Anglo (º)	Peak	Values	Residua	al Values
At Displace	ement		Friction Angle (°) Cohesion (kPa)			-		-
-				Correlation		-		-
•				n Angle (°)		4.6		-
Shear St	ress		Cohesion (kPa) Correlation		0.0 1.0000		-	
			Friction Angle (°)		-			
At Constant Volume			Cohesion (kPa)			-		-
			(Correlation		-		-
	ne results of the tests, cali ocument are traceable to mpliance with ISO/IEC 1: ccept in full.	Australian/nationa 025. This docum	al standards. Accred ent shall not be repr	lited for oduced,	Authorise	d Signatory:		2/2018
MACQUARIE GEOŢECH	_	Facility Name:	ry Number: 148 Sydney Branch Sit n: 8/10 Bradford S	e	NSW 2015		Da	ite:







Report Number:	84944.02-1
Issue Number:	1
Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150A
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH203 (1.0 - 1.45m)
Material:	Filling - Light grey gravelly sand filling with trace of silt

Particle Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Lin	nits	
53 mm	100			
37.5 mm	77			
26.5 mm	77			
19 mm	77			
13.2 mm	75			
9.5 mm	74			
6.7 mm	73			
4.75 mm	73			
2.36 mm	71			
1.18 mm	70			
0.6 mm	67			
0.425 mm	60			
0.3 mm	26			
0.15 mm	3			
0.075 mm	2			

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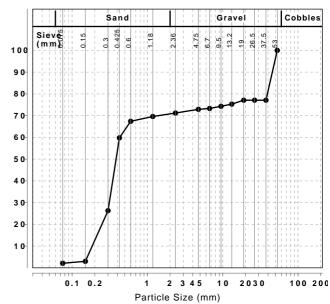
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Percent Passing

Approved Signatory: Lujia Wu NATA Accredited Laboratory Number: 828

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Report Number:	84944.02-1
Issue Number:	1
Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150B
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH203 (5.5 - 5.95m)
Material:	Sand - Yellow brown sand

Particle Distribution (AS1289 3.6.1)

Particle Distribution (AS	1289 3.6.1)	
Sieve	Passed %	Passing Limits
19 mm	100	
13.2 mm	100	
9.5 mm	100	
6.7 mm	100	
4.75 mm	100	
2.36 mm	100	
1.18 mm	100	
0.6 mm	100	
0.425 mm	97	
0.3 mm	53	
0.15 mm	1	
0.075 mm	1	

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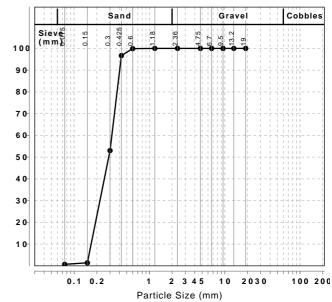


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Report Number:	84944.02-1
Issue Number:	1
Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150C
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH204 (1.0 - 1.45m)
Material:	Filling - Yellow brown, slightly gravelly, sand filling with trace of silt

Particle Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Lin	nits	
37.5 mm	100			
26.5 mm	94			
19 mm	90			
13.2 mm	89			
9.5 mm	88			
6.7 mm	87			
4.75 mm	86			
2.36 mm	82			
1.18 mm	79			
0.6 mm	72			
0.425 mm	60			
0.3 mm	31			
0.15 mm	5			
0.075 mm	3			

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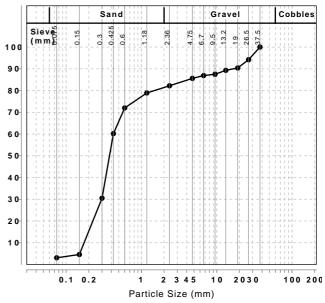
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Report Number:	84944.02-1
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Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150D
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH204 (2.5 - 2.95m)
Material:	Filling - Light grey sand filling with trace of gravel and silt

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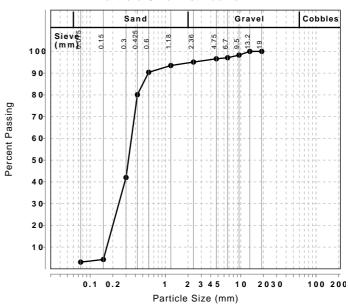
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	on (AS1289 3.6.1)	Describer Linette
Sieve	Passed %	Passing Limits
19 mm	100	
13.2 mm	100	
9.5 mm	98	
6.7 mm	97	
4.75 mm	97	
2.36 mm	95	
1.18 mm	94	
0.6 mm	90	
0.425 mm	80	
0.3 mm	42	
0.15 mm	4	
0.075 mm	3	

Report Number:	84944.02-1
Issue Number:	1
Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150E
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH204 (5.5 - 5.95m)
Material:	Sand - Yellow brown sand

Particle Distribution (AS1289 3.6.1

Particle Distribution (AS	51289 3.6.1)	
Sieve	Passed %	Passing Limits
19 mm	100	
13.2 mm	100	
9.5 mm	100	
6.7 mm	100	
4.75 mm	100	
2.36 mm	100	
1.18 mm	100	
0.6 mm	100	
0.425 mm	98	
0.3 mm	58	
0.15 mm	2	
0.075 mm	1	

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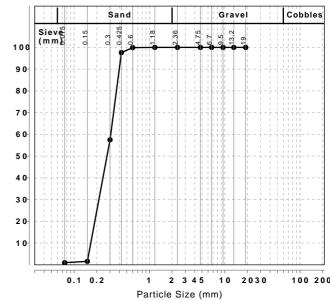


Percent Passing

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Report Number:	84944.02-1
Issue Number:	1
Date Issued:	15/01/2018
Client:	Cranbrook School
	5 Victoria Road, Bellevue Hill NSW 2023
Contact:	Mark Flanagan
Project Number:	84944.02
Project Name:	Additional Investigation
Project Location:	New South Head Road, Bellevue Hill
Work Request:	2150
Sample Number:	18-2150F
Date Sampled:	08/01/2018
Sampling Method:	Sampled by Engineering Department
Sample Location:	BH204 (14.5 - 14.95m)
Material:	Sand - Yellow brown sand with trace of silt

Particle Distribution (AS1289 3.6.1)

Particle Distributio	on (AS1289 3.6.1)	
Sieve	Passed %	Passing Limits
19 mm	100	
13.2 mm	100	
9.5 mm	100	
6.7 mm	100	
4.75 mm	100	
2.36 mm	100	
1.18 mm	100	
0.6 mm	100	
0.425 mm	92	
0.3 mm	45	
0.15 mm	3	
0.075 mm	2	

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