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.

	Signature	Date
Author	Allilia	3 October 2018
Reviewer	buchase Bha	3 October 2018





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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.



Table 1A: Summary of Material Strata Levels

Chroto				RL of Top	of Mater	ial 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
vI to I 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

Notes: vI = very loose; I = loose; md = medium dense; d = dense; MS = medium strength; HS = high strength;

NE = not encountered

Table 1B: Summary of Material Strata Levels

011	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		

 $Notes: \ vI = very\ loose;\ I = loose;\ md = medium\ dense;\ d = dense;\ MS = medium\ strength;\ HS = high\ strength;$ 

NE = not encountered; N/A = not applicable as bore was drilled to find top of rock only



Table 1C: Summary of Material Strata Levels

Otroto	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			
vI to I 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			

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.

Table 2: Levels of Refusal in Dynamic Penetrometer Tests (m, AHD)

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

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.



Table 3: Groundwater Level Measurements in Monitoring Wells

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

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.

**Table 4: Summary of Uniaxial Compressive Strength Results** 

Borehole	Depth (m)	Description	UCS (MPa)	Is <sub>50</sub> (MPa)	UCS: Is <sub>50</sub> 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

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<sub>50</sub> 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  $\mu$ S/cm and 200  $\mu$ 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.

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

Sample/Depth (m)	Description	pH (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

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 groutinjected 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.

**Table 6: Material and Strength Parameters for Excavation Support Structures** 

Material	Bulk Density (kN/m³)	Friction Angle (deg.)	Cohesion (kPa)	Young's Modulus (MPa)	Coefficient of Active Earth Pressure (Ka)	Coefficient of Earth Pressure at Rest (K <sub>o</sub> )	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

Notes: vI = very loose; I = 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: Design Parameters for Spread Footings** 

Material Description	Allowable Bearing Pressure (kPa) <sup>1</sup>	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: <sup>1</sup>Provided 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.



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

	Allowable Parameters		Ultimate P	Variable	
Material Description	Adhesion		End-Bearing Pressure (kPa)	Shaft Adhesion (kPa) <sup>1</sup>	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

Notes: 1 Only 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

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

## About this Report Douglas Partners

### Introduction

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

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

### Copyright

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;
- 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 Methods Douglas Partners

### 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:

> 4,6,7 N=13

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

15, 30/40 mm

### 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 Douglas Partners Discriptions

### **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	1	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

### Soil Descriptions

### Soil Origin

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

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

Transported soils may be further subdivided into:

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

### **Rock Strength**

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

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

<sup>\*</sup> 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	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:

RQD % = <u>cumulative length of 'sound' core sections ≥ 100 mm long</u> total drilled length of section being assessed

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

### **Stratification Spacing**

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

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

## Symbols & Abbreviations Douglas Partners

### Introduction

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

### **Drilling or Excavation Methods**

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

NQ Diamond core - 47 mm dia HQ Diamond core - 63 mm dia PQ Diamond core - 81 mm dia

### Water

### **Sampling and Testing**

A Auger sample
B Bulk sample
D Disturbed sample
E Environmental sample

U<sub>50</sub> Undisturbed tube sample (50mm)

W Water sample

pp pocket penetrometer (kPa)
 PID Photo ionisation detector
 PL Point load strength Is(50) MPa
 S Standard Penetration Test

V Shear vane (kPa)

### **Description of Defects in Rock**

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

### **Defect Type**

B Bedding plane
Cs Clay seam
Cv Cleavage
Cz Crushed zone
Ds Decomposed seam

F Fault
J Joint
Lam lamination
Pt Parting
Sz Sheared Zone

V Vein

### Orientation

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

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

### **Coating or Infilling Term**

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

### **Coating Descriptor**

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

### Shape

cu curved ir irregular pl planar st stepped un undulating

### Roughness

po polished ro rough sl slickensided sm smooth vr very rough

### Other

fg fragmented bnd band qtz quartz

### Symbols & Abbreviations

### **Graphic Symbols for Soil and Rock**

Talus

Graphic Syl	mbols for Soil and Rock		
General		Sedimentary	Rocks
	Asphalt		Boulder conglomerate
	Road base		Conglomerate
A . A . A . A B . B . B . L	Concrete		Conglomeratic sandstone
	Filling		Sandstone
Soils			Siltstone
	Topsoil		Laminite
	Peat		Mudstone, claystone, shale
	Clay		Coal
	Silty clay		Limestone
	Sandy clay	Metamorphic	Rocks
	Gravelly clay		Slate, phyllite, schist
-/-/-/-	Shaly clay	+ + +	Gneiss
	Silt		Quartzite
	Clayey silt	Igneous Roc	ks
	Sandy silt	+ + + + + + + , + , +	Granite
	Sand	<	Dolerite, basalt, andesite
	Clayey sand	× × × × × × × × × × × × × × × × × × ×	Dacite, epidote
. . . . . .	Silty sand	\ \ \ \ \	Tuff, breccia
	Gravel		Porphyry
	Sandy gravel		
	Cobbles, boulders		

### Cone Penetration Tests

## Partners

### Introduction

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

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

•	Cone tip resistance	$q_c$
•	Sleeve friction	$f_s$
•	Inclination (from vertical)	i
•	Depth below ground	Z

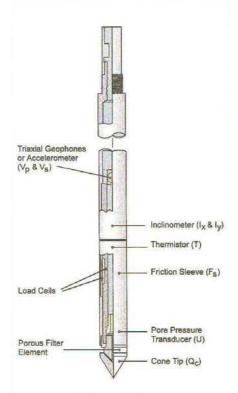


Figure 1: Cone Diagram

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

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



Figure 2: Purpose built CPT rig

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

### **Types of CPTs**

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

Туре	Measures
Standard	Basic parameters (q <sub>c</sub> , f <sub>s</sub> , 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 <sub>s</sub> ), compression wave velocity (V <sub>p</sub> ), 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)

### Cone Penetration Tests

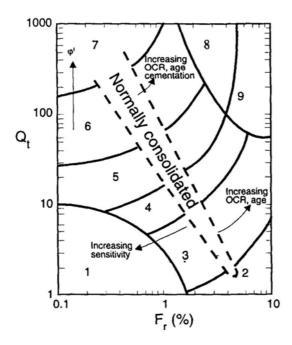


Figure 3: Soil Classification Chart

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.

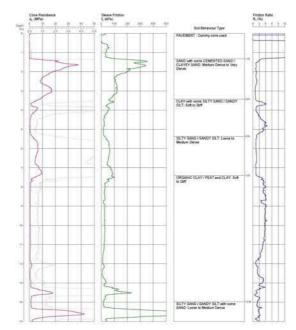
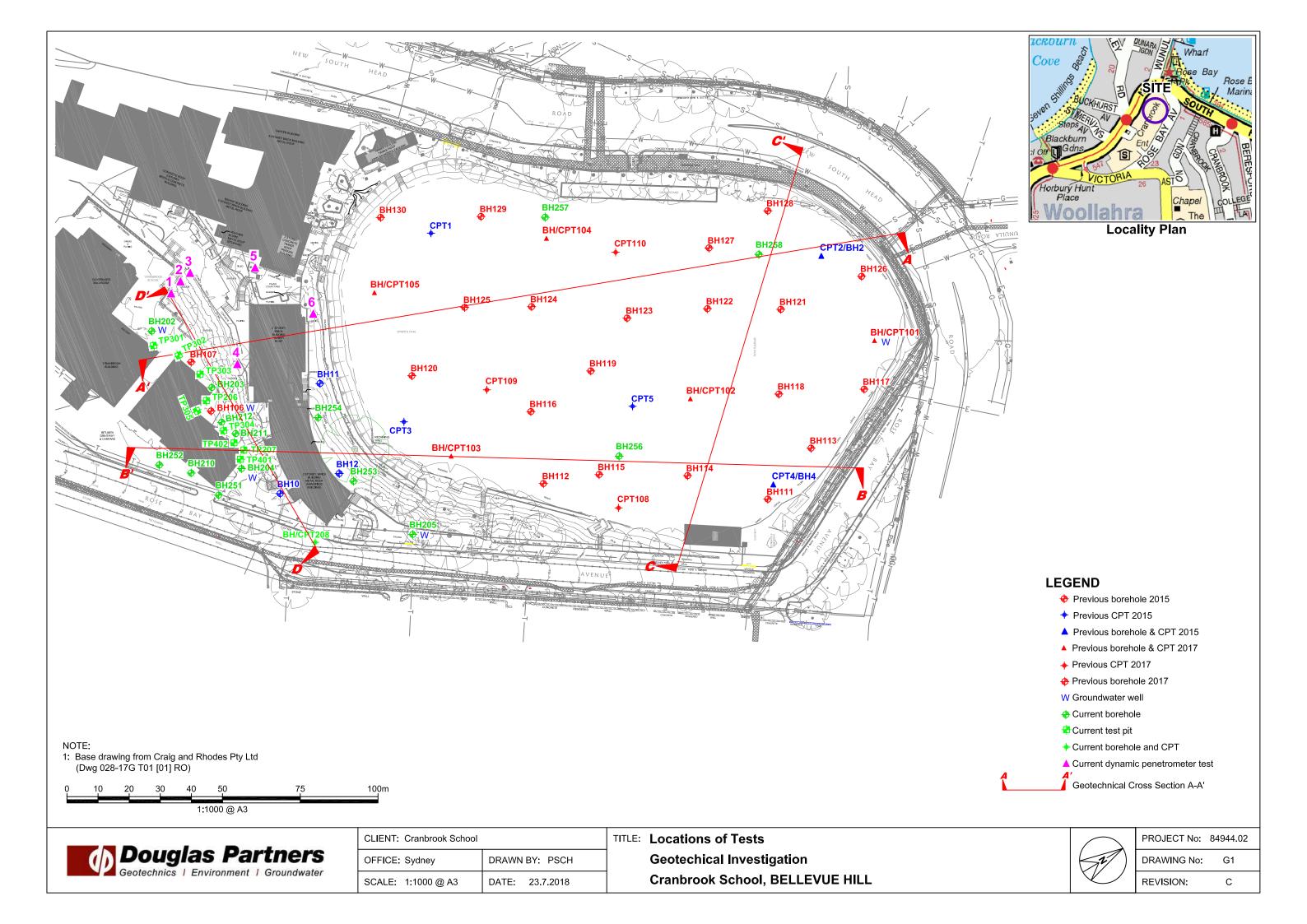
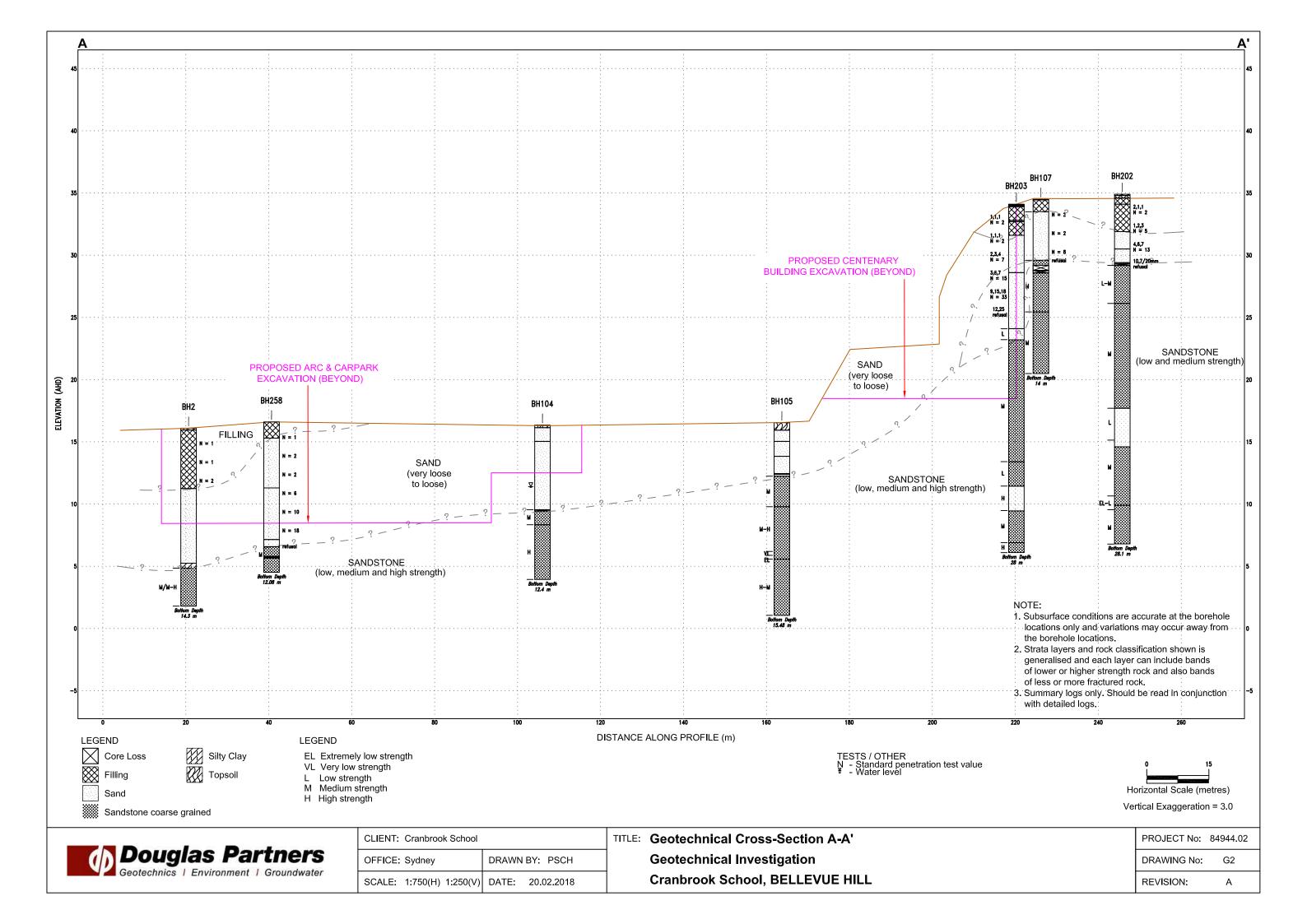


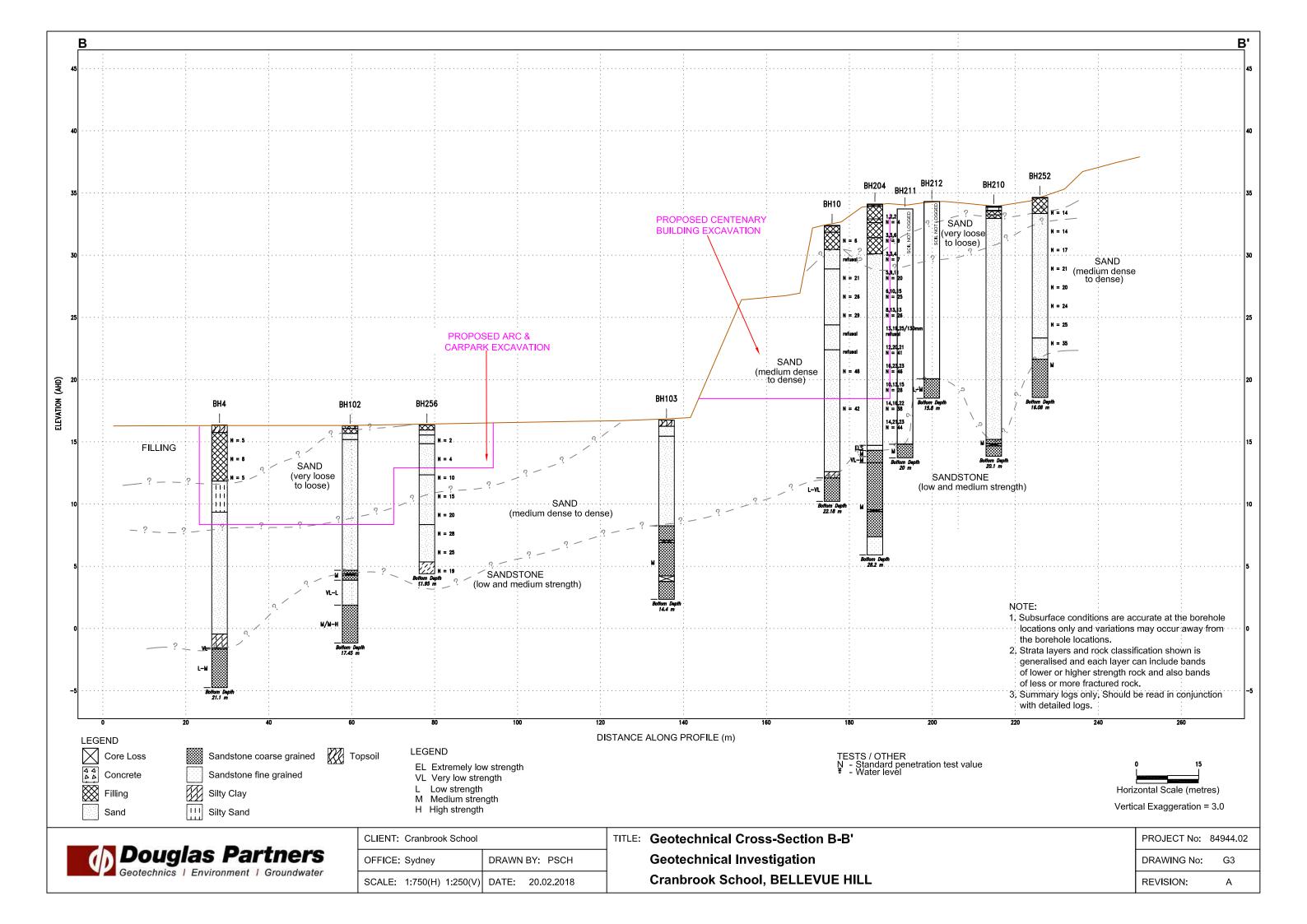
Figure 4: Sample Cone Plot

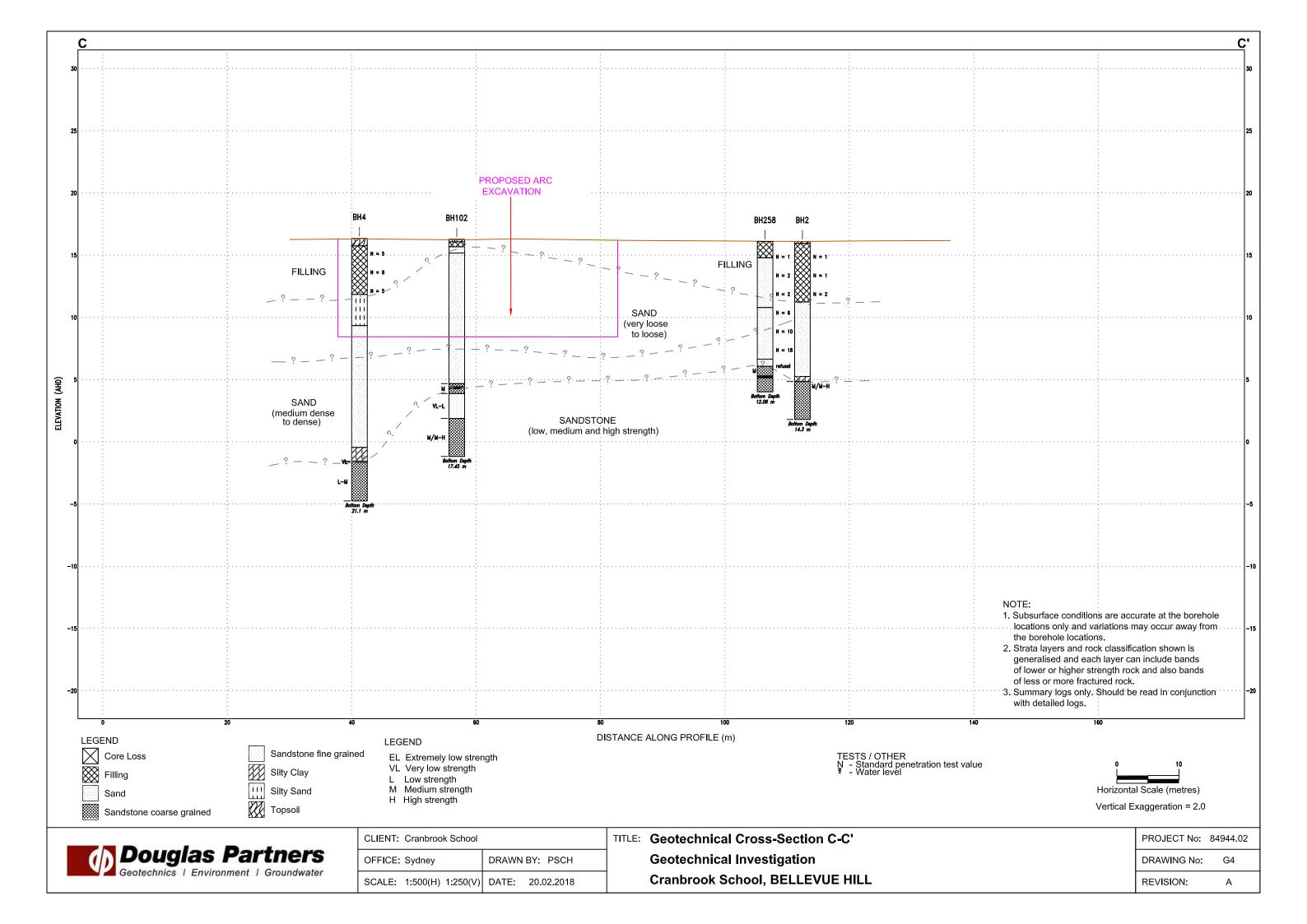
## Appendix B

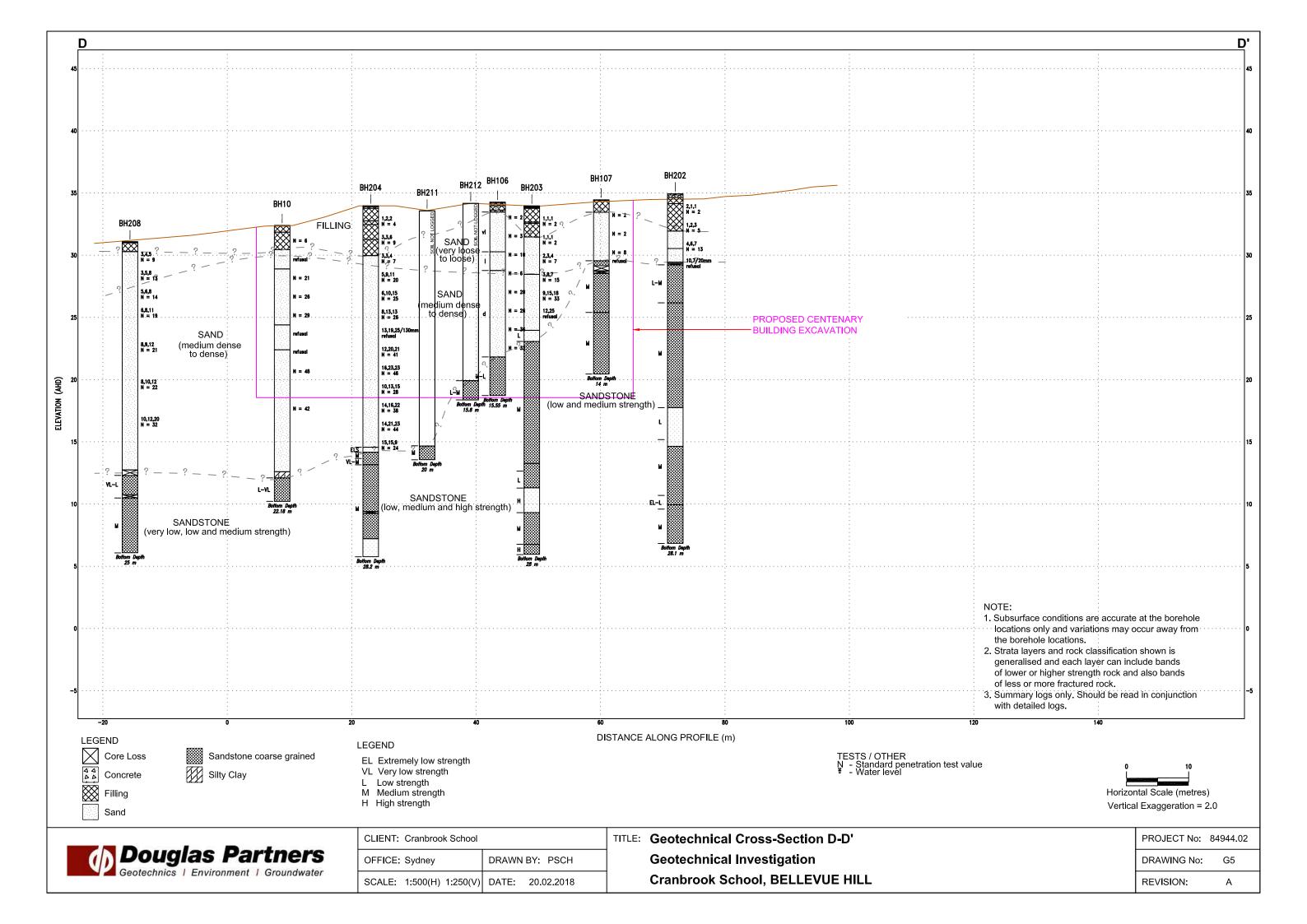
Drawings

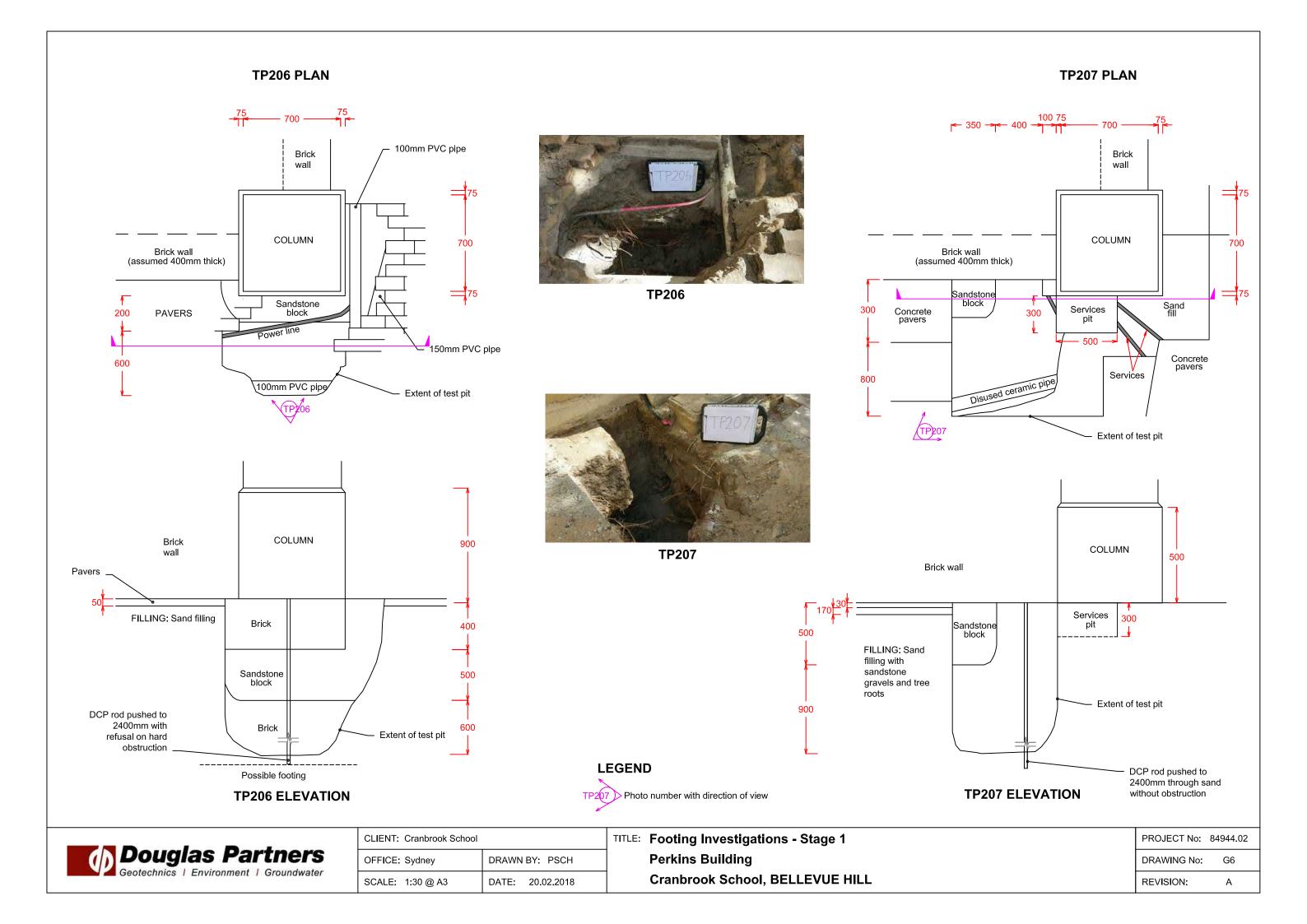




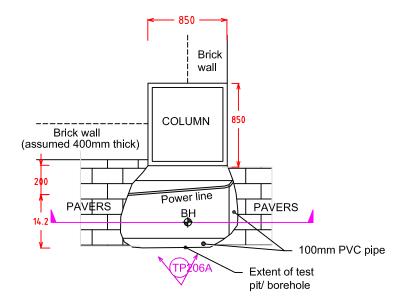


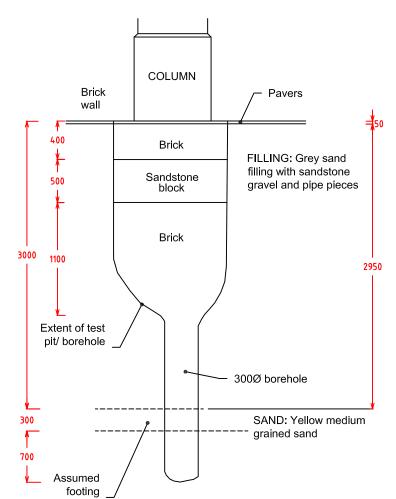






#### **TP206A PLAN**





**TP206A ELEVATION** 

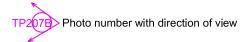


**TP206A** 

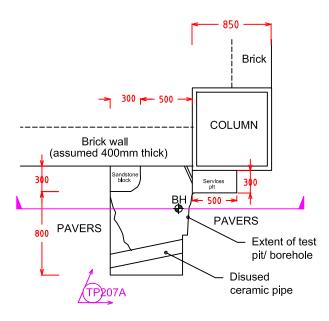


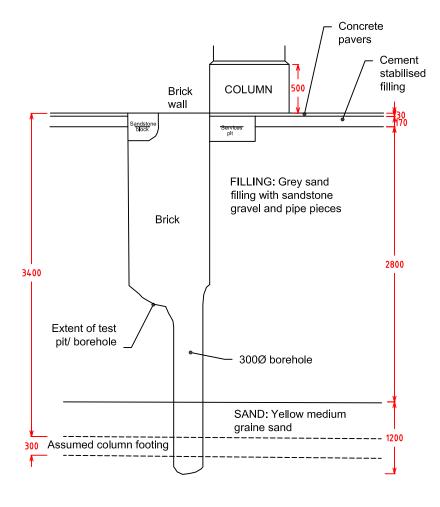
**TP207A** 

#### **LEGEND**



#### **TP207A PLAN**





**TP207A ELEVATION** 



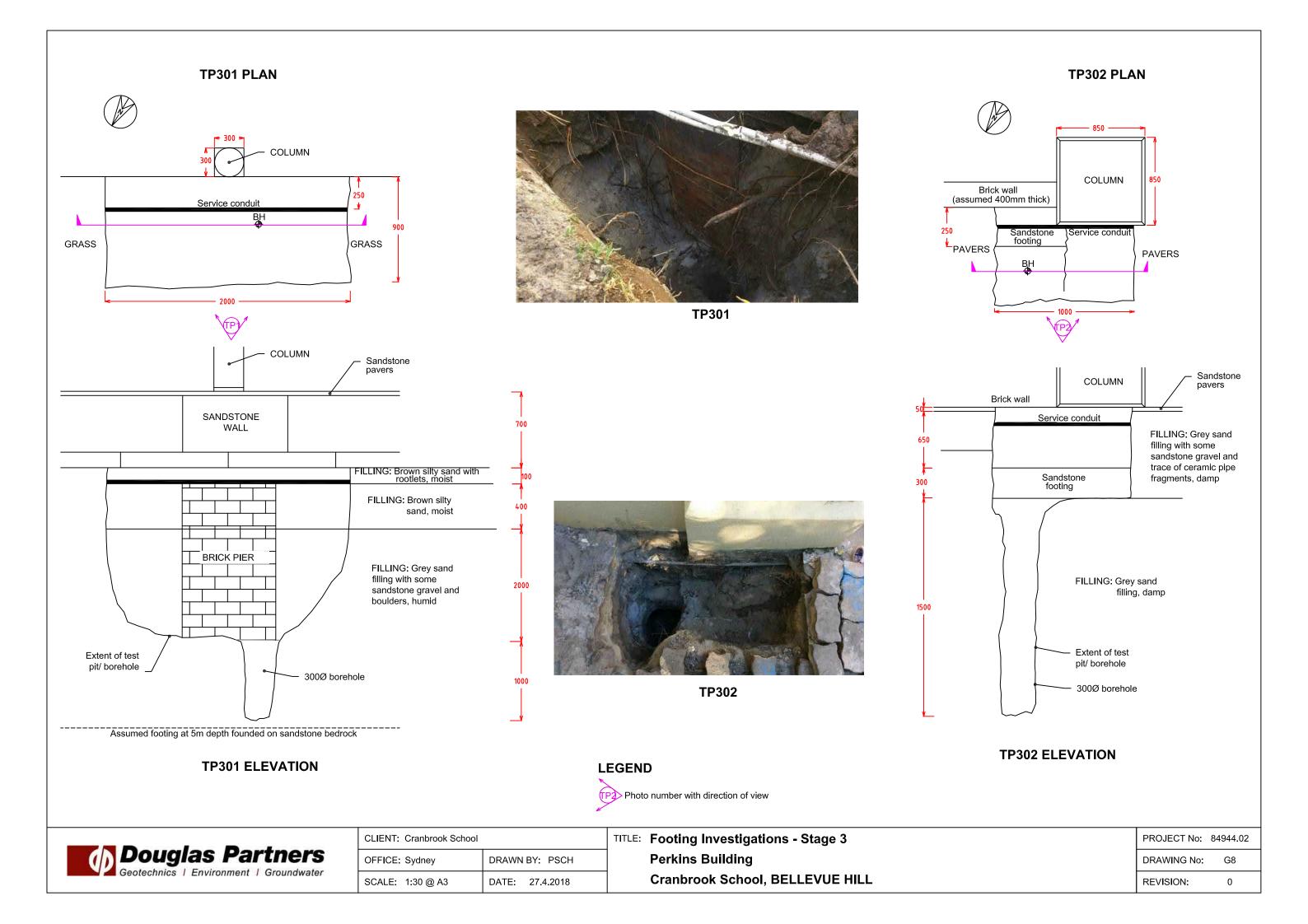
CLIENT: Cranbrook School						
OFFICE: Sydney	DRAWN BY: PSCH					
SCALE: 1:30 @ A3	DATE: 20.02.2018					

Perkins Building
Cranbrook School, BELLEVUE HILL

PROJECT No: 84944.02

DRAWING No: G7

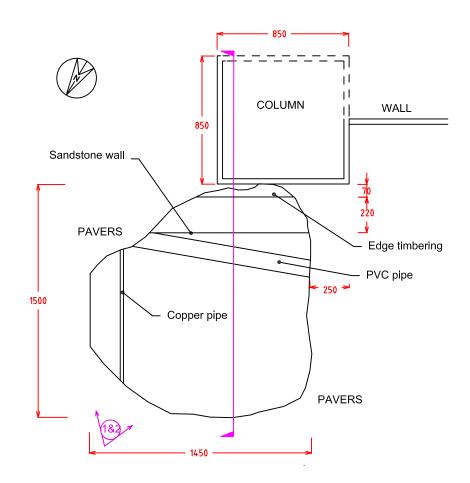
REVISION: A



# **TP303 ELEVATION** Ground level COLUMN **PAVERS** FILLING: dark brown silty sand (fine to medium grained) with roots and bricks FILLING: pale grey fine PVC grained filling FILLING: brown slightly silty sand (medium grained) filling with concrete, slate, terracota and brick fragments <del>|<</del> 220 -Sandstone block



#### **TP303 PLAN**





dh	Douglas Partners  Geotechnics   Environment   Groundwater
Y	Geotechnics   Environment   Groundwater

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

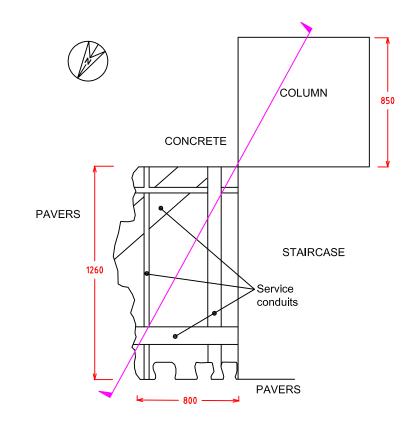
Perkins Building
Cranbrook School, BELLEVUE HILL

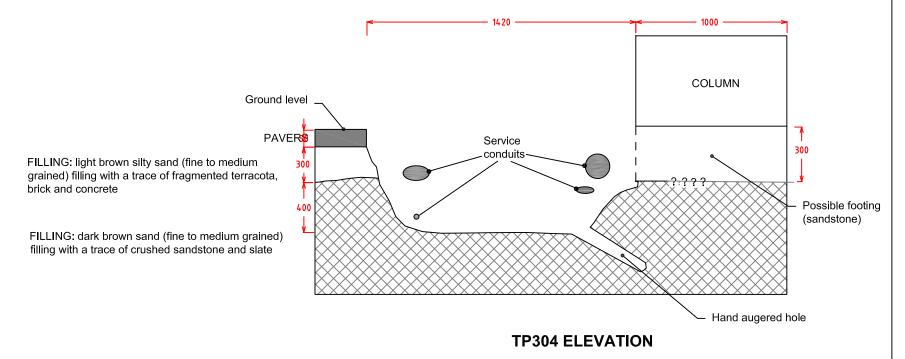
PROJECT No:	84944.02
DRAWING No:	G9
REVISION:	0

## **TP304 PLAN**









dh	Douglas Partners  Geotechnics   Environment   Groundwater
	Geotechnics   Environment   Groundwater

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

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

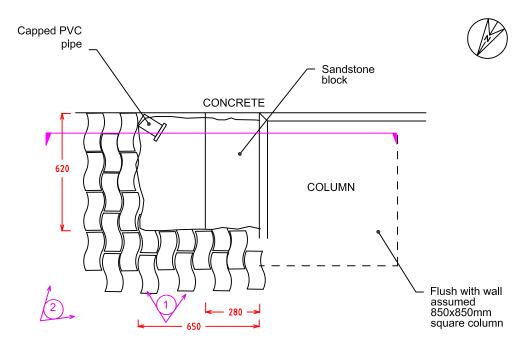
PROJECT No:	84944.02
DRAWING No:	G10

0

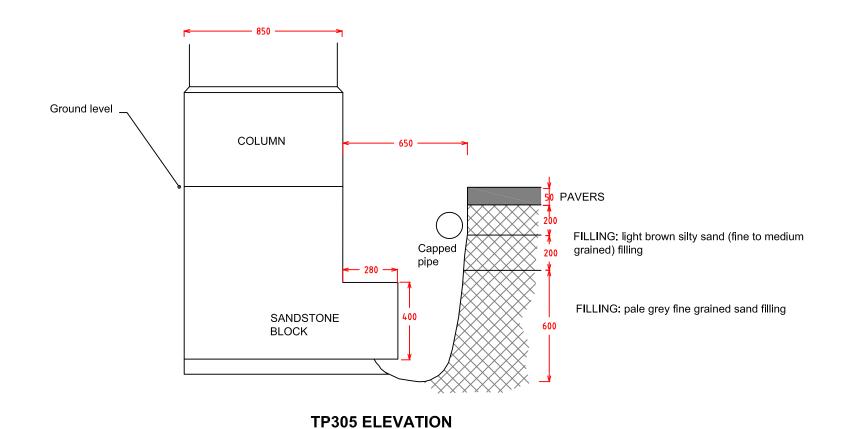
REVISION:

#### **TP305 PLAN**











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

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

PROJECT No: 84944.02

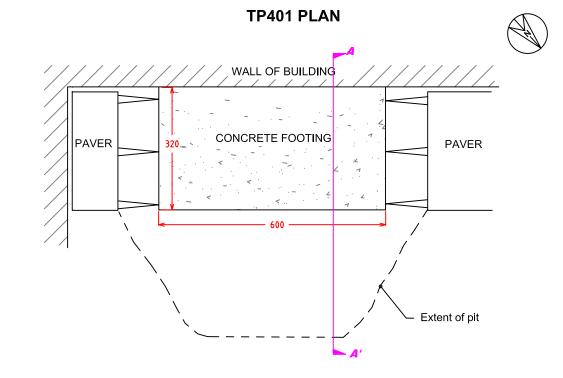
DRAWING No: G11

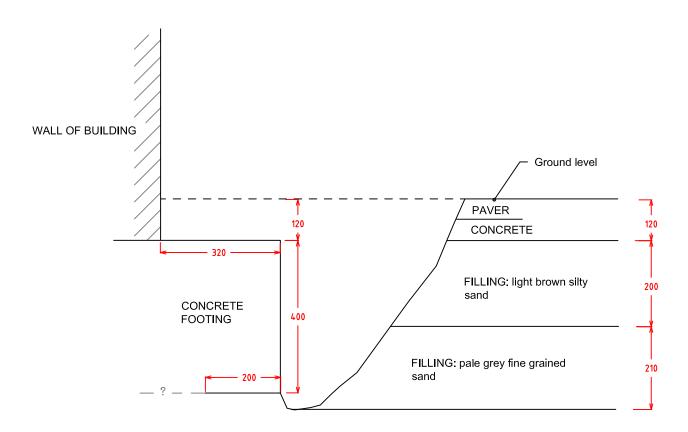
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REVISION:









## TP401 Section A-A'

DPT rod inserted at the base of the footing at angle of about 45°. It was inserted to a depth of 1.9m and no footing or hard surface was encountered.



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

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

PROJECT No: 84944.02

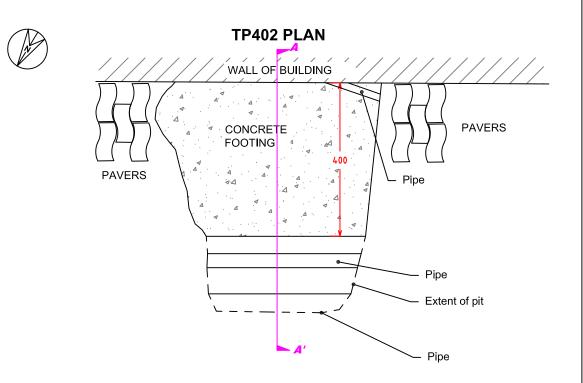
DRAWING No: G12

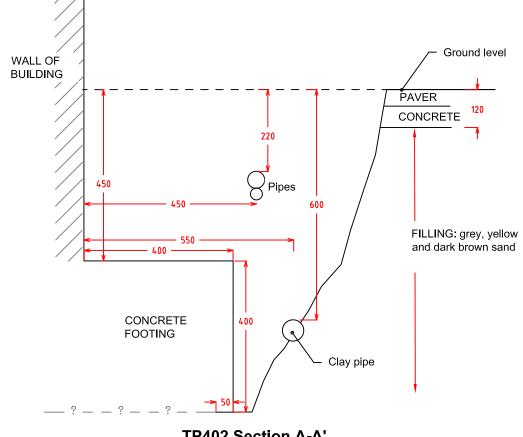
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REVISION:









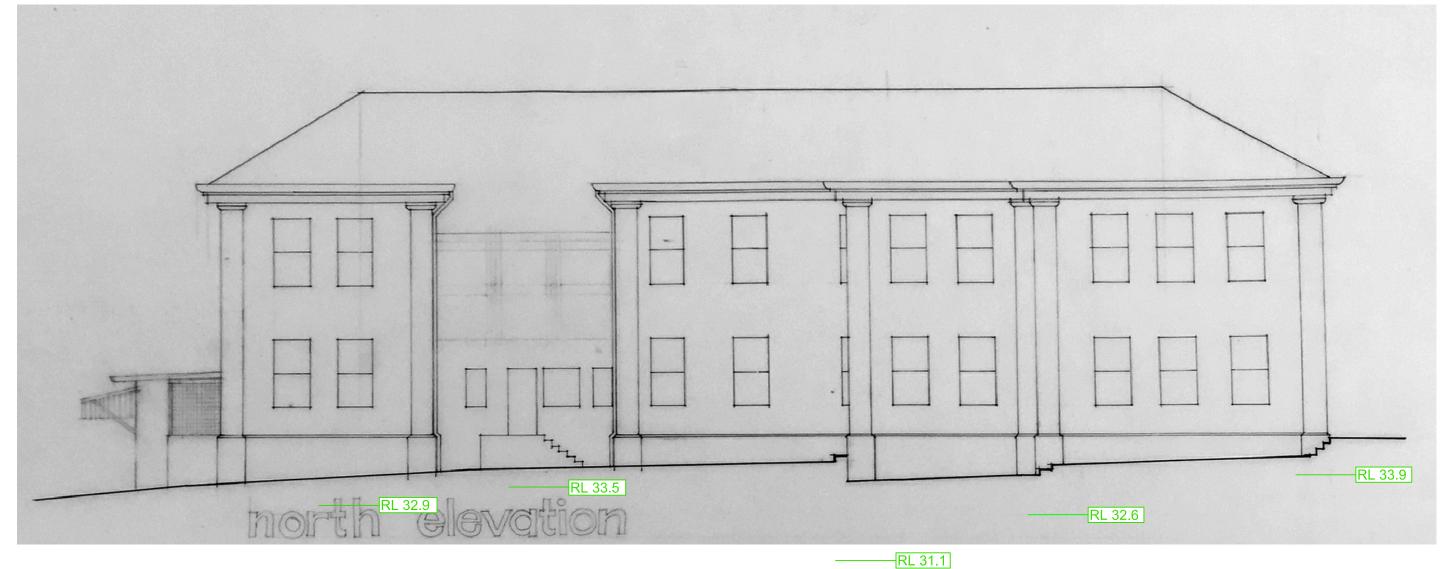
TP402 Section A-A'

DPT rod inserted at the base of the footing at angle of about 60°. It was inserted to a depth of 1.9m and no footing or hard surface was encountered.



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

TITLE: Footing Investigations - Stage 4 Perkins Building Cranbrook School, BELLEVUE HILL PROJECT No: 84944.02 DRAWING No: G13 REVISION: 0



-RL 30.2

Douglas Partners

Geotechnics | Environment | Groundwater

CLIENT: Cranbrook School	
OFFICE: Sydney	DRAWN BY: PSCH
SCALE: N.T.S.	DATE: 4.10.2018

TITLE: Approximate Footing Levels Along Northern Elevation **Perkins Building** Cranbrook School, BELLEVUE HILL

PROJECT No: 84944.02 DRAWING No: G14 REVISION: 0

# Appendix C

Borehole Logs

CLIENT: Cranbrook School PROJECT: Stage 1 Development

LOCATION: Victoria Road, Bellevue Hill SURFACE LEVEL: 16.10 AHD

**EASTING: NORTHING: DIP/AZIMUTH:** 90°/-- **BORE No:** 2

**PROJECT No: 84944 DATE:** 7/7/2015 SHEET 1 OF 2

П		Description	Degree of Weathering		Rock Strength		Fracture	Discontinuities	Sa	ampling &	In Situ Testing
귒	Depth	of	vveathering	8 3		Water	Spacing	B - Bedding J - Joint			
	(m)	Strata	M M W S S S S S S S S S S S S S S S S S	Log	Medium High Very High	V 10.0	0.05 0.10 1.00 ( <b>m</b> )	S - Shear F - Fault	Туре	Core Rec. % RQD %	& Comments
-9-		TOPSOIL - dark brown, silty sand	im i Σ ω ii ii	اللار الم	۩ٛڒٙڴڗؾ؆ڐ	ō	00 00			ш.	Comments
15	0.15	topsoil with trace rootlets, damp  FILLING - poorly compacted, dark brown and light grey-brown mottled, silty sand, damp							_E_ S		1,0,1 N = 1
14	2								E		N = 1
				$\otimes$					s		0,0,1 N = 1
[	3			$\times$					E		N = 1
13									E		
12	4								S S		1,1,1 N = 2
	4.85 ·	SAND - light yellow-brown, medium grained sand, damp							Е		
	6										
-0 -	7					  -  -  -					
	9										
						  -  -  -					

CASING: HQ to 9.5m RIG: Bobcat DRILLER: SY LOGGED: MP/SI

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:** 

SAMPLING & IN SITU	TESTING	LEGI	ENL
G Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level G PU×W △♥



**CLIENT:** Cranbrook School PROJECT: Stage 1 Development Victoria Road, Bellevue Hill LOCATION:

**EASTING: NORTHING:**  **BORE No:** 2 **PROJECT No: 84944** 

**DATE:** 7/7/2015 SHEET 2 OF 2

**DIP/AZIMUTH:** 90°/--

SURFACE LEVEL: 16.10 AHD

	Dent	Description	Degree of Weathering	S _	Rock Strength	Fracture	Discontinuities				n Situ Testing
귐	Depth (m)	of		Srapt Log	Very Low Very Low Nedium High Very High Ex High Ex High	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	ار ارم	Test Results &
			EW HW EW	Θ	Kery Very Very Very Very Very Very Very V	0.05 0.10 0.50 1.00	S - Shear F - Fault	T	S &	χ°	Comments
9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 -	10.85 -	SAND - light yellow-brown, medium grained sand, damp (continued)  SILTY CLAY - light grey, silty clay					Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
4	11.25	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				11 1					PL(A) = 0.5
3	13						12.34-12.37m: Cs 12.58-12.60m: fg	С	100	86	PL(A) = 0.7
2	14	13.85-14.15m: very low strength siltstone bands					13.83m: J65°, un, ro, cly \ 14.1m: B5°, cly co				PL(A) = 1.2 PL(A) = 0.4
ŧ	14.3	Bore discontinued at 14.3m	<del>                                     </del>		<del>                                     </del>	<del>      •        </del>	14.15m: J30°, pl, sm, cly				1 = (/1) = 0.4
	15										
0	16										
	17										
-5	18					ii ii					
۳.	19										

LOGGED: MP/SI CASING: HQ to 9.5m DRILLER: SY

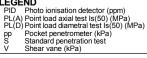
TYPE OF BORING: Solid flight auger to 9.5m; Rotary to 11.25m; NMLC-Coring to 14.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

**REMARKS:** 

		SAMPLING	& IN SITU TESTING	3 LEGE	ND
Α	Auger sample	G	Gas sample	PID	Photo ionis
В	Bulk sample	Р	Piston sample	PL(A)	Point load
DI L	Plack cample	- 11	Tubo cample (v mm dia )	ים / ום	Doint load

Water sample Water seep Water level Core drilling
Disturbed sample
Environmental sample





**CLIENT:** Cranbrook School PROJECT: Stage 1 Development

Victoria Road, Bellevue Hill LOCATION:

SURFACE LEVEL: 16.35 AHD

**PROJECT No: 84944 EASTING: NORTHING: DATE:** 3/7/2015 SHEET 1 OF 3

**BORE No:** 4

DIP/AZIMUTH: 90°/--

		Description	Degree of Weathering pides	Rock Strength	Fracture	Discontinuities	Sa		g & In Situ Testing
귒	Depth (m)	of	graph	Ex Low Very Low Medium High Very High Ex High	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	Test Results &
			WH WW S R R	Low Medi High Very Very Very Ex H		S - Shear F - Fault	F	Q & g	Comments
16	- 0.6	TOPSOIL - dark brown, silty sand topsoil with trace rootlets, damp					E		
	- 1 - 1	FILLING - dark brown and grey-brown, silty sand filling, damp					s	-	2,2,3 N = 5
15	-2						E	-	N = 5
- 41	-	- becoming slightly silty and yellow-brown mottled below 2.0m					s		3,4,4 N = 8
13	-3 -3 -						E		N = 8
12	-4 -4 	4.0-4.5m: trace organic material					E S		1,2,3 N = 5
- 11	5 5	SILTY SAND - brown and brown-grey, fine to medium grained sand, damp							
	- - - - -6			.					
10	- - - - -7 7.0								
-6	-	SAND - yellow-brown, medium grained sand, damp							
- 8	- -8 - - -								
	- -9 -								
-	-								

CASING: HW to 11.5m RIG: Bobcat DRILLER: SY LOGGED: MP/SI

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:** 

#### **SAMPLING & IN SITU TESTING LEGEND**

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



CLIENT: Cranbrook School

**PROJECT:** Stage 1 Development **LOCATION:** Victoria Road, Bellevue Hill

**SURFACE LEVEL: 16.35 AHD** 

**DIP/AZIMUTH:** 90°/--

**EASTING:** PROJECT No: 84944 NORTHING: DATE: 3/7/2015

SHEET 2 OF 3

**BORE No:** 4

_				ree of thering of the ring of				. 90 / <b>3</b> Hi		IEE1 2 OF 3			
	<b>.</b>	Description	Degree of Weathering	. <u>2</u>	Rock Strength	<u></u>	Fracture	Discontinuities				n Situ Testing	
귐	Depth (m)	of		Log	Strength  Nedium  Nedium  Nedium  Nety High  Net High  X High	Nate	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	ص %	Test Results &	
		Strata	E S S E	0	Kery Kery Kery Kery Kery Kery Kery Kery	_	0.00 0.10 0.50 0.00 0.50 0.50 0.50 0.50	S - Shear F - Fault	F	S &	Ŋ,	Comments	
ŀ	-	SAND - yellow-brown, medium grained sand, damp (continued)			.								
-9													
ŀ	-												
ŀ	-11												
F	- '												
-2	-												
[	-												
Ė	- -12												
-													
-4	-												
ŀ													
Ē	- -13												
<u></u>	[												
F	-						 						
ŀ	-												
-	- -14												
-2	-												
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F	-												
ŀ	- 15												
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Ė	-												
ŀ	-												
Ė	- 16 -												
-													
[	-												
ŀ	- 16.8 -	SILTY CLAY - light grey, silty clay											
-	- 17 - -							Note: Unless otherwise stated, rock is fractured					
-	-							along rough planar bedding dipping 0°- 10°					
-				1				bedding dippling 0 - 10					
F	- - 17.9 -18 18.0	SANDSTONE - very low strength,		<u>/.i.</u>			 						
Ė	- 18.01	light grey-brown, fine to medium grained sandstone				T							
-7		SANDSTONE - low and medium						18.27 & 18.46m: B (x2) 5°- 10°, cly vn, ti				PL(A) = 0.5	
F	-	strength, highly to moderately then slightly weathered, slightly fractured, red-brown then light brown, medium					<b>  </b>         <b>  </b>	, , , , ,				(, ,) 0.0	
ŀ	- - 19	red-brown then light brown, medium grained sandstone with some very			╽┆┆┆				С	100	91		
-		low strength bands						19.2m: B10°, fe, cly					
-7	-							19.5-19.55m: Cs				DL (A)	
-					<b> </b>			19.5-19.55III: US				PL(A) = 0.2	
Ŀ	-			::::::									

RIG: Bobcat 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:** 

## SAMPLING & IN SITU TESTING LEGEND G Gas sample PID Pho

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



**CLIENT:** Cranbrook School **PROJECT:** Stage 1 Development

LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL:** 16.35 AHD

**EASTING: PROJECT No:** 84944 **NORTHING: DATE:** 3/7/2015 **SHEET** 3 OF 3

**BORE No:** 4

		Description	Degree of Weathering Graphic Graphic Part of the Part	Rock Strength	Fracture	Discontinuities				n Situ Testing
R	Depth (m)	of	3raph	Ex Low Very Low Medium High Very High Ex High Ex High Order	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Туре	ore 3c. %	RQD %	Test Results &
F		Strata SANDSTONE - low and medium	WHEN SER	Very Lex High	0.05	S - Snear F - Fault	<u> </u>	0 %	ır.	Comments
-4	-	strength, highly to moderately then slightly weathered, slightly fractured, red-brown then light brown, medium grained sandstone with some very low strength bands (continued)				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 - 21.1	Bore discontinued at 21.1m			<del>                                      </del>					PL(A) = 0.4
	- 22									
Ė	-									
9-	-									
Ė	- 23									
	-									
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		I						1	$\Box$	

RIG: Bobcat 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:

#### **SAMPLING & IN SITU TESTING LEGEND**

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



**CLIENT:** Cranbrook School **PROJECT:** Stage 1 Development

LOCATION: Victoria Road, Bellevue Hill

SURFACE LEVEL: 30.0 AHD

EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 7

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

Г			Description	je		Sam		& In Situ Testing		Dynamic Penetrometer Test
씸	De (r	epth m)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	(blows per 150mm)
8			Strata		Ė.	Ď	Saı	Comments		5 10 15 20
+	-	0.07	TOPSOIL - dark brown, silty sand with trace rootlets, damp							
t			FILLING - poorly compacted, dark brown, grey and red-brown, silty sand filling with some sandstone gravel							
			and cobbles							
-	-									
ł	-									· 5
ţ										
-	-	0.04								. 👢 : :
-82	-1	0.94	SAND - loose, yellow-brown and brown, slightly silty, medium grained sand, damp							-1
ŀ	-		medium grained sand, damp							
-	-									
ł	-									
İ										
-	-									
ŀ	-	1.95								· []
-8	-2		SAND - loose, pale yellow-brown, medium grained sand, damp							-2
										7
ŀ	-									· [
ł	-									
Ţ										
-	-		becoming medium dense helevy 2.70m							. ! 🖺 !
+	-		- becoming medium dense below 2.70m							·
<u></u>	- -3									-3
"	-									
-	-									·
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İ										
26	-4	4.05							}	-4
ł	-	4.05	Bore discontinued at 4.05m							
ţ			- target depth reached							
-										
+	-									
ţ										
Į.	-									
ŀ	-									
$\sqsubseteq$	L									

RIG: Hand tools DRILLER: MP LOGGED: MP CASING: Uncased

**TYPE OF BORING:** Hand auger to 4.05m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

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

SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Stage 1 Development

LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL: 34.3 AHD** 

EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: 8

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

		Description			Sam	nplina a	& In Situ Testing		
귐	Depth	Description of	Graphic Log					Water	Dynamic Penetrometer Test (blows per 150mm)
_	(m)	Strata	Gra	Туре	Depth	Sample	Results & Comments	×	
+		BRICK PAVEMENT		Ė		ν.		+	5 10 15 20
.	0.08		$\bowtie$	1					<u> </u>
.  -		FILLING - poorly compacted, red-brown, brown and light grey, sand filling with some ripped sandstone gravel and some silt, damp							
34		some silt, damp		]					
Ī				1					
	0.53	SAND - very loose, light grey and dark brown, slightly silty	<del>                                     </del>	]					
-		sand, damp		ļ					
ŀ				}					<b>[</b>
ŀ				]					<del></del> ├┍┛
ŀ	1			1					<b>-1</b>
ŀ				ł					
		- clean sand below 1.20m		}					
"				}					5
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ŀ									<b>                                     </b>
ŀ				]					<b>                                     </b>
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ľ	2			1					
ļ				]					
3		<ul> <li>becoming slightly clayey and wet below 2.27m</li> <li>very wet to saturated below 2.35m</li> </ul>		1				▼	
ŀ	2.4	Bore discontinued at 2.4m						<u> -<del>-</del></u>	<b>-</b>
ŀ		- hole collapse							- [
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RIG: Hand tools DRILLER: MP LOGGED: MP CASING: Uncased

**TYPE OF BORING:** Hand auger to 2.40m

WATER OBSERVATIONS: Free groundwater observed at 2.35m

**REMARKS:** 

✓ Sand Penetrometer AS1289.6.3.3✓ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level

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 slandard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Stage 1 Development
LOCATION: Victoria Road, Bellevue Hill

SURFACE LEVEL: 32.4 AHD EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

**BORE No:** 10 **PROJECT No:** 84944 **DATE:** 6/7/2015 **SHEET** 1 OF 3

	- ·	Description	Degree of Weathering	.ie	Rock Strength	Fracture	Discontinuities	S	ampli	ng &	In Situ Testing
귐	Depth (m)	of		Log	ExLow Very Low Low Medium High Very High Ex High Water	Spacing (m)	B - Bedding J - Joint	Type	ore %:	RQD %	Test Results &
		Strata	EW HW EW	O	EX Low Low Low Low Low Low Low Low Low Low	0.00	S - Shear F - Fault	\ <u>\</u>	S S	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Comments
32		CONCRETE SLAB  FILLING - dark brown, silty sand, medium to coarse grained sand, damp  FILLING - light grey, medium grained sand with trace of silt, damp						E			3,3,3 N = 6
30	1.95	SAND - yellow-brown, medium grained sand with a trace of silt, damp						E	- - -		
29	-3	- loose						S	_		6,8,11* refusal
28 2	3.5	- medium dense below about 3.5m						S	-		7,9,12 N = 21
27	-5							s	-		9,12,14 N = 26
25 26	7							S	-		8,13,16 N = 29
24	8.0	- dense below about 8.0m						S	-		13,20,20/100mr refusal
23	10.0										

RIG: Bobcat 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
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
D Disturbed sample
E Environmental sample

SAMPLING & IN SITU TESTING LEGEND
PID Photo ionisation detector (ppm)
PPL(A) Point load axial test 1s(50) (MPa)
PPL(D) Point load diametral test 1s(50) (MPa)
PPL(D) Standard penatroin test
S Standard penatroin test
S Standard penatroin test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Stage 1 Development
LOCATION: Victoria Road, Bellevue Hill

EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

SURFACE LEVEL: 32.4 AHD

**BORE No:** 10 **PROJECT No:** 84944 **DATE:** 6/7/2015 **SHEET** 2 OF 3

		Description	Degree of Weathering	<u>.</u> 0	Rock Strength 5	Fracture	Discontinuities	Sa	ampling &	In Situ Testing
씸	Depth (m)	of	vvcaulening	raphi Log	Ex Low Very Low Medium High Kyery High Ex High Ex High Stranger St	Spacing (m)	B - Bedding J - Joint			
	(111)	Strata	MW AWW FS FS FS	ق	Ex Lov Very L Mediu Mediu Very F Ex High	0.050 0	S - Shear F - Fault	Туре	Core Rec. % RQD %	& Comments
П		SAND - yellow-brown, medium grained sand with a trace of silt,						s		12,26/150mm refusal
22	-	damp							1	reiusai
	-									
	-11									
21										
Ė									1	13,24,24 N = 48
	-							S		N = 48
Ė	- 12 -									
20	-									
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	:									
ŀ	- 13 - -									
19	-									
	-									
[	- 14 - -									
-8	:									
								s	]	13,16,26 N = 42
1	- - - 15								]	N = 42
	- 13									
4										
	-									
ŀ	- - 16									
	- '									
-9	[									
	-									
[	- - 17									
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15										
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[ ]	- - 18									
[ ]	[									
4	-									
ĖĖ										
	- 19									
<u> </u>										
13-	:						Note: Unless otherwise stated, rock is fractured			
<u> </u>	- - 19.8		-				along rough planar bedding dipping 0°- 10°			
Ш	-		Liiii				5 11 5 - 7			

RIG: Bobcat 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

SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
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)



CLIENT: Cranbrook School PROJECT: Stage 1 Development LOCATION: Victoria Road, Bellevue Hill SURFACE LEVEL: 32.4 AHD **EASTING: NORTHING: DIP/AZIMUTH:** 90°/--

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

		Description	Degree of Weathering	. <u>o</u>	5	Rock Strength	_	Fracture	Discontinuities	S	ampli	ng & I	n Situ Testing
귙	Depth (m)	of		Log	NO NO NO	Strength   High   Very High   KHIGh   Very High   Very	Nate	Spacing (m)	B - Bedding J - Joint	Type	ore %	RQD %	Test Results &
		Strata	F S S M H E	٥	Ex Lc	File File File		0.00 0.10 0.50 0.10 0.50	S - Shear F - Fault	F	S &	8	Comments
:		SILTY CLAY - light grey and red-brown, silty clay with trace		//									
-2	20.3	ironstone bands (continued)											PL(A) = 0.2
: [		SANDSTONE - low and very low strength, highly to moderately then			\c	<u> </u>		╎╠╗╎╎	20.48-20.6m: B (x3) 0°- 10°, fe, cly co				
:		strength, highly to moderately then slightly weathered, slightly fractured,						<b>     </b>	20.86m: B0°, cly				
: [	-21	light grey-brown, medium to coarse grained sandstone						i ii <b>l</b> ii l			400	00	
-=-								 	21.18m: B5°, fe	С	100	80	PL(A) = 0.2
Ė					-	<b>:</b>			21.55m: B10°, fe, cly				
: [								<b>  </b>					
:  -	-22 22.18				∐	<del> </del>			21.93-22.18m: J80°, pl, ro, cly inf				PL(A) = 0.1
.e	22.10	Bore discontinued at 22.18m			İ								
E					į								
-	-23												
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6													
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LOGGED: MP/SI RIG: Bobcat DRILLER: SY 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

**SAMPLING & IN SITU TESTING LEGEND** Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample

Core drilling
Disturbed sample
Environmental sample

LECEND
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)



CLIENT: Cranbrook School
PROJECT: Stage 1 Development
LOCATION: Victoria Road, Bellevue Hill

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

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

Г	Б "	Description	jc _		San		& In Situ Testing		Dynamic Penetrometer Test
R	Depth (m)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	(blows per 150mm)
		Strata		É.	ă	Sa	Comments		5 10 15 20
ŀ	_	TOPSOIL - dark brown, silty sand with trace rootlets, damp							
ŀ	- 0.2	FILLING - poorly compacted, dark brown and grey-brown, silty sand with trace of gravel and cobbles, damp							
		silty sand with trace of gravel and cobbles, damp							]
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ŀ	_								
22									
-	-1								<u> </u>
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į									[ <b>]</b>
-	-								
-	1.55								-
<u> </u>	ļ l	SAND - loose, pale yellow-brown, slightly silty, medium grained sand, damp							
-2									[ <b>L</b> j
-	-	- clean sand below 1.80m							
+	-2								-2
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+	-3								-3
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-	-	- becoming medium dense below 3.30m							-
-	_								· : : 7: :
-61	-								
[-									
-	-								-
f	-4 4.0	Bore discontinued at 4.0m	1						4
ţ		- target depth reached							
-	-								
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f	-								
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-	-								
_					1				

RIG: Hand tools DRILLER: MP LOGGED: MP CASING: Uncased

**TYPE OF BORING:** Hand auger to 4.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

✓ Sand Penetrometer AS1289.6.3.3✓ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Stage 1 Development
LOCATION: Victoria Road, Bellevue Hill

SURFACE LEVEL: 26.4 AHD EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

**BORE No:** 12 **PROJECT No:** 84944 **DATE:** 6/7/2015 **SHEET** 1 OF 1

		Description	i		San		& In Situ Testing	L	
묍	Depth (m)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	,	Strata	9	Ty	Del	San	Comments		5 10 15 20
	- - 0.35 -	TOPSOIL - dark brown, silty sand with trace rootlets, damp							
56	-	FILLING - poorly compacted, brown-grey and brown, silty sand with trace ripped sandstone gravel, damp		> > > > >					
	-1 <sub>1.03</sub> -	SAND - loose, pale yellow-brown, slightly silty, medium grained sand							-1
52	-	- clean sand below 1.50m							
23	-2 -2	- becoming medium dense below 2.85m							-2 -3
22	-4 4.05 - - -	Bore discontinued at 4.05m - target depth reached	<u> </u>						
	- - -								

RIG: Hand tools DRILLER: MP LOGGED: MP CASING: Uncased

**TYPE OF BORING:** Hand auger to 4.05m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

Sand Penetrometer AS1289.6.3.3□ Cone Penetrometer AS1289.6.3.2

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

SAMPLING & IN SITU TESTING LEGEND

G Gas sample
P Piston sample
P Piston sample
D Sample (x mm dia.)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PD Pocket penetrometer (kPa)
S Standard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

П		Description	Degree of Weathering	O	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
귐	Depth (m)	of	vveathening	aphi -og	Strength Strength Nater Nater	Spacing (m)	B - Bedding J - Joint	φ	% بو	۵	Test Results
	(m)	Strata	EW HW SW SW FS ES	ق ا	Ex Low Very Lov Low Medium High High Ex High		S - Shear F - Fault	Type	Core Rec. %	R %	& Comments
-9-		TOPSOIL - dark brown, fine to	ПТ⋝ОКК	<i>Y</i> ),		11 11		Α/E	-		Comments
[ ]		medium silty sand topsoil, moist						' -			
	0.4	FILLING - yellow-brown, fine to medium sand filling, dry to moist						Α/E			
F		9.7m: as above, grey-brown and		$\times\!\!\times$							
2	1	yellow-brown		$\langle \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$				Α			
-			iiiii	$\times$		ii ii					
		1 Francis of the same areas have and		$\times\!\!\times$							
		1.5m: as above, grey-brown and yellow brown mottled dark brown		$\langle \rangle \langle \rangle$							
		,		$\times$							
4	2			$\times$				A/E			
				XX							
1				$\times\!\!\times$		11 11					
ŧ [				$\times$							
<b>E E</b>	3			$\langle\!\!\langle\!\!\langle$		ii ii		A/E			
5	3.2	CAND II I S		$\bigotimes$							
<u> </u>		SAND - yellow-brown, fine to medium sand, dry to moist									
		modiam dana, ary to molot									
	4					ii ii		A/E			
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RIG: Scout 2 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)

	COVCI	,			
	SA	MPLING	& IN SITU TESTIN	G LEGE	END
Α	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 Is(50) (MPa)
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
	Environmental comple		Motor lovel	1/	Chaar vana (kDa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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	<u>.0</u>	Rock Strength ็อ	Fracture	Discontinuities	Sá	ampling &	In Situ Testing
R	Depth (m)	of		iraph Log	Strength Nedium High Ex High E	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. % RQD %	Test Results &
Ш		Strata	EW H W H W	υ.	Very Very Very Very Very	0.00	S - Shear F - Fault	F	0 8 8	Comments
9	-11	SAND - yellow-brown, fine to medium sand, dry to moist (continued)								
-4	-12									
	-13						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°			
2	-14									
-	14.35 - 15	SANDSTONE - medium and high strength, moderately weathered, slightly fractured and unbroken, red-brown and brown, medium to coarse grained sandstone					14.7m: B0°, fe 15.2m: B10°, cly vn, ti			PL(A) = 4.14 PL(A) = 0.66
-0	-16						15.72 & 15.75m: Cs	С	100 99	PL(A) = 1.52
										PL(A) = 0.91
-2	17.4 - 18	Bore discontinued at 17.4m								
-3	-19									

RIG: Scout 2 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)				
	SAMP	LING	& IN SITU TESTING	LEGE	ND
Α	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 Is(50) (MPa)
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
	Environmental cample	7	Water level	1/	Shoor yong (kDa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

	5	Description	Degree of Weathering	၌	Rock Strength ់ច	Fracture	Discontinuities				n Situ Testing
묎	Depth (m)	of		3raph Log	Strength Ned lum Ned l	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	å %	Test Results &
Н		Strata  TOPSOIL - dark brown, fine to	W M M M M M M M M M M M M M M M M M M M	V	E KI KI KI KI KI KI KI KI KI KI KI KI KI	0.00 0.	S - Shear F - Fault	_	0 %	œ	Comments
16	0.2	medium silty sand topsoil, dry to						A/E			
	- 0.6	\moist \ \text{FILLING - dark brown, fine to}		$\boxtimes$				A/E			
Ė	-	\medium sand filling with clay, dry SAND - dark brown, fine to medium									
+	-1 -1 1.1	sand, dry to moist (possibly filling)						A/E			
15		SAND - grey fine to medium sand, dry to moist									
	· ·	1.4m: as above but becoming yellow-brown									
Ė	-2	1.8m: as above but grey-brown						A/E			
-4	-							~ E			
F	- -					 					
	·										
<u> </u>	- -3										
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RIG: Scout 2 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
B Bulk sample
B Bulk Slock sample
C C Core drilling
D Disturbed sample
E Environmental sample

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
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)



**CLIENT:** Cranbrook School Cranbrook School ECI PROJECT: LOCATION: Victoria Road, Bellevue Hill 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

	Donth	Description	Degree of Weathering	<u>اءِ ۔</u>	Rock Strength ត្រ		Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
1	Depth (m)	of	Weathering	Srapt Log	Strength Low High Ex High Ex High Water Water		Spacing (m)	B - Bedding J - Joint	Type	c.%	RQD %	Test Results &
		Strata	ER SW HW		KEY KEY KEY KEY KEY KEY KEY KEY KEY KEY	0.01	0.05 0.50 1.00	S - Shear F - Fault	Ε,	O &	œ °	Comments
	-11	SAND - grey fine to medium sand, dry to moist <i>(continued)</i> 11.35m: yellow brown, fine to medium grained clayey sand						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
Ė	11.6	SANDSTONE - medium strength,				i						PL(A) = 0.82
-	12 12.0	highly weathered, slightly fractured, brown, coarse grained sandstone with some quartz gravel		×		++		11.86m: CORE LOSS: 140mm	С	86	50	
-	12.4	SANDSTONE - very low and low strength, highly to moderately weathered, slightly fractured, light	1   <b>6</b>			i  -  -		12.4-12.6M: dS				
-	-13	grey and red-brown, fine to medium grained sandstone with some extremely low strength bands				1		12.8m: J60°, pl, ro, cln 12.85m: B0°, cly				PL(A) = 0.2
	-14							13.52-13.58m: Ds 13.65m: J60°- 70°, cu, ro, fe	С	100	92	PL(A) = 0.2
	14.4 - - 15	SANDSTONE - medium and medium to high strength, moderately weathered, slightly fractured, brown to red-brown, medium grained sandstone						14.35m: B0°, cly, 10mm 14.4-14.45m: Cs 14.5-14.62m: B (x3) 0°- 5°, fe, cly co				PL(A) = 0.8
	-16							15.4m: J30°, he	С	100	92	PL(A) = 0.5
								16.15 & 16.42m: B (x2) 5°, fe				PL(A) = 2.8
-	- 17				- <del>         </del>			16.9m: B5°, fe, cly, 10mm				PL(A) = 0.8
-	17.45	Bore discontinued at 17.45m	<del>                                     </del>	·····		İ						
-	-18					i 						
-												
-	-19					1						
-												

CASING: HW 11.6m RIG: Scout 2 DRILLER: JS LOGGED: SI/RW

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**

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

LEGENU
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)



**CLIENT:** Cranbrook School Cranbrook School ECI PROJECT: LOCATION: Victoria Road, Bellevue Hill **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	ie	Rock Strength	Fracture	Discontinuities			_	n Situ Testing
씸	Depth (m)	of		raph Log	Strength Low High High High High Water	Spacing (m)	B - Bedding J - Joint	Type	e	Qg ,	Test Results &
	(***)	Strata	EW HW EW	Ō	Ex Low Low Low Medium High Very High Ex High	0.05 0.10 0.50 1.00	S - Shear F - Fault	Ţ	Core Rec. %	RG %	α Comments
16	- 0.5	TOPSOIL - dark brown, silty clay topsoil with rootlets, dry		3				A/E A A/E			
15	1.3	SAND - yellow-brown, fine to medium sand, dry to moist						Α/E			
14	-3										
13	- - - - - - - - - -										
12	-5										
	- - - 6 - -										
10	- 7 - 7 						Note: Unless otherwise				
-6	- 8 - 8 - 8.5	SANDSTONE - medium strength,					stated, rock is fractured along rough planar bedding dipping 0°- 10°				
-8	- - - - - - - - -	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					8.96m: B0°- 5°, un, ro, fe stn 9.45m: J20°, pl, ro, fe ∱stn	С	93	89	PL(A) = 0.55 PL(A) = 0.43
[	9.85			$\bowtie$			9.6m: Cs, 50mm 9.65m: CORE LOSS:				

LOGGED: RW/JN RIG: Scout 2 DRILLER: JS CASING: HQ to 8.5m

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

**REMARKS:** 

## **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering	. <u>o</u>	Rock Strength	<u>بر</u>	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
R	Depth (m)	of	Weathering	Log Log	Ex Low Low Low Medium High Ex High Ex High	Water	Spacing (m)	B - Bedding J - Joint	Туре	se	RQD «	Test Results &
	(,	Strata	EW BW BW FS FS	ق ا	Ex Lov Very High Ex High	>		S - Shear F - Fault	≥	လို့ မိ	RO %	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
	-12 12.52							11.66m: B0°- 5°, un, ro, cbs, st 11.68m: J0°- 30°, cu, ro, cbs, st 11.97m: J0°- 30°, cu, ro, fe stn 12.52m: J30°, pl, ro, cln				PL(A) = 0.36 PL(A) = 0.31
3	- <sub>13</sub> 12.97							CORE LOSS: 450mm	С	85	75	PL(A) = 0.54
	- 14 - 14.4	Bore discontinued at 14.4m						13.72, 13.76m: J30°, pl, ro, cln 13.8m: Ds, 50mm 13.88m: Cs, 30mm 14.12m: Cs, 80mm				PL(A) = 0.47
2	-15	- target depth reached										
- 0	-16											
-	-17											
-2	-18											
-3	-19											

RIG: Scout 2 DRILLER: JS LOGGED: RW/JN CASING: HQ to 8.5m

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

REMARKS:

	SAMI	PLING	& IN SITU TESTING	LEGE	ND
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)
BLI	K Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test ls(50) (MPa)
C	Core drilling	W	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:** Cranbrook School Cranbrook School ECI PROJECT: LOCATION: Victoria Road, Bellevue Hill **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

		Description	De We	egre	ee o nerin	of na i	<u></u>		Str	Roc	qth		_		acture		Discon	tinuities	Sa	ampli	ng & I	n Situ Testing
귐	Depth (m)	of	De Wea			٦	rapt Log	<b>1</b>   ≤	/ery Low	TT IĘI	Very High	lg :	water	(	acing (m)		B - Bedding		Туре	c.%	RQD %	Test Results &
	` '	Strata	H E	M	SW FS	£ (	IJ	I 의	- [ [ ]	Medi	Very	±  -	<b>&gt;</b> 10.0		0.10	1.00	S - Shear	F - Fault	\ <u>\</u>	ပြည်	R <sub>0</sub>	Comments
-		TOPSOIL - dark brown, fine to					YV						- 1						A/E			
9	0.2	medium silty sand topsoil, moist  SAND - dark brown mottled brown,	]					·					l	i		i						
t		iron indurated, fine to medium sand,						.						-					A/E			
ŀ		moist (possibly filling)		 				. ¦								i						
ŀ	- -1	0.8m: as above but brown and grey-brown mottled dark brown		H				ļ					ļ	Ţ		ļ			A/E			
_[	1.3		1	 		¦ [:	<u> </u>	] ¦					li			i						
12	1.5	SAND - yellow brown mottled brown and dark brown, grey fine to medium						ij					ļ	Ī		ļ						
ļ		sand, moist		 				ŀ					li			¦						
F	-2			ij				·						ĺ		İ			A/E			
E				 									l			¦			AVE			
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ŀ	-6		Hii	ij	i	i		ŀ	i	ii	i	il	i	i	ii	i	Note: Unles stated, rock	is fractured				
Ē				 									H				along rough bedding dip	planar ping 0°- 10°				
2				ij	i	i		ļί	i	ii			li	i	ii	i	bodding dip	ping o To				
ļ				 																		
Ė	6.8	SANDSTONE - medium strength,	A		\$		$\approx$	F	7	T	\$	H	Ť	$\Rightarrow$	Ħ	F	6.8m: CORI 100mm	E LOSS:				PL(A) = 0.71
ŀ	.	moderately weathered, fractured and slightly fractured, light grey and						]   					H				10011111					
»ţ		red-brown, medium grained sandstone	l i i	ij	į			į	į	ij	i		į	Ė		į	7.3-7.45m: I	B (x3) 0°, cly				
ŀ		Salidatoria		Ш				<b>!</b> ¦		Ш					¦		co, 1-2mm					DL (A) = 0.26
Ē				jľi	İ			<b>!</b>	İ	ij	i		li	į		į						PL(A) = 0.36
-	-8 8.0	SANDSTONE - high strength, fresh,		<b>   </b> 	+	┧╠		1		4	1			F		1	7.9 & 7.95m	: B0°, fe	С	97	90	
,		slightly fractured and unbroken, light grey, medium grained sandstone	Hi	ij	İ			<b>;</b> ;	İ	ii	i					j				9/	90	
ŧ		groj, mediam granica sandstone		 			:::::	<b>!</b>								$\  \ $						PL(A) = 1.19
E				ij	İ			j	İ	įί	i		li	į	į į							FL(A) - 1.18
ŧ	-9															$\  \ $						
ŧ								} ¦		11	i		ľ			i						
-								]								¦Ц	9.4m: B0°, c	clv. 5mm				
E								] ¦			l			İ		i	Do , C	,, •		400	100	PL(A) = 1.2
	.							1											С	100	100	1 = (/1) - 1.2

**RIG:** DT100 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:** 

## **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Piston sample
(x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

LECEND
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)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

		Description	Degree of Weathering	<u>ö</u>	Rock Strength ชู	Fracture	Discontinuities				n Situ Testing
묍	Depth (m)	of Charles		Graph	Strength   Strength	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Туре	Core Rec. %	RAD %	Test Results &
	_	SANDSTONE - high strength, fresh,	M H W W R H E		K Keligidel	0.00	3 - Sileal 1 - Fault	-	28	<u> </u>	Comments
-9	- 11	SANDSTONE - high strength, fresh, slightly fractured and unbroken, light grey, medium grained sandstone (continued)						С	100	100	PL(A) = 1.17
2	-12						11.9m: B0°, cly, 10mm				PL(A) = 1.01
[_	- '-					<b> </b>					PL(A) = 1.08
[	- 12.4 -	Bore discontinued at 12.4m	1 1 1 1		111111						
	-										
	- 13 - -										
-6											
	- 14 - -					 					
-2	- - -					 					
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-5			1 1 1 1 1			 					
	19		1 1 1 1 1			 					
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RIG: DT100 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:** 

#### **SAMPLING & IN SITU TESTING LEGEND**

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
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)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

		Description	Degree of Weathering	Rock Strength	Fracture	Discontinuities				n Situ Testing
R	Depth (m)	of	J. J. J. J. J. J. J. J. J. J. J. J. J. J	Extremedia Extra No. 1 Co. 2 C	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	a S	Test Results &
		Strata  TOPSOIL - dark brown, silty sand	WH WE WE WE WE WE WE WE WE WE WE WE WE WE	EX L	0.10	S - Shear F - Fault	_	_	<u>~</u>	Comments
9	• • •	topsoil filling with some rootlets, damp					A/E A/E			
	0.6	SAND - grey-brown medium sand with some coarse graining, moist (possible filling)					ΑÆ			
15	1.5 -	SAND - brown to dark brown medium sand, damp (possible filling)					Α⁄Ε			
13	2.7	SAND - light brown to orange-brown medium sand, damp				Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	A/E			
	-4 -4 4.1	4.1m: becoming extremely								
10 11 12 12	- 4.13 - 4.33 5 - 6 - 6	weathered sandstone  SANDSTONE - medium strength, moderately to slightly weathered, slightly fractured, light grey-brown to red-brown, medium grained sandstone  SANDSTONE - medium and high				4.1m: CORE LOSS: 50mm 4.15-4.3m: Cs 4.35m: J35°, he 4.4m: B20°, pl, ro, cln 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 5.93m: J60° & 85°, st, ro, fe 6.63m: J (x2) 70°, un, ro, fe, partially he	С	98	84	PL(A) = 0.5  PL(A) = 0.49  PL(A) = 0.31
-0.	-7 -7 	strength, moderately to slightly weathered and fresh, slightly fractured, light grey-brown, medium grained sandstone				6.75-6.77m: Cs 7.16m: J70°, he 7.82m: B0°, cly, 5mm 8.12m: J30°, pl, sm, cln 8.6m: J20°, pl, ro, cln	С	100	91	PL(A) = 1.31 PL(A) = 0.61
						9.35m: B5°, fe, cly, 5mm 9.45m: J25°, pl, ro, fe 9.85-10.10m: Cs				PL(A) = 0.49

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:** 

	5	SAMPLING	& IN SITU TESTING	LEGE	ND
Α	Auger sample	G	Gas sample	PID	Photo ionisation of
В	Bulk sample	Р	Piston sample		Point load axial te
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diamet
С	Core drilling	W	Water sample	pp	Pocket penetrom
D	Disturbed sample	⊳	Water seep	S	Standard penetra
E	Environmental sam	ple ₹	Water level	V	Shear vane (kPa)

GEND

Photo ionisation detector (ppm)
(A) Point bad axial test Is(50) (MPa)
(D) Point bad diametral test Is(50) (MPa)
Pocket penetrometer (kPa)
Standard penetration test
Shear vane (kPa)



Cranbrook School **CLIENT:** Cranbrook School ECI PROJECT: LOCATION: Victoria Road, Bellevue Hill **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

		Description	Degree of Weathering	. <u></u>	Rock Strength		Fracture	Discontinuities				n Situ Testing
R	Depth (m)	of		rap	Strength  Nedium High New High Kx High	wate	Spacing (m)	B - Bedding J - Joint	Туре	ore c. %	RQD %	Test Results &
Ш		Strata	M M M M M M M M M M M M M M M M M M M	· · · ·	Key High Med Key	Č	0.05	S - Shear F - Fault				Comments
- 9	- 11 10.96	SANDSTONE - medium and high strength, moderately to slightly weathered and fresh, slightly fractured, light grey-brown, medium grained sandstone (continued) 40.35-10.66m: very low strength 10.66-10.96m: extremely low strength  SANDSTONE - high then medium						10.45-10.47m: Ds 10.66-10.96m: Ds	С	100	91	PL(A) = 0.65 PL(A) = 0.1
- 4	-12	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
3	-13 -13 							12.4-12.48m: Cs 12.6m: J70°, pl, ro, cln				PL(A) = 1.06 PL(A) = 1.26
	- - -14 - -							13.86m: B5°, cly, 10mm 14.15m: B5°, cbs co	С	100	88	PL(A) = 1.03
-	- - 15 - - - - 15.48	Bore discontinued at 15.48m						14.75-14.9m: Cs				PL(A) = 0.92
-	-16 -16	bore discontinued at 15.4011										
-	- 17											
-2	-18											
-3	-19											

LOGGED: RM/SI CASING: HQ to 4.1m RIG: Scout 2 DRILLER: JS

TYPE OF BORING: Solid flight auger (TC-bit) to 4.1m; NMLC-Coring to 15.48m

WATER OBSERVATIONS: Some seepage from 0.5m

**REMARKS:** 

SAMPLING	& IN SITU	TESTING	LEGE	END
G	Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

		Description	Degree of Weathering	<u>.</u> 2	Rock Strength 5	Fracture	Discontinuities	Sa	ampling &	n Situ Testing
R	Depth (m)	of	Wodinomig	raph Log	Strength  Cow Ned Low Ned Low Ned High High Ned	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	Test Results &
			EW HW EW	9	Ex Low Very Very Very Very Very Very Very Very	0.00	S - Shear F - Fault	Ţ	288.	Comments
ŀ	- 0.08	FILLING - brick pavers	.	XX				Α		
38	- 0.3	FILLING - brown silty sand filling with some fine to medium grained sandstone gravel, moist						Α	_	
-	- 0.8	FILLING - sandstone boulder filling FILLING - concrete slab		XX				Α		
	-1 - -	SAND - very loose, light grey medium grained sand, moist						s	1	1,1,1 N = 2
37		medium grained sand, moist							-	N = 2
	- - -									
	-2									
36	- - -									
-	-					 		s		1,1,2 N = 3
[	-3					 			1	
. 32										
	-									
	- -4 4.0	SAND - loose, pale yellow medium							-	455
- 4	- - -	grained sand, moist						S		4,5,5 N = 10
34										
-	-5									
33	5.5	SAND - dense, yellow medium grained sand, moist						S	1	2,3,3
	- - -6	granica sana, moist								N = 6
	- - -									
32	-					 				
-	-7					 				
	-							s		5,10,10 N = 20
31	-								-	14 - 20
-						 				
	- 8 -					 				
30	-									
[						                  		s		6,11,15 N = 26
	-9								1	
29						i ii ii l				
	- -									
Ŀ	-					<u>i ii ii </u>				

RIG: Bobcat 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)

	SAMF	LINC	& IN SITU TESTING	3 LEGE	ND
Α	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
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
Ε	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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	ic	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
	epth (m)	of	Degree of Weathering	raph	Very Low Low Medium High Kery High Kery High Water	Spacing (m)	B - Bedding J - Joint	Туре	ore	RQD %	Test Results &
`			EW HW EW	Э	Kary Kery Kery Kery Kery Kery Kery Kery Ke	0.05	S - Shear F - Fault	Ļ	2 %	Σ°.	Comments
- 11		SAND - dense, yellow medium grained sand, moist (continued) 40.0m: becoming wet						S	_		10,17,19 N = 36
- 12	!						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	s	_		10,14,18 N = 32
	12.45	SANDSTONE - medium then low									PL(A) = 0.63
- 13	i	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°- 5°, pl, ro, cly, 1mm				PL(A) = 0.56
- 14 - 14 - - - -							14.5m: B5°, pl, ro, fe stn	С	100	99	PL(A) = 0.5
-15	15.55 -	Bore discontinued at 15.55m - target depth reached									PL(A) = 0.2
- 16 - 16	;										
- 17 - 17											
- 18	<b>,</b>										
- 19											

RIG: Bobcat 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	PLING	& IN SITU TESTING	3 LEGE	ND
Α	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)
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
Е	Environmental sample	¥	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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	<u>.</u> 2	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
R	Depth (m)	of		raph	Strength Needium Needi	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	۵»	Test Results &
			WH WW WE WE	Ö	EX LOW High Very Very Low	0.05 0.10 0.50 1.00	S - Shear F - Fault	Ţ	S &	Σ°`	Comments
39		FILLING - brick pavers				 		Α			
-	-	FILLING - brown silty sand filling with some fine to medium sandstone		$\bigvee$				Α			
E	-	gravel, moist		$\bigotimes$				_			
-				$\boxtimes$				A			
38	1.0	SAND - very loose then loose, light grey medium grained sand, moist				i ii ii l		S			1,1,1
- "	- -	grey medium grained sand, moist				 		3			N = 2
F											
E	-										
	-2										
3						i ii ii l					
ŀ	-										1,1,1
ŀ	-							S			N = 2
+	-3										
36	-										
-	-										
E	[										
-	-4						Note: Unless otherwise stated, rock is fractured	_			2,3,5
35						i ii ii l	along rough planar bedding dipping 0°- 10°	S			N = 8
-	-					 					
Ė	4.9							S			10/149mm
+	-5	SANDSTONE - medium strength, slightly weathered, slightly fractured,				i ii li			1		refusal
34	-	orange and light grey medium grained sandstone					5.3m: CORE LOSS:				PL(A) = 0.48
-		<b>3</b> · · · · · · · · · · · · · · · · · · ·		X			410mm	С	58	56	
E	5.71			X			5.73m: CORE LOSS: \ 180mm				
+	-6 [					<u>                                </u>	<sup>L</sup> 5.91m: J45°, pl, ro, cln				DI (A) - 0.54
- 6	-						6.2m: J20°, un, ro, cln				PL(A) = 0.54
-	-										
E	-					╎╎╧═╣╎	6.8m: J30°, pl, ro, cly,				
+_,	-7						5mm 6.88m: J45°- 60°, un, ro,				
32	-						cln				
+							7.57, 7.64m: J20°, pl, ro,				
E	-						cly, 2mm	С	100	92	PL(A) = 0.46
-	-8					╎╏	8.03-8.35m: J70°, un,				
31	-						ro, fe stn, partially he				PL(A) = 0.45
ŀ	<u> </u>					i i <b>l</b> ii l					, , , , ,,,,,
ŀ	-										
-	9.05	SANDSTONE - medium strength,	<b>                              </b>				8.93, 8.94m: B10°, pl, ro, cly, 1mm				
30	[	fresh, slightly fractured then unbroken, light grey medium									
-	-	grained sandstone with traces of carbonaceous laminations				  -		С	100	100	PL(A) = 0.48
ŧ	[	carbonac <del>c</del> ous idminiduons		::::::::  ::::::::					100	.00	
ш	L			h°.*.*.			<u>l</u>		$\perp$		

RIG: Bobcat 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 14.0m **WATER OBSERVATIONS:** No free groundwater observed whilst augering

REMARKS:

	SAMPLING & IN SITU TESTING LEGEND												
Α	Auger sample	G	Gas sample		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	W	Water sample	pp	Pocket penetrometer (kPa)								
D	Disturbed sample	$\triangleright$	Water seep	S	Standard penetration test								
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)								



**CLIENT:** Cranbrook School Cranbrook School ECI PROJECT: LOCATION: Victoria Road, Bellevue Hill 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	Si	Rock Strength 5	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
묍	Depth (m)	of	Troumen in	əraph Log	Strength Nater High Nater Ex High Nater Na	Spacing (m)	B - Bedding J - Joint	Туре	ore c. %	RQD %	Test Results &
			M M M M M	•••••	EX Low Very Very Very Very Very Very Very Very	0.00	S - Shear F - Fault	Ę.	ပန္	α -	Comments
28	-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 11.37m: B5°, pl, ro, cly, 2mm 11.87m: B5°, pl, ro, fe stn	С	100		PL(A) = 0.5 PL(A) = 0.64
	- - -										PL(A) = 0.49
	- 13										
26	- - -							С	100	100	
	- - -										PL(A) = 0.71
	- - -14 14.0	Bore discontinued at 14.0m									
25		- target depth reached									
24	-										
23	- -16 - - -										
	- - - 17										
21	-1818										
20	- - - - - -										

RIG: Bobcat 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 14.0m WATER OBSERVATIONS: No free groundwater observed whilst augering

**REMARKS:** 

#### **SAMPLING & IN SITU TESTING LEGEND** A Auger sample B Bulk sample BLK Block sample

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level Core drilling
Disturbed sample
Environmental sample



Cranbrook School **CLIENT: PROJECT:** Cranbrook School ECI Victoria Road, Bellevue Hill LOCATION:

SURFACE LEVEL: 16.28 AHD **EASTING:** 338412.68 **NORTHING:** 6250794.55 **DIP/AZIMUTH**: 90°/--

BORE No: BH111 **PROJECT No:** 84944.01 **DATE:** 13/4/2017 SHEET 1 OF 1

			Description	. <u>o</u>		Sam	ıpling 8	& In Situ Testing		Well
꿉	De (r	pth n)	of	Graphic Log	Type	oth	ple	Results &	Water	Construction
	ζ.	.,	Strata	ō	Ę	Depth	Sample	Results & Comments	>	Details
- 91	-	0.3	TOPSOIL - brown medium sand filling with trace red-brown clay and rootlets		_A/E_/	0.1 0.15				
ŀ	-		FILLING - dark brown medium sand filling (possibly natural)		_A/E_/	0.45 0.5				
Ė	- - - 1	0.8	FILLING - pale brown mottled dark brown, medium sand filling (possibly natural)		_A/E_/	1.0 1.05				1
-51	-					1.05				
-	-									
Ė	- -2 -				_A/E_	1.9 2.0				-2
-4	-	2.6								-
ŀ	-	2.6	SAND - pale brown and yellow, medium sand, moist		A/E_	2.9 3.0				
-5	-3 - -	3.1	Bore discontinued at 3.1m - target depth reached	<u> </u>		3.0				-3
-	-		- target depth reached							
ŀ	- - -4									-4
12	-									
Ė	-									
-	- 5 - -									-5 -
-	-									
Ē	- - - -6									-6
-2	-									
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	-8 - -									-8
-	-									
-	- - -9									[ -9
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LOGGED: AT **CASING:** Uncased RIG: DT100 DRILLER: SS

**TYPE OF BORING:** Auger to 3.1m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU	TESTING I	_EGI	ΞND
G Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level G P U×W △♥



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

	_		Description	.ie		San		& In Situ Testing		Well
R	De (r	pth n)	of Strata	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction Details
-			TOPSOIL - dark brown, silty clay topsoil with rootlets, dry	W	A/E	0.1	ŭ			L
16	-	0.4	SAND - dark brown mottled yellow-brown, fine to medium grained sand, dry to moist (possibly filling)		А	0.5				
-	- -1 -	1.0	SAND - yellow-brown mottled dark brown, fine to medium sand, dry to moist		ΑÆ	1.0				-1
15	-		1.5m: as above but yellow-brown							
ŀ	-2 -	2.0	Bore discontinued at 2.0m - target depth reached	<u> </u>	-A/E-	-2.0-				-
4	-		target depart redorted							
	- - - 3									3
-										
-	-									
-	-4 - -									-4
12	-									
-	- - - 5 -									-5
-	-									
-2	-									-
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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:

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



Cranbrook School **CLIENT:** PROJECT: Cranbrook School ECI LOCATION: Victoria Road, Bellevue Hill SURFACE LEVEL: 16.22 AHD **EASTING:** 338402.54 **NORTHING**: 6250814 **DIP/AZIMUTH**: 90°/--

**BORE No:** BH113 **PROJECT No:** 84944.01 **DATE:** 13/4/2017 SHEET 1 OF 1

	_		Description			Sam		& In Situ Testing		Well
R	De <sub>l</sub> (n	ptn n)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction
L			Strata  FILLING - brown medium grained sand filling (tonsoil)	XXX			Sa	Comments		Details
-19		0.2	FILLING - brown, medium grained sand filling (topsoil) with some red-brown clay, traces of rootlets		_A/E_/	0.1 0.15				
-		0.7	FILLING - dark brown, medium sand filling		_A/E_/	0.5 0.55				
ŀ	- 1	0.7	FILLING - pale brown mottled dark brown, medium sand filling			1.0				- - -1
- 51	· '				_A/E_/	1.05				
ŀ										
-	-					1.05				
-4	-2				A/E	1.95 2.0				-2
Ė	-	2.3	SAND - pale brown and yellow, medium sand, moist	l X X						
ŀ										
-	-3	3.0	Bore discontinued at 3.0m		-A/E-	-3.0-				3
-5			- target depth reached							
Ė										
ŀ	- - 4									-4
12										
F	-									
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LOGGED: AT **CASING:** Uncased RIG: DT100 DRILLER: SS

**TYPE OF BORING:** Auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU TESTI	NG LEG	end
G Gas sample	PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



Cranbrook School **CLIENT: PROJECT:** Cranbrook School ECI Victoria Road, Bellevue Hill LOCATION:

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

	D		Description	ji _	Sampling & In Situ Testing				<u>_</u> _	Well
RL	De <sub>l</sub>	n)	of Strata	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction Details
	-	0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, moist	XX	A/E	0.1	S			-
16	- - -		SAND - dark brown mottled-brown, fine to medium sand, moist (possibly filling)		ΑÆ	0.5				
	- - - 1 -				ΑÆ	1.0				1
15	- - -									
	- - 2 -	1.8	SAND - dark brown mottled yellow-brown, fine to medium sand with iron indurated pockets, moist		ΑÆ	2.0				-2
14	- - -									
	- - 3	3.0	Bore discontinued at 3.0m		-A/E-	-3.0-				3
13			- target depth reached							
	-									
Ė	- - 4 -									- -4 [
12										
	-									
	-5 -									-5 -
17										
	-6 -									-6 -
10	-									
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	- - -9									-9
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LOGGED: RW **CASING:** Uncased RIG: Scout 2 DRILLER: JS

**TYPE OF BORING:** Auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU TESTI	NG LEG	end
G Gas sample	PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL**: 16.43 AHD **EASTING**: 338384.73 **NORTHING**: 6250747.66 **DIP/AZIMUTH**: 90°/--

BORE No: BH115 PROJECT No: 84944.01 DATE: 11/4/2017 SHEET 1 OF 1

	_		Description	je		Sam		& In Situ Testing		Well	
RL	De (n	ptn n)	of Strata	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction Details	
	-		TOPSOIL - dark brown, fine to medium silty sand topsoil,	<i>YY</i>	A/E	0.1	Š			Details	
16		0.3	dry to moist  SAND - grey-brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5					
	- -		(possibly filling) 0.8m: as above but becoming dark brown and grey-brown		,,,_	0.0					
	- - 1 -	1.1	SAND - pale grey, fine to medium sand, dry to moist		ΑÆ	1.0				- -1 -	
15			SAND - pale grey, line to medium sand, dry to moist								
-										· ·	
	-2	2.0	Bore discontinued at 2.0m	1777	-A/E-	-2.0-				2	
-4	-		- target depth reached								
	- 3 -									-3	
13											
	-4 -									-4 - -	
12											
	-5 -									-5 -	
-1-	-										
	-6 - -									-6 - -	
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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:** 

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
PID Photo ionisation detector (ppm)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
p Pocket penetrometer (kPa)
S Standard penetration test
V Shear vane (kPa)



Cranbrook School **CLIENT:** PROJECT: Cranbrook School ECI LOCATION: Victoria Road, Bellevue Hill 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

	Da		Description	Sampling & In Situ Testing  Sampling & In Situ Testing  Polytical State of the Comments  Sampling & In Situ Testing  Results & Comments					_ h	Well
R	(r	pth n)	of Strata	Grap	Туре	Depth	Sample	Results & Comments	Water	Construction  Details
F	-		TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	M	A/E	0.1	S			-
-9		0.3	SAND - dark brown and yellow-brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5				
Ė	-	0.7	SAND - dark grey, fine to medium sand, moist							
ŀ	- 1 -				A/E	1.0				-1
15	-		1.5m: as above but becoming pale grey							
ŧ	-2				A/E	2.0				-2
[		2.2	SAND - dark brown mottled brown, fine to medium sand,							
-4	-		iron indurated, dry to moist		}					
ŧ	-3	3.0	Bore discontinued at 3.0m		-A/E-	-3.0-			+	3
13-			- target depth reached							
Ė	-									
ŧ	4									-4
12										
Ė	-									
ŧ	-5 -									-5 -
-=	-									
ŧ	- -6									-6
	-									
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ŀ	- -7									-7
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F	-									
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LOGGED: RW **CASING:** Uncased RIG: DT100 DRILLER: SS

**TYPE OF BORING:** Auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU TESTI	NG LEG	end
G Gas sample	PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL:** 16.04 AHD **EASTING:** 338392.47 **NORTHING:** 6250837.21 **DIP/AZIMUTH:** 90°/--

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

	Da	n. 4 h	Description	je E		Sampling & In Situ Testing				Well
R	(r	pth n)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction  Details
16	-		Strata  TOPSOIL - grey and dark brown, silty sand filling (topsoil),  traces of rootlets	XX		0.1 0.15	Š			Details
ŧ		0.2	Traces of rootlets  FILLING - dark brown, medium sand filling		]	l .				
ŧ	-		TILLING GARCHOWN, Mediam Sand Hilling		_A/E_	0.45 0.5				
-5	- 1				A/E	0.95 1.0				[ -1
ŀ	-									
-	-									
-4	-2				A/E	1.95 2.0				-2
•						2.0				
F		2.5	FILLING - pale grey and dark brown, medium sand filling							
<sub>-</sub>	- -3				AVE	2.95 3.0				-3
-	-	3.2	SAND - pale grey, brown and brown, medium sand (possibly filling)		]	3.0				
ŧ			(possibly filling)		}					
ļ.,	- - -4	4.0								4
[-	-		Bore discontinued at 4.0m - target depth reached							-
ŀ	-									
-	-5									-5
-=	-									
ŀ	-									
-										-6
-	-6 -									
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	-8 -									-8
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RIG: Scout 2 DRILLER: JS LOGGED: AT CASING: Uncased

**TYPE OF BORING:** Auger to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level

LEGEND
PID Photo ionisation detector (ppm)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
p
Pocket penetrometer (kPa)
Standard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL:** 16.14 AHD **EASTING:** 338382.59 **NORTHING:** 6250811.43 **DIP/AZIMUTH:** 90°/--

BORE No: BH118 PROJECT No: 84944.01 DATE: 13/4/2017 SHEET 1 OF 1

			Description	.≌		Sam		& In Situ Testing		Well
꿉	Dept (m)	th	of	Graphic Log	ЭС	oth	Sample	Results &	Water	Construction
	(111)	′	Strata	ַט פֿ	Type	Depth	Sam	Results & Comments	>	Details
-91	-	0.2	TOPSOIL - grey-brown, medium silty sand (topsoil), traces of rootlets, organic odour		_A/E_/	0.1 0.15	- 07			-
Ė			FILLING - dark brown medium sand filling, traces of silt		_A/E_/	0.45 0.5				
-		0.7	SAND - pale brown and yellow, medium sand, moist	· · · ·						- -
-51	-1 - -				A/E	0.95 1.0				-1 -
Ė										
Ē	-	1.8	SAND - pale brown and brown, medium sand, moist			1 95				-
-4	-2 - -				A/E	1.95 2.0				-2
-	-	2.5	Bore discontinued at 2.5m							
ŧ	- - -3		- target depth reached							-3
13	-									-
ŧ										
ŀ	- - -4									-4
12										
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-	- - - 5									
- =	-									
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RIG: DT100 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
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample

SAMPLING & IN SITU TESTING
G Gas sample
P Piston sample
T tube sample (x mm dia.)
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

П			Description	O		Sam	ıpling 8	& In Situ Testing		Well	
R	Dep	pth	of Description	Graphic Log	Φ				Water	Construction	
	(n	11)	Strata	Gr.	Type	Depth	Sample	Results & Comments	>	Details	
		0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil,  \dry to moist	M	A/E	0.1	U)			-	
16	•		SAND - grey-brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5					
-			SAND - yellow, fine to medium sand, dry to moist								
-	-1		1.0m: as above but dark brown		A/E	1.0				<u>-1</u>	
-	· ·		1.5m: as above but grey-brown mottled yellow-brown							-	
E	-2	2.0	1.9m: as above but dark grey		-A/E-	_20_					
-4-		2.0	Bore discontinued at 2.0m - target depth reached		/VL	2.0					
	- 3									-3	
-5											
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	-4									-4	
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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:

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

Despit   Despit   Of Strata   Surpting & Its Stu Testing   West   Construction   Details   SAND - Income year   SA		Description Description					Sam		& In Situ Testing	Well	
TOPSOIL dark brown, fine to medium sity sand topsoil, dry to moist value of the control of the	R	De <sub>l</sub>	ptn n)		Grapt Log	ype	epth	ımple	Results & Comments	Water	
ADD - brown-yellow, fine to medium sand, dry to moist (possibly filing)  SAND - trown-yellow, fine to medium sand, dry to moist (possibly filing)  SAND - trown and yellow-brown, fine to medium sand, iron indurated, dry to moist  A 1.0  Bore discontinued at 2.0m - target depth reached  AIE 2.0  4  4  4  4  4  4  4  4  4  4  4  4  4	-	-		TOPSOIL - dark brown, fine to medium silty sand topsoil	XX			Sa			- Details
SAND - dark brown and yellow-brown, fine to medium sand, iron indurated, dry to moist  2 20 Bore discontinued at 2.0m - target depth reached  AE 2.0  4  7  7  7	ŀ	-	0.2	↑dry to moist /							
E 1.5  Bore discontinued at 2.0m - target depth reached  4  4  7  8  8  8  8	-9	-	0.7			A	0.5				
Bore discontinued at 2.0m - target depth reached  AE - 2.0  AE - 2.0  AF - 2	-	- - - 1		SAND - dark brown and yellow-brown, fine to medium sand, iron indurated, dry to moist		Α	1.0				[ -1
Bore discontinued at 2.0m - target depth reached  AE - 2.0  AE - 2.0  AF - 2.0  AF - 2.0  AF - 2.0  AF - 2.0  AF - 2.0  AF - 2.0  AF	[										
Bore assormment at 2 m  - target depth reached  - target depth reached  - 4  - 4  - 5  - 5  - 5  - 7  - 7  - 7	- 2	-				Е	1.5				
Bore assormment at 2 m  - target depth reached  - target depth reached  - 4  - 4  - 5  - 5  - 5  - 7  - 7  - 7	Ė	- - - 2	2.0			_A/F-	-20-				2
2	ŀ	- <sup>-</sup>		Bore discontinued at 2.0m - target depth reached		,,,_	0				
	-	-									
	- 7	-									
-5 -5 -5 -5 -7 -7 -7 -7 -7 -7 -8 -8 -8 -8	[	- 3 - -									
-5 -5 -5 -5 -7 -7 -7 -7 -7 -7 -8 -8 -8 -8	ŀ	-									
-5 -5 -5 -5 -7 -7 -7 -7 -7 -7 -8 -8 -8 -8	13	-									
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RIG: Scout 2 DRILLER: JS LOGGED: RW CASING: Uncased

**TYPE OF BORING:** Auger to 2.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING	& IN SITU	<b>TESTING</b>	LEGEND

A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

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

			Description	. <u>0</u>		Sam	ipling &	& In Situ Testing	L	Well	
꿉	De	epth m)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction	
	,		Strata	O			San	Comments		Details	
-6	Ė	0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist		A/E	0.1					
-			FILLING - yellow-brown fine to medium sand filling, dry to moist		ΑÆ	0.5					
15	-1	0.75	SAND - yellow-brown and grey-brown mottled dark brown, fine to medium sand, dry to moist (possibly filling)	×××	ΑÆ	1.0				- -1	
										-	
ŀ	-2				Α/E	2.0				-2	
-4	-	2.2	SAND - yellow-brown, fine to medium sand, dry to moist		742	2.0				-	
-	[		SAND - yellow-blown, line to medium sand, dry to moist								
ŧ	-3	3.0			-A/E-	-3.0-				Ī - 3	
150	Ė		Bore discontinued at 3.0m - target depth reached								
ŧ											
ŧ	-									-	
12	-4									-4	
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RIG: DT100 DRILLER: SS LOGGED: RW CASING: Uncased

**TYPE OF BORING:** Auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU TESTING LEGEN	ō
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A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

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

	_		Description	je_		Sam		& In Situ Testing	_	Well
집	De <sub>l</sub> (n	ptn n)	of Strata	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction Details
- 9			FILLING - dark brown, fine to medium silty sand filling, dry		A/E	0.1	Ö			-
[-		0.3	to moist  SAND - dark brown mottled grey, fine to medium sand, dry to moist (possibly filling)	X	ΑÆ	0.5				
			dry to moist (possibly filling)							
12	-1	1.2			ΑÆ	1.0				-1
			SAND - yellow-brown, fine to medium sand, dry to moist							
-4	-2	2.0	Bore discontinued at 2.0m - target depth reached	1	-A/E-	-2.0-				
										-
	- 3									-3
13										
-	- 4									-4
12										
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Ė	-5									-5
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- 6	- 7 -									- <sub>7</sub>
	-8									-8
	- 9									- -9
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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:

SAMPLING & IN SITU TESTING LEGEN	D
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A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

	<b>D</b> -	41-	Description	Jic T		Sam		& In Situ Testing		Well
R	ре (r	pth n)	of Otanta	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction
	-		Strata  TOPSOIL - dark brown, fine to medium silty sand topsoil,	1XX	A/E	0.1	Sa	Commente		Details
16	-	0.2	√dry to moist /	<i>// // /</i>	/ 1	0.1				
-	-	0.7	SAND - grey-brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5			-	
-	- - - 1	0.7	SAND - dark brown, fine to medium sand, iron indurated, dry to moist		A/E	1.0				
- 2	- '		ary to motor		AVE	1.0				-1
-	-	1.5	SAND - yellow-brown, fine to medium sand, dry to moist							
-	-		SAIND - yellow-brown, line to medium sand, dry to moist						[	
-	-2	2.0	Bore discontinued at 2.0m		-A/E-	-2.0-			-	2
-4			- target depth reached							
	-									
	- - 3									-3
13	-									
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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:

SAMPLING	& IN SITU	<b>TESTING</b>	LEGEND

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

	-		Description	je		Sam		& In Situ Testing		Well
R	Dep (m	pth n)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction
-		-	Strata  TOPSOIL - dark brown, fine to medium silty sand topsoil,	XX	A	0.1	Sa	Confinents		Details
F	-	0.3	_ dry to moist	KK.	^	0.1				
-9		0.75	SAND - grey-brown, fine to medium sand, dry to moist (possible filling)		ΑÆ	0.5				
-	-1 -1		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 -1
15			,							
ŀ	-	2.0			A/E	0.0				
F	-2 -	2.0	Bore discontinued at 2.0m - target depth reached		-A/E-	-2.0-				-
-4	-		- talget deptil reactied							
-	- -3									-3
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120										-
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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:

SAMPLING & IN SITU TESTING LEGEN	ō
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A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

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

	_		Description	- jc		Sam		& In Situ Testing		Well
씸	De <sub>l</sub> (n	ptn n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
F			TOPSOIL - dark brown, fine to medium silty sand topsoil	XX	A	0.1	Š			- Details
		0.2	dry to moist  SAND - dark brown and grey-brown, fine to medium sand,		А	0.5				
-	-	0.7	SAND - dark brown and grey-brown, fine to medium sand, dry to moist (possibly filling)  SAND - grey mottled yellow-brown, fine to medium sand,			0.5				- - -
ŧ	- - 1		dry to moist		ΑÆ	1.0				- -1 -
+	-		1.2m: as above but yellow-brown mottled brown							- -
-										
E	-2	2.0	Bore discontinued at 2.0m		-A/E-	-2.0-				2
ŧ	-		- target depth reached							- - -
-4	-									- -
Ē	-3									- -3
ŧ	-									- - -
13	-									- -
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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:

SAMPLING	& IN SITU	<b>TESTING</b>	LEGEND

A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

	_		Description	.je		San		& In Situ Testing		Well
R	) De	pth n)	of	Graphic Log	Туре	Depth	Sample	Results & Comments	Water	Construction
			Strata	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			Sar	Comments	1	Details
16		0.3	TOPSOIL - dark brown, fine to medium silty sand topsoil, trace gravel, dry to moist		A/E	0.1				
-	- - -	0.5	FILLING - yellow brown, fine to medium sand filling, dry to moist		ΑÆ	0.5				
15	- 1 - 1 -		1.3m: as above but grey-brown		ΑÆ	1.0				-1 -1
	-2		1.311. as above but grey-brown		ΑÆ	20				
- 41	- 2		2.4m: as above but becoming grey-brown and dark brown		AVE	2.0				
13	- - - 3 -				ΑÆ	3.0				-3
	-	3.4	SAND - yellow-brown, fine to medium sand, moist							
12	- -4 -	4.0	Bore discontinued at 4.0m	[	—A—	4.0-			+	4
Ė			- target depth reached							
ŀ	-									<u> </u>
F										
-=	-5 -									-5 -
-	-									
Ė	- - -6									- -6
-6										
ŀ	-									<u> </u>
ŀ	-									
- - 0	- - 7 -									-7
Ė	-									
ŀ	-									
ŀ	-									
	- 8 - -									-8
Ė										
Ė	-									
-	- -9									-9
[										
Ė	-									
ŀ	-									<u> </u>
						<u> </u>				

RIG: DT100 DRILLER: SS LOGGED: RW CASING: Uncased

**TYPE OF BORING:** Auger to 4.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN SITU TESTING
G Gas sample
P Piston sample
T tube sample (x mm dia.)
W Water sample
W Water sample
W Water level



Cranbrook School **CLIENT:** PROJECT: Cranbrook School ECI Victoria Road, Bellevue Hill LOCATION:

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

	_		Description	.E_		Sam		& In Situ Testing		Well
RL	De <sub>l</sub> (n	ptn n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
16	- - -	0.3	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	M	A/E	0.1	o		-	
- 1	· · ·	0.3	SAND - dark brown mottled yellow-brown, fine to medium sand with iron indurated pockets, dry to moist (possibly filling)		ΑÆ	0.5			-	
15	- -1 -	1.2			ΑÆ	1.0			-1	ı
	- - -		SAND - yellow-brown, fine to medium sand, moist							
- 41	- - -2	2.0	Bore discontinued at 2.0m		-A/E-	-2.0-			2	-
	• • •		- target depth reached							
13	- -3 -								-3	3
12	- - - - - 4								-4	
	- - - -									
11	- -5 - - -								5	5
10	- - - - 6 -								-6	3
	· · · · · · · · · · · · · · · · · · ·								-	
6	-7 - - - -								- 7	
- 8	- - - - 8								-8	3
-	- - - - -								-	
4	- 9 - - -								- 9 - -	
-	- - -								-	

LOGGED: RW **CASING:** Uncased RIG: DT100 DRILLER: SS

TYPE OF BORING: Auger to 2.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU	TESTING I	_EGI	ΞND
G Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

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

	Da	nath	Description	ji r		Sam		& In Situ Testing	<u></u>	Well
R	De (n	ptn n)	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	S			- -
	· · ·	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
14		1.4 -	SAND - mottled yellow-brown, dark brown and grey-brown, fine to medium sand, dry to moist (possibly filling)		A/E	2.0				2
		2.2	SAND - yellow-brown, fine to medium grained sand, dry to moist		AL	2.0				
13	-3	3.0	Bore discontinued at 3.0m - target depth reached		-A/E-	-3.0-				3
	•		- target depth reactied							
12	-4 -4									[ -4 [
	•									
-=	- 5 									-5 [
-	•									
10	6									-6 -
	· .									
-6 -	-7									7
-	- - -									
- 8	-8									-8 - -
	· · ·									
	-9									-9 [
-										

RIG: DT100 DRILLER: SS LOGGED: RW CASING: Uncased

**TYPE OF BORING:** Auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING	& IN SITU	<b>TESTING</b>	LEGEND

A Auger sample
B Bulk sample
B Bulk Slock sample
C C Core drilling
D D isturbed sample
E Environmental sample
W Water sample
W Water sample
W Water level



Cranbrook School **CLIENT:** PROJECT: Cranbrook School ECI LOCATION: Victoria Road, Bellevue Hill 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

	<b>D</b> -	-41-	Description	jc _	Sampling & In Situ Testing			& In Situ Testing		Well
R	De (n	n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
	-		TOPSOIL - dark brown, fine to medium silty sand topsoil,	M	A/E	0.1	Ø			
16	-	0.3	dry to moist  SAND - grey-dark brown, fine to medium sand, dry to moist (possibly filling)		ΑÆ	0.5				
-	- - - 1				ΑÆ	1.0				- - -1
- 15	-	1.2	SAND - mottled grey-brown and yellow-brown sand with pockets of iron induration, moist							
-	- - - 2				ΑÆ	2.0				- - - -2
-4	-		2.5m: as above but grey-brown							
	- - - 3				Α	3.0				-3
13	-	3.5	SAND - yellow-brown, fine to medium sand with clay, wet							
	- - -	4.0	3.9m: as above but pale-grey		A	-4.0-				-
12	- <b>4</b> -	4.0	Bore discontinued at 4.0m - target depth reached		Α	4.0				. <del>"</del> - -
-										
-	- - 5 -									- -5 -
-==	-									-
-	- - - 6									- - - -6
-0	-									
-	-									
	-7 - -									-7 - - -
-	-									-
-	- - 8 -									- - -8 -
- - - -	-									
-	- - - -9									- - - -9
	-									
-	-									- - -
Ł										

LOGGED: RW **CASING:** Uncased RIG: DT100 DRILLER: SS

**TYPE OF BORING:** Auger to 4.0m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

SAMPLING & IN SITU	TESTING	LEGI	END
G Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level G P U×W △♥

LECEND
PID Photo ionisation detector (ppm)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
p Pocket penetrometer (kPa)
S Standard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Cranbrook School ECI
LOCATION: Victoria Road, Bellevue Hill

**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

			Description	O	Sampling & In Situ Testing			& In Situ Testing		Well		
귐	De	pth	Description of	aphic og			Water	Construction				
	(n	n)	Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Š	Details		
		0.2	TOPSOIL - dark brown, fine to medium silty sand topsoil, dry to moist	XX.	A/E	0.1	(0)					
16		0.2	SAND - yellow-brown mottled dark brown, fine to medium sand, dry to moist (possible filling)		Α	0.5						
	·1		1.0m: as above but dark brown		ΑÆ	1.0				1		
15		1.3	SAND - yellow-brown and grey-brown, fine to medium sand with clay, wet									
	-2	2.0				-2.0-				2		
14-	.3	2.0	Bore discontinued at 2.0m - target depth reached		74.	2.0				-3		
13												
12	4									-4		
	-5									-5		
- 17												
	-6									-6 -6		
9												
6	7									-7		
	-8									-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:** 

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN S11 of IESTING
G Gas sample
P Piston sample
V Water sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
PID Photo ionisation detector (ppm)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
p Pocket penetrometer (kPa)
S Standard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
묍	Depth (m)	of		Graphic Graphi	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	g %	Test Results &
			M H W S E H	EX Low Year High	0.05	S - Shear F - Fault	1	Q &	œ °	Comments
34	0.1	TOPSOIL - grey-brown, silty sand topsoil with rootlets, moist  FILLING - grey-brown, silty sand filling, moist  FILLING - grey silty sand filling with sandstone gravel, moist					D			
33	-1 - - - - -	FILLING - light grey, medium grained sand filling, damp					S	-		2,1,1 N = 2
32	-2						S	-		1,2,3 N = 5
31	-	SAND - medium dense, yellow, medium grained sand, damp								4,6,7
30	4.4	SAND - medium dense, orange-brown, medium grained sand, damp				Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S			N = 13
ŀ	5.5	¬ SANDSTONE - low strength, light					S			10,7/20mm refusal
29	5.6/ 5.72/ -6	grey, fine to medium grained sandstone  SANDSTONE - low and medium strength, slightly weathered, light grey and red and orange, medium				5.6m: CORE LOSS: 120mm 5.88m: B0°- 5°, un, ro, cly, 1mm 6.24m: J20°, un, ro, cln				bouncing PL(A) = 0.17
28	- - -7 -	grained sandstone with trace of very low strength decomposed seams					С	96	92	PL(A) = 0.3
27	- - - - 8					7.65m: Ds, 50mm 8.1, 8.15m: J70°, pl, ro,				PL(A) = 0.11
-	8.77	CANDETONIE medium akranali				cly, 5-10mm				PL(A) = 0.11
26	-9 -9 -	SANDSTONE - medium strength, fresh, unbroken then slightly fractured, light grey, medium grained sandstone with some carbonaceous laminations and some low strength bands				9.2m: J60°, pl, ro, cln 9.2-9.4m: J60°, un, fe stn, he	С	100	100	9.00-9.20m: UCS Sample PL(A) = 0.33
25	- - -	Sa Grigari Starto				9.4-9.6m: J60°, un, fe stn, he				

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

	SAMPLING & IN SITU TESTING LEGEND												
Α	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)								
С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)								
D	Disturbed sample	⊳	Water seep	S	Standard penetration test								
l F	Environmental sample	e <b>T</b>	Water level	V	Shear vane (kPa)								



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	<u> </u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
R	Depth (m)	of		Graphic Log	Strength Needium High Nery High Need High New High New High Str High Str High New Hi	Spacing (m)	B - Bedding J - Joint	Туре	ore	RQD 6	Test Results &
	, ,	Strata	EW HW SW HW	<sup>ب</sup>	Ex Low Low Very Very Very Very Very Very Very Very	0.05 0.50 1.00	S - Shear F - Fault	\ \frac{1}{2}	2 %	Σ°`	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 (continued)					`9.95m: B0°, pl, ro, cly, 2mm	С	100		PL(A) = 0.72
22 23	- 12 - - - - -						<b>&gt;&gt;</b>	С	100	100	PL(A) = 0.65  PL(A) = 0.59
21	- - -14						14.14m: B0°, pl, ro, cly, 5mm				PL(A) = 0.2
	-						Sillili				PL(A) = 0.7
20	- -15 -										PL(A) = 0.52
19	- 16 - 16							С	100	100	PL(A) = 0.88
9.	-17						16.9m: B0°, pl, ro, cly, 1mm				
17	- 17.2 · - - - - - - -18	SANDSTONE - low strength, moderately to slightly weathered, fractured, light grey and red, fine to medium grained sandstone with some medium and high strength, iron-cemented bands and traces of					17.51m: B0°, pl, ro, fe stn				PL(A) = 0.19
16	- - - - 19	extremely low and very low strength seams					18.23m: J60°- 90°, un, ro, cly, 5mm 18.28m: B0°- 10°, un, ro, cln 18.4-18.7m: J70°- 90°, un, ro, cly, 1mm, he	С	100	94	PL(A) = 0.16 PL(A) = 0.73
15						<b>=</b> 7, \\ -\\1\\	19.43m: B0°, pl, ro, fe stn 19.5m: Cs, 20mm 19.58m: fg, 40mm				FL(A) = 0.73

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

	SAI	MPLING	& IN SITU TESTING	LEGE	ND
Α	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 <sub>x</sub>	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
	Cardanana atal anamala	-	Materia level	1/	Chanada (I-Da)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

	Description	Degree of Weathering	Rock 은 Strength 등	Fracture	Discontinuities	Sa			n Situ Testir
Depth (m)	of	Weathering	Graphic Log Ex Low Very Low Medium Log Very High Ex High Water Water Water Water	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	g %	Test Resu &
	Strata	E S S E E	Kelgh Med Kelg K	0.00	S - Shear F - Fault	<u>-</u>	0 8	ر تع	Commen
- - 20.3	SANDSTONE - medium and low	_			19.75m: B0°- 10°, un, ro, fe stn 20.15m: J60°, pl, ro, fe	С	100	94	PL(A) = 1.
-21	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				20.38m: J0°- 45°, un, ro, cln  21.42m: B5°, pl, ro, cln  21.75m: B5°, pl, ro, fe stn  22.12m: B10°, pl, ro, fe stn	С	100	98	PL(A) = 0
- -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
- 24 - 24 	SANDS I ONE - low then medium				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, ro, cln 24.7m: Cs, 150mm 24.85m: Ds, 150mm	С	100	62	PL(A) = 0 $PL(A) = 0$ $PL(A) = 0$
-26 27	strength, fresh, slightly fractured then unbroken, light grey, medium grained sandstone with some carbonaceous laminations				25.7, 25.76m: J60°, pl, ro, cly, 8mm	С	100	100	PL(A) = 0. $PL(A) = 0.$

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

29

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

	S	SAMPLING	& IN SITU TESTING	G LEGI	END
Α	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)
С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
F	Environmental cam	nla 🖫	Water level	1/	Shoor yong (kDa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering	ပ	Rock Strength ็อ	Fracture	Discontinuities	Sa	ampling &	In Situ Testing
꿉	Depth (m)	of	Wednering	rapn Log	Strength Nedium	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. % RQD %	Test Results &
			WH WW WH WH	פ	Very Very Very Very Very		S - Shear F - Fault	Ţ	2588.	Comments
34	_ 0.06 <u> </u> - 0.17 - 0.15	PAVERS FILLING - yellow fine to medium		$\hat{\lambda}$		 		_A_/		
F	0.15	grained sand filling, humid		$\otimes$				Α		
ŀ	-	CONCRETE PAVERS		X						
E	-1	FILLING - light grey, medium grained sand filling, damp		$\times$				Α		
33	- - - 13	FILLING - grey silty sand filling with some tree roots and gravel, damp		$\bigotimes$		 		s		1,1,1 N = 2
ŧ	1.4	FILLING - light grey, medium		$\stackrel{\star}{\times}$						
ŀ	-	grained sand filling, damp  FILLING - brown, medium grained		X						
-25	-2	sand filling, damp		$\otimes$						
- ["	-			$\times$		 				
ŀ	- 2.5 -	SAND - loose, light grey, medium		XX						1,1,1
ŀ	-	grained sand, damp						S		N = 2
- 2	-3 - -									
ŀ	-									
F						 				
ŀ	- - -4									
-8	-							s		2,3,4 N = 7
-	-									N - 7
ŀ	-					 				
-8	- -5									
F.2										
ŧ	- - 5.5	SAND - medium dense, yellow,								
ŀ	-	medium grained sand, damp				 		S		3,8,7 N = 15
-8	-6									
ŧ	-									
ŧ	-									
F						 				
27	-7 - -	- becoming dense to very dense						s		9,15,18 N = 33
ŧ	-									N = 33
F										
ŧ	- - -8					 				
26										
F	-									40.05
ŧ								S		12,25 refusal
25	- -9					 				
-2	-						Note: Unless otherwise stated, rock is fractured			
ŧ							along rough planar bedding dipping 0°- 10°			
ŧ	-						beauting dippling 0 - 10			
	10.0									

RIG: DT250 DRILLER: GM LOGGED: JN CASING: HW to 5.5m; HQ to 10.0m

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:

	SAMPI	LING	& IN SITU TESTING I	LEGE	ND
Α	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 Is(50) (MPa)
С	Core drilling	WÎ	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: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering .º	Rock Strength	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
R	Depth (m)	of	Weathering Sides	Ex Low Low Nedium High High Ex High Water	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Туре	ore %.%	RQD %	Test Results &
+		SANDSTONE - low then medium	WH WW W W W	F   High	0.050	5 - Silear F - Fault	-	0 %	œ	Comments PL(A) = 0.3
24	40.0	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) = 0.18
23	10.9 - - 11	SANDSTONE - medium strength, slightly weathered then fresh, slightly fractured and unbroken, light grey, medium grained sandstone with some carbonaceous				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:
22	-12	laminations and traces of extremely low strength bands and very low strength decomposed seams								UCS Sample PL(A) = 0.43
21	-13			3		12.53m: B5°, pl, ro, cly, 2mm				
										PL(A) = 0.43
20	-14						С	100	99	
19	-15					14.73m: B5°, pl, ro, cly, 2mm				PL(A) = 0.47
	-16					15.72, 15.75, 15.82m: J70°- 90°, cu, he				PL(A) = 0.87
18				3		16.62m: J30°, cu, ro, cln				PL(A) = 0.51
17	-17						С	100	100	
16	-18					18.1-18.3m: J60°- 90°, un, ro, partially he		100	100	PL(A) = 0.48
15	-19					18.47m: Cs, 10mm				
							С	100	94	PL(A) = 0.74

RIG: DT250 DRILLER: GM LOGGED: JN CASING: HW to 5.5m; HQ to 10.0m

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:

	SAN	<b>IPLING</b>	& IN SITU TESTING	G LEGE	ND
Α	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)
	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)



**CLIENT:** Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **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

П		Description	Degree of Weathering	္ခ	Rock Strength	Fracture	Discontinuities				n Situ Testing
귐	Depth (m)	of	Weathering	F a	Strength Ned Low Ned L	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	وچ ،	Test Results &
	, ,	Strata	M H W H W H W N H	IJ	Very Low Very Very Very	0.05	S - Shear F - Fault	Ļ	2 %	Я°°	Comments
13	20.7	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 22.66	SANDSTONE - high strength, fresh,					21.9m: J0°- 45°, un, ro, cln 22.16m: B0°, pl, ro, cln 22.32m: J20°, pl, ro, cln 22.47m: B0°- 10°, un, ro, fe stn				PL(A) = 0.23
	-23	slightly fractured, light grey fine to medium grained sandstone with some carbonaceous laminations					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 24.65	SANDSTONE - medium strength, fresh, unbroken then slightly fractured, light grey medium grained									PL(A) = 1.01
- 8 -	-26	sandstone with a trace of carbonaceous laminations and some extremely low strength bands					25.3m: J30°, pl, ro, cln	С	100	92	PL(A) = 0.86 PL(A) = 0.39
7	-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		100	92	
9 -	-28 28.0 -29	Bore discontinued at 28.0m - limit of investigation					3mm 27.83-27.91m: B0°- 10°, un, ro, cln				PL(A) = 1.24
2											

RIG: DT250 DRILLER: GM LOGGED: JN CASING: HW to 5.5m; HQ to 10.0m

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:** 

#### **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 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 Core drilling Disturbed sample Environmental sample



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

/AZIMUTH:	90°/	SHEET 1	OF	3
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		Description	Degree of Weathering	Rock Strength 5	Fracture	Discontinuities	Sa		& In Situ Testing
씸	Depth (m)	of	Weathering Supplied Degree of Supplied	Nat   Inigh   Nat	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. % RQD	Test Results &
		Strata	EW HWW HWW HWW HWW HWW HWW HWW HWW HWW H	Low High High	0.00	S - Shear F - Fault	Ę.	0 % %	Comments
34	0.07	CONCRETE PAVERS					Α		
		FILLING - yellow fine to medium grained sand filling, damp					Α	]	
		FILLING - grey silty sand filling with a trace of roots and gravel, and							
ĒĒ	-1	some glass fragments, damp					Α	-	
33	1.2	EILINO II I					S	1	1,2,2 N = 4
<b>†</b>	1.5	FILLING - yellow-brown, medium grained sand filling, damp							N = 4
	1.5	FILLING - grey, medium grained							
		sand, damp							
8	-2								
<u> </u>	2.7							1	3,3,6
	.	FILLING - light grey, medium grained sand filling, damp		}			S		N = 9
2	-3	gp							
	,								
-8	-4 4.0	SAND - loose, yellow medium					_	1	334
Ē		grained sand, moist					S		3,3,4 N = 7
								1	
Ė									
59	-5								
ŀ									
	5.5	SAND - medium dense then dense,						1	5044
		yellow medium grained sand					S		5,9,11 N = 20
-8	-6							1	
<u> </u>									
Ē									
إِ	7							-	
5							s		6,10,15 N = 25
ŧ ļ									
[				1					
<u> </u>	-8								
26									
<u> </u>							s		8,13,13 N = 26
	-9							-	14 - 20
25									
[									
ŧ ļ									
L									

RIG: DT250 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 cov	er; c	oncrete plug							
	SAMPLING & IN SITU TESTING LEGEND									
Α	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 Is(50) (MPa)					
С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)					
D	Disturbed sample	⊳	Water seep	S	Standard penetration test					
E	Environmental sample	¥	Water level	V	Shear vane (kPa)					



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

SURFACE LEVEL: 34.1 AHD EASTING: 338340 NORTHING: 6250642 DIP/AZIMUTH: 90°/--

BORE No: 204 PROJECT No: 84944.02 DATE: 16 - 18/8/2017

S	HEET 2 OF 3
	Sampling & In Situ Tes

		Description	Degree of Weathering	<u>.</u> 2	Rock Strength	Fracture	Discontinuities				n Situ Testing
씸	Depth (m)	of	i rodanomig	iraph Log	Strength Nedium Medium Nedium Nedium Nedium Nedium Nedium Nedium Nedium Nater Nater	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	ص %	Test Results &
		Strata	M M M M M M M M M M M M M M M M M M M		Low High Very Ex H	0.05	S - Shear F - Fault	F	S, S	8.	Comments
24		SAND - medium dense then dense, yellow medium grained sand (continued)						s			13,19,25/130mm refusal
ŀ	-	(continued)				 					
ŧ	[					 					
23	11										
Ŧ"	-										
F	[										12 20 21
ŧ						 		S			12,20,21 N = 41
-8	-12										
ŀ	-										
F	[										
ŧ	- 13										
-2	<u> </u>					 		s			16,23,23 N = 46
ŧ	-					 			-		11 10
F	[										
-8	14										
ŧ"	<u> </u>										
ŧ	<u> </u>					 		_	1		10,13,15
F	[					 		S			N = 28
-6	- 15 -										
ŧ	[ ]					i ii ii l					
ŧ	<u> </u>										
	- 16			::::					-		
F <sup>#</sup>	[					 		s			14,16,22 N = 38
ŧ	ļ			: :::  : :::		 			1		
ŧ	<u> </u>										
-1-	- 17										
F	[										
ŧ	<u> </u>					 		s	1		14,21,23
ŧ	- - 18					 					N = 44
-6	Į . Š										
F	[										
ŧ	<b>[</b>			 			Nata Halan B				
15	19			::::			Note: Unless otherwise stated, rock is fractured		-		4
-	<u> </u>					 	along rough planar bedding dipping 0°- 10°	S			15,15,9 N = 24
F	19.4	SANDSTONE - extremely low strength, orange, fine to medium							1		
ŧ	19.8	grained sandstone with some medium strength iron-cemented				<del>            </del>		С	100	84	

RIG: DT250 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									
	SAMPLING & IN SITU TESTING LEGEND									
Α	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)					
BL	K Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)					
С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)					
D	Disturbed sample	⊳	Water seep	S	Standard penetration test					
ΙF	Environmental sample	Ī	Water level	V	Shear vane (kPa)					



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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 의 Strength	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
R	Depth (m)	of Strata	Weathering  A A A A S S S E	Graphic Log Ex Low Very Low Neddium Bahagh Very High Ex High Ex High Water	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Туре	Core Rec. %	RQD %	Test Results & Comments
12 13 14	- 20.8	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 120.1m: J45°- 70°, un, ro, fe stn, cly, 1mm 20.12m: B0°- 10°, un, ro, fe stn 20.37m: Cs, 30mm 20.43m: 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	UCS Sample  PL(A) = 0.66  PL(A) = 0.59
	-23					23.1m: B5°, pl, ro, cly co 23.35m: B0°- 10°, un, ro, fe stn	С	100	100	PL(A) = 0.67 PL(A) = 0.69
	24 - 24 - 24.72	SANDSTONE - medium strength, fresh, fractured, light grey, medium greined, exactered, with years.				23.9, 23.96m: Ds, 10mm 24.23m: Ds, 20mm 24.23-24.57m: J80°- 90°, un, ro, fe stn, cly, 10mm 24.57m: CORE LOSS: 150mm	С	91	85	PL(A) = 0.75
-6	-26	grained sandstone with some carbonaceous laminations and some extremely low strength bands				25.2-25.5m: J70°, un, he 25.26m: Cs, 10mm 26.42m: Cs, 10mm	С	100	86	PL(A) = 0.61
9	26.75	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	C	100	80	PL(A) = 0.13 PL(A) = 0.73
	28.2	Bore discontinued at 28.2m - limit of investigation								

RIG: DT250 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										
	SAMPLING & IN SITU TESTING LEGEND										
Α	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 Is(50) (MPa)						
С	Core drilling	WÎ	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: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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 Signature Signa	Rock Strength ់ក្រ	Fracture	Discontinuities	Sampling	& In Situ Testing
꿉	Depth (m)	of	raph de raph	Strength Low Low Medium High Wein High Ex High Agreem High High High High High High High High	Spacing (m)	B - Bedding J - Joint	Type Core Rec. %	Test Results
		Strata	EW HWW SWW ER FS EW ER FS EW EW EW EW EW EW EW EW EW EW EW EW EW	Koery Low Low Low Low Low Low Low Low Low Low	0.05	S - Shear F - Fault	Type Core Rec. %	% & Comments
F	0.02	\PAVERS /					Α	
27	· · ·	FILLING - yellow-brown, fine to medium grained sand filling with some fine igneous gravel, damp					A	
	- 0.8 - - 1 -	FILLING - grey silty sand filling, damp					A S	1,1,3 N = 4
26	- 1.3 - - -	FILLING - light grey, medium grained sand filling, damp						N = 4
25	-2 - - - -							455
	- 2.8 - 3 - 3	SAND - medium dense, orange-brown, medium grained sand, damp					S	4,5,5 N = 10
24	3.5	SAND - dense, grey, medium grained sand, moist		·	 			
23	-4 - 4.2 -	SAND - medium dense, yellow, medium grained sand					S	28,25/130mm refusal
22	-5 -5 							
21	- - - - - - -						S	7,10,15 N = 25
	-7	7.0m: becoming dense to very						10.13.17
50	- - - -	dense					S	10,13,17 N = 30
19	- 8 - 8 							
	- - - - -9				                  		S	10,14,16 N = 30
18	- - - - - - - -							

RIG: DT250 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											
	SAMPLING & IN SITU TESTING LEGEND											
Α	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)							
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)							
D	Disturbed sample	⊳	Water seep	S	Standard penetration test							
E	Environmental sample	Ī	Water level	V	Shear vane (kPa)							



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering	<u>.0</u>	Rock Strength	Fracture	Discontinuities				In Situ Testing
R	Depth (m)	of	T Countries	raph	Strength Nedium Nedium Nedium Nedium Nedium Nedium Nedium Nedium Nedium Nedium Nater	Spacing (m)	B - Bedding J - Joint	Type	ore : %	RQD %	Test Results &
	(,	Strata	EW HW SW SW FS FS FS	Ō	Ex Lo Very I Medic High	(m)	S - Shear F - Fault	Ţ	ပို့ မွ	R.	Comments
F	-	SAND - medium dense, yellow, medium grained sand <i>(continued)</i>			.			S			13,15,23 N = 38
+	-	modiam grained cana (bonumaca)									N = 38
F	[										
ŀ	-										
ŀ	-11					i ii ii l					
19	-				.	 					
F					.			S			11,24,31 N = 55
ŀ	-					i ii ii l					N = 55
F	-12				.	 					
-5	-										
E											
ŧ	- - 13			::::		 					
Ē	- 13							s			11,14,16 N = 30
-4	-										N = 30
F	[					 					
ŀ	-										
F	- 14 -				.						
-€	-										
E	[				. ; ; ; ; ; ; ;	i ii ii l		S			14,14,19 N = 33
ŧ	- - 15										N = 33
[	[ 13				.						
-5	-					i ii ii l					
ŀ	-				.	 					
ŧ	- -16										
F	- 10					i ii ii		S			18,27 refusal
ξĘ	<u> </u>					 					
ŀ	-			. ::							
Ė	- - 17			::::							
ŀ	ļ ''					 					
-9	[			::::							
F	-							S			17,25/130mm refusal
ŧ	- 18			::::		 					
ŀ	ļ .										
-6	[			::::							
ŀ	-				]	 					
Ė	- 19			  ::::							
ŀ	19.25							s			12,14,23
	[ .5.25	SAND - dense, light grey, medium grained sand				 					N = 37
ŀ						i ii ii l					
Ė	-										

RIG: DT250 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										
	SAMPLING & IN SITU TESTING LEGEND										
Α	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	W	Water sample	pp	Pocket penetrometer (kPa)						
D	Disturbed sample	⊳	Water seep	S	Standard penetration test						
E	Environmental sample	¥	Water level	V	Shear vane (kPa)						



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering	. <u>e</u>	Rock Strength		Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
킫	Depth (m)	of	Weathering	rapt Log	Strength  Nedium High Nedy High Kx Hig	Wate	Spacing (m)	B - Bedding J - Joint	Туре	ore %:	RQD %	Test Results &
		Strata	EW HW EW EW EW EW EW EW EW EW EW EW EW EW EW	0	Ex Low Medi Wery Very Very Ex H	100	0.05	S - Shear F - Fault	Ţ	Rec	8	Comments
-		SAND - dense, light grey, medium grained sand <i>(continued)</i>						Note: Unless otherwise stated, rock is fractured along rough planar				
, , , , , , , , , , , , , , , , , , , ,	20.5 - 20.62 - -21	SANDSTONE - very low strength, slightly weathered, fractured, light grey, fine to medium grained sandstone with some carbonaceous laminations  SANDSTONE - medium strength,						bedding dipping 0°- 10°  20.97m: B10°, pl, ro, cly, 8mm				PL(A) = 0.07 PL(A) = 0.91
	-22	slightly weathered, light grey and orange, medium grained sandstone with traces of extremely low strength bands and some very low strength seams						∖ 22.25m: Cs, 20mm	С	100	92	PL(A) = 0.87
	-23							22.27-22.29m: J (x3) 10°, pl, ro, fe stn 22.57m: Ds, 90mm				22.78-23.00m UCS sample
+	23.6						<b>  </b>	23.3m: J45°, pl, ro, cln				PL(A) = 0.74
	-24	Bore discontinued at 23.6m - limit of investigation										
	-26											
	-27											
	-28											
	-29											
-												

RIG: DT250 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												
	SAMPLING & IN SITU TESTING LEGEND												
Α	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)								
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)								
D	Disturbed sample	⊳	Water seep	S	Standard penetration test								
E	Environmental sample	¥	Water level	V	Shear vane (kPa)								



#### **TEST PIT LOG**

**CLIENT:** Cranbrook School PROJECT: Additional Investigation LOCATION:

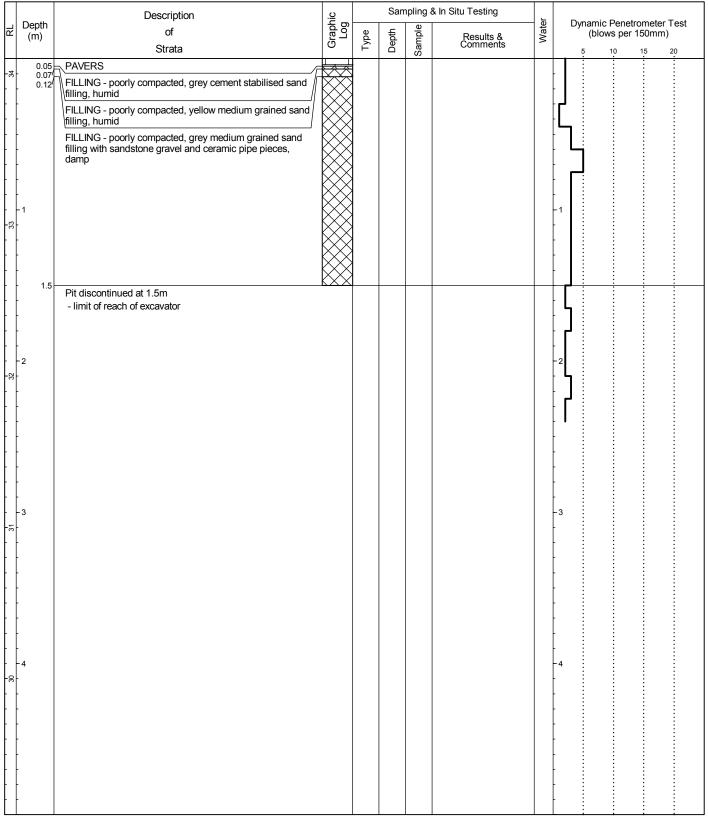
Victoria Road, Bellevue Hill

**SURFACE LEVEL: 34.1 AHD EASTING:** 338315

**NORTHING**: 6250632

**PIT No: 206** 

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



RIG: 1.8t excavator - 300mm bucket to 1.5m LOGGED: JN **SURVEY DATUM: MGA94** 

WATER OBSERVATIONS: No free groundwater observed

#### **REMARKS:**

Core drilling
Disturbed sample
Environmental sample

 Sand Penetrometer AS1289.6.3.3 ☐ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND** A Auger sample B Bulk sample BLK Block sample

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

LEGENU
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)



#### **TEST PIT LOG**

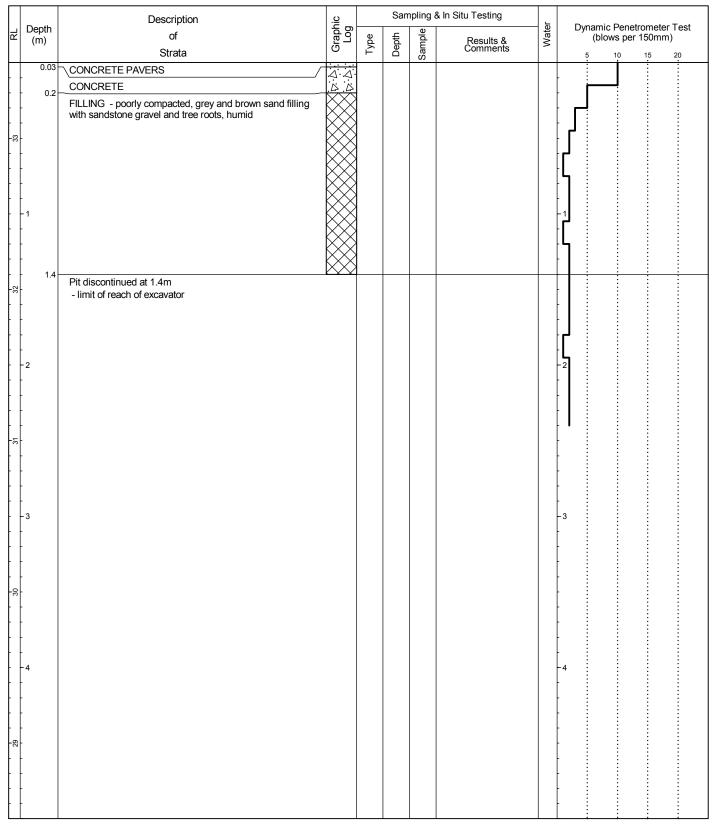
**CLIENT:** Cranbrook School PROJECT: Additional Investigation LOCATION:

Victoria Road, Bellevue Hill

SURFACE LEVEL: 33.5 AHD

**EASTING**: 338336 **NORTHING**: 6250644 **PIT No: 207** 

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



RIG: 1.8t excavator - 300mm bucket to 1.4m LOGGED: JN **SURVEY DATUM: MGA94** 

WATER OBSERVATIONS: No free groundwater observed

#### **REMARKS:**

 Sand Penetrometer AS1289.6.3.3 ☐ Cone Penetrometer AS1289.6.3.2

A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

**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 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)



Cranbrook School CLIENT: PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **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
		01	•

		Description	Degree of Weathering	<u>.</u> 0	Rock Strength 5	Fracture	Discontinuities	Si	ampli	ng &	In Situ Testing
씸	Depth (m)	of	- Wodanomig	Log Log	Strength Nedium High Ex High Ex High Ex High Ex High Out	Spacing (m)	B - Bedding J - Joint	) e	e.%	RQD %	Test Results
	(,	Strata	EW HW EW	Ō	Ex Low High High EX High		S - Shear F - Fault	Туре	ပြလည်	S %	& Comments
H	0.05	ASPHALT /r						Α			
30	_	FILLING - dark grey roadbase gravel filling, damp						A	1		
	0.8	FILLING - grey sand filling with some fine to medium sandstone gravel, damp	i i i i i   ! ! ! ! ! !								
	-1	SAND - medium dense, yellow						_A_	1		3.4.5
Ė		medium grained sand, humid						S			3,4,5 N = 9
-8	-										
	-										
E	-2										
<b>E</b>											
-8	-								1		
F	-							s			3,5,8 N = 13
	-3					ii ii					N - 13
	-	3.0m: becoming moist									
	-			· · · ·		ii ii					
27	-										
<u> </u>	-					ii ii					
	-4								1		568
E						ii ii		S			5,6,8 N = 14
-8	-								1		
	-					ii ii					
E	-5										
+	-					ii ii					
25	-								-		
Ė								s			6,8,11 N = 19
	- -6			· · · ·					-		11 - 13
	-										
-24											
[	-										
-	-										
Ė	-7 -										
23	-										
Ė						ii ii					
	-8										
	-					ii ii			$\frac{1}{2}$		
-8	-							s			8,9,12 N = 21
						ii ii			1		
	- -9										
	-										
-12											
ţ"	-					ii ii					
	-										

LOGGED: JN/SI **CASING:** HW to 5.65m; HQ to 18.35m RIG: Explora 130 DRILLER: JS

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

	SAMP	LING	& IN SITU TESTING	LEGE	ND
Α	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)
С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	Ī	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **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	i	St	Rock rength	<u></u>	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
RL	Depth (m)	of		Graph	Ex Low Very Low	rength	Wate	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Sore %: %	RQD %	Test Results &
H		SAND - medium dense, yellow	W H W W E E					0.00 0.	3 - Sileai 1 - Fault	_	0 %	L.	Comments
		medium grained sand, humid (continued)											
20	-												
	-11												
-	-												0.40.40
19										S			8,10,12 N = 22
	- 12				.								
-													
- 18	-												
-	- - - 13												
	- 13				.     			 					
17	-				.     								
	-												
-	- 14 - -												
16		14.5m: becoming dense								s			10,12,20 N = 32
	-										1		
	- 15 - -												
15	- -												
			1 1 1 1 1					 					
	- 16 -												
14	-												
	- 17												
13	-								Note: Unless otherwise stated, rock is fractured				
					.     			 	along rough planar bedding dipping 0°- 10°				
	- 18 -								-				
12	18.35	SANDSTONE - very low and very		:.:·:	7		$\vdash$		18.35m: CORE LOSS: 450mm				
-	- - 18.8	low to low strength, highly weathered, fractured and slightly fractured, light grey-brown medium							<del></del>				
	- 19 - 19	grained sandstone with a medium strength band								С	77	60	
- 1		-			<b>   </b> 			i ii i <b>i</b> I					
[	- -				i i I L								PL(A) = 0.16

DRILLER: JS LOGGED: JN/SI **CASING:** HW to 5.65m; HQ to 18.35m RIG: Explora 130

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

		SAM	PLING	& IN SITU TESTING	3 LEGE	ND
	Α	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)
- 1	BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test ls(50) (MPa)
		Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
- 1		Disturbed sample	⊳	Water seep	S	Standard penetration test
	Е	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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 .º	Rock Strength	Fracture	Discontinuities				n Situ Testing
R	Depth (m)	of Strata	Graph	Rock Strength   Ned High   Ned Hi	Spacing (m) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	B - Bedding J - Joint S - Shear F - Fault	Туре	Core Rec. %	RQD %	Test Results &
		low to low strength, mighty				20m: Ds, 50mm 20.1-20.3m: J70°- 90°,	С	77	60	Comments
- 1	20.35 20.6 -	weathered, fractured and slightly fractured, light grey-brown medium grained sandstone with medium strength band (continued)  SANDSTONE - medium strength, slightly weathered, slightly fractured, light grey and brown medium grained sandstone with some extremely low and very low strength bands				20.3m: Ds, 50mm 20.35m: CORE LOSS: 250mm 20.6m: J70°, un, ro, cln 20.9m: B0°- 5°, un, ro, cln 21.5m: J80°, pl, ro, cln 21.6m: B10°, pl, ro, cln	С	92	87	PL(A) = 0.43 PL(A) = 0.52
8	-23					22.4m: Cs, 10mm 22.5m: Cs, 20mm 22.85m: J50°, pl, cly, 10mm 23.15-23.7m: B (x3) 0°- 5°, cly, 10mm				PL(A) = 0.48 PL(A) = 0.46
9	-24					23.75m: J70°, he/ti 24.15m: J50°, pl, ro, fe 24.5m: J45°, pl, ro, cln	С	100	79	PL(A) = 0.52 24.00-24.20m: UCS Sample
2	-25 25.0-	Bore discontinued at 25.0m - limit of investigation								
	-26									
3	- 27									
	-28									
2	- 29									

RIG: Explora 130 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

	SAN	IPLING	& IN SITU TESTING	G LEGE	ND
Α	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)
С	Core drilling	WÎ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)



**CLIENT:** Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **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	<u>.0</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & l	n Situ Testing
牊	Depth (m)	of	- Wodinomig	ab	Ex Low Very Low Medium Medium New High New High Ex High Ex High Water	Spacing (m)	B - Bedding J - Joint	) e	.% e	RQD %	Test Results
	()	Strata	M M M M M M M M M M M M M M M M M M M	يَ	Ex Low Very Low Medium High Very High Ex High	0.00	S - Shear F - Fault	Туре	ပ္သမ္တ	8%	& Comments
- 8	- 0.1	ASPHALT				1 11 11					
F		PAVERS		H							
E	0.4	FILLING - light grey crushed		$\bigotimes$							
ŀ	0.7	sandstone filling, damp  FILLING - yellow medium grained		$\bowtie$							
33-	- -1 1.0	_sand filling, humid		$\bowtie$							
F	-	SAND - yellow medium grained			1						
E	[	sand, moist									
ŀ	-				1						
<b>†</b>	-					i ii ii					
32	-2										
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F											
34	-3				1						
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RIG: Explora 130 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:** 

# **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Piston sample
(x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

LECEND
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)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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 2 OF 3

		Description	Degree of Weathering  A € € 8 8 € €	<u>.0</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
씸	Depth (m)	of		raph	Ex Low Very Low Medium High Ex High Ex High Water	Spacing (m)	B - Bedding J - Joint	Туре	ore S.%	RQD %	Test Results &
4		Strata	EW H W H EW	U	Ex Low High Very Very Very Very Very Very Very Very	0.05	S - Shear F - Fault	F	QÃ	8,	Comments
2	- - - - -	SAND - yellow medium grained sand, moist <i>(continued)</i>				                       					
23	- - 11 - - - -										
22	- 12										
21	- - - - 13										
0											
26	- 14 - - - - -										
19	- - 15 -										
18 1	- - - - 16										
41	- - - - - 17				:						
	-						Note: Unless otherwise				
16	- 18 - 18						stated, rock is fractured along rough planar bedding dipping 0°- 10°				
15	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:	С	88	48	PL(A) = 0.4
-	- - - -	49.1-19.6m: very low strength					19.27-19.4m: Ds 19.5m: B10°, fe 19.55m: J55°, he/ti 19.62m: B0°, cly, 20mm				PL(A) = 0.5

RIG: Explora 130 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:

		SAMPLING	& IN SITU TESTING	S LEGEND
Α	Auger sample	G	Gas sample	PID Photo ionisation detector (
В	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D) Point load diametral test Is
_	Coro drilling	١٨ĵ	Water cample	nn Pocket panetrometer (kPa

Photo ionisation detector (ppm)
A) Point load axial test Is(50) (MPa)
D) Point load diametral test Is(50) (MPa)
Pocket penetrometer (kPa)
Standard penetration test



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	D	egr	ee o	of na	Graphic		 S	Ro	ock	th	Τ,	١	Fr	acti	ure	I	Discontinuities	Sa	ampli	ng &	n Situ Testing
R	Depth (m)	of			5.11	9	sraph Log	) ×	ر ادا ادا	 	<u>∃</u>	h Nery High	lign A/24	Wate		paci (m)	)		B - Bedding J - Joint	Туре	ore	RQD %	Test Results &
4		Strata	E E	⋛	S S	띺	Θ.	EX	  el	۽ او	High		X -	100	5 6	9.10	1.00	_	S - Shear F - Fault	F	Οğ	Σ.	Comments
Ė,	- 20.1 -	Bore discontinued at 20.1m		Н				1	<u>                                     </u>					ľ	_		11	7	19.87m: J80°, pl, ro, fe 19.92m: J70°, un, ro, fe 20.0-20.07m: fg 20.07m: J50°, pl, ro, fe				
-	-	- limit of investigation																	20.0-20.07m: fg 20.07m: J50°, pl, ro, fe				
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RIG: Explora 130 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:** 

#### SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
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)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

Г		Description	Degree o Weatherin	of .º	S	Rock trength   High   Aciv Hig	L	Fracture	Discontinuities				In Situ Testing
R	Depth (m)	of	VV GGG TGTT	is aph		를   표  <u>년</u>   기   등	Water	Spacing (m)	B - Bedding J - Joint	/pe	Core Rec. %	αD %	Test Results &
L		Strata	FS M H W	E C	Kel E			(m) (m)	S - Shear F - Fault	Ę.	O &	œ -	Comments
ŧ		SOIL NOT LOGGED		i									
ŀ	-							 					
33													
ŧ	- -1			<u> </u>	Тij								
ŀ	-			<u> </u>									
ŧ	-							 					
32	İ												
ŀ	-2												
-	-			<u> </u>	Hii			i ii ii l					
31	-			<u> </u>									
ŧ	-3												
ŧ								 					
ŀ	-												
-8	-			i I	Hii								
ŧ	-4			<u> </u>	Hii								
ŧ	-			<u> </u>									
29													
-	- - -5							 					
-	-							 					
F	-												
-82	-			<u> </u>	Hii								
ŧ	-6			<u> </u>	Hii								
ŧ	-												
-	-							 					
27								 					
ŧ	-7 -						1 1						
ŧ	-												
26	-												
ŀ	- -8												
F					1.1								
ţ								 					
25													
ŧ	-9 -												
F	-												
24	-					$\square$							
E	-												

RIG: DT250 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:** 

#### **SAMPLING & IN SITU TESTING LEGEND**

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LEGENU
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)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	Degree of Weathering	<u>.</u> 2	Rock Strength	٠	Fracture	Discontinuities				n Situ Testing
Ζ	Depth (m)	of		raph	Ex Low Very Low Medium High Very High Ex High	water	Spacing (m)	B - Bedding J - Joint	Type	ore c. %	RQD %	Test Results & Comments
		Strata	F S S M H E	9	Medi Kery L	10.0	(m) (m)	S - Shear F - Fault	Ţ	C. Rec	R.	Comments
ŀ	-	SOIL NOT LOGGED (continued)				l						
Ė						ŀ						
23	-					ļ						
ļ	- 11					l						
ŀ	- '					1						
Ē						ļ						
-22	-					l						
E	- 12											
ŧ						ļ						
ŀ	-					ľ						
-2												
ŀ	- -13					į						
F	[											
ŧ						ll l						
-8	-											
ŧ	14					ļ						
ŀ	-					ľ						
-	[					l.						
-6						ļ						
ŀ	- 15 -					ļ						
Ē												
-81						ŀ						
<u></u>	ļ					ļ						
ŧ	- 16 -											
ŀ	-											
-	[					į						
[	- - 17											
ŀ	ļ											
Ė												
16	<u> </u>					ļ						
E	- 18							Note: Unless otherwise				
ŀ								stated, rock is fractured along rough planar bedding dipping 0°- 10°				
ŀ	-							bedding dipping 0°- 10°				
15	- I											
ŀ	- 18.9 - 19	SANDSTONE - medium strength,	<del>                                      </del>		<del>╒</del> ┷┷┷┩┤╎╎	#	<u> </u>	18.95m: J45° & 90°, st,				
ŀ	-	SANDSTONE - medium strength, slightly weathered, slightly fractured, light grey-brown, medium to coarse						ro, fe 19.07-19.15m: Cs 19.27m: B10°, fe	_			PL(A) = 0.61
ŀ	[	grained sandstone with clay band at 19.07m				į	<b> </b>	`19.27m: B10°, fe	С	100	85	1 = (1 1) = 0.01
-4	t l							19.75m: B0°, fe				PL(A) = 0.51
	20.0	Bore discontinued at 20.0m		<u> </u>								

Bore discontinued at 20.0m

RIG: DT250 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:** 

#### SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

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)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of Weathering	ပ္	Rock Strength	_	Fracture	Discontinuities	Sá	ampling &	In Situ Testing
귐	Depth (m)	of	Weathering	raph	Strength  Very Low Medium High Very High Ex High	Vate	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	Test Results &
	( )	Strata	EW MW SW FS	Ŋ	Ex Lo Very Low High Very Ex High	>	(m)	S - Shear F - Fault	Тy	2 8 8 8	Comments
-	-	SOIL NOT LOGGED									
34	-										
ŀ	-										
Ė	_1										
+	·										
33-											
ŀ	-										
E	-2										
32	-										
+"	-										
ŧ											
ŧ	- -3										
31	-										
ŧ											
ŀ	-										
F	- -4 -										
-8	-										
ŀ	- -										
ŧ											
ŀ	-5										
-8	-										
ŧ	-										
ŀ	-										
ŧ	-6 -										
- 28	-										
F	-										
ŧ	- -7										
+	-										
27	-										
ŧ			1111								
F	-8				11111						
26											
ŧ"	-										
f	:										
ŧ	- -9 -										
25	-										
F	-										
ŧ											

RIG: DT250 DRILLER: GM LOGGED: SI CASING: HW to 8.0m; HQ to 14.2m

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:** 

#### **SAMPLING & IN SITU TESTING LEGEND**

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LEGENU
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)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

	5	Description	Degree of Weathering	je je	Rock Strength 5	Fracture	Discontinuities				In Situ Testing
R	Depth (m)	of Charles		Graph	Strength Needium Low High Weldium Needium Needium Needium Needium Needium Needium Needium Needium Nater	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Sore %. %	RQD %	Test Results &
$\mathbb{H}$		SOIL NOT LOGGED (continued)	₩ ¥ ₩ % ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩		K K K K K K K K K K K K K K K K K K K	0.00	G - Gricar T - Fault		~ %	ш.	Comments
24	·	(,									
	-11										
23	· ·										
<u> </u>	·										
	-12					 					
22											
	· ·										
	-13										
21	· ·						Note: Unless otherwise stated, rock is fractured				
	· ·						along rough planar bedding dipping 0°- 10°				
	- 14										
20	14.25	SANDSTONE - low then medium		*****							DI (A) 0.05
		strength, slightly weathered, slightly fractured, light grey-brown medium				<b>     </b>	14.5m: J60°, pl, ro, cln				PL(A) = 0.25
	- - 15	grained sandstone			┆╤╧┼╗╎╎┆		ղ 14.88-14.91m: Ds		400	00	
-6						 	14.95m: J60°, pl, ro, cln	С	100	96	
-						 					PL(A) = 0.6
	15.8	Bore discontinued at 15.8m	<b> </b>								
	- 16	- limit of investigation									
-8											
	•										
	- 17										
17	· ·										
	· ·					 					
	· ·										
	-18										
16						 					
-											
	-19					 					
15											
-											

RIG: DT250 DRILLER: GM LOGGED: SI CASING: HW to 8.0m; HQ to 14.2m

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

	SAM	PLING	& IN SITU TESTING	LEGE	ND
Α	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)
BLŁ	K Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **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

		Description	Degree of Weathering Substituti	Rock Strength	Fracture	Discontinuities	Sa	ampling &	In Situ Testing
씸	Depth (m)	of	Sraph	EX Low Low Nearly Low Nearly Low Nearly Low Nearly Low Nearly Low Nearly Low Nearly Ne	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. % RQD %	Test Results &
8	0.05	Strata /	S	EX LOW Medi		S - Shear F - Fault	_	0.88	Comments
-	- 0.3			X			A		
33	-1 1.0 1 -1.0	trace of crushed sandstone gravel, humid (possible filling)  SAND - medium dense, light brown, fine grained sand, moist					S		4,5,5 N = 10
32	- - - -2 -								
31	-3				               		S		5,7,9 N = 16
30	- - - - - -4						s		5,9,12 N = 21
29	- - - - -5								N = 21
28	- - - - - - - - -						S		5,9,12 N = 21
27	7 7.0	SAND - dense, light brown, fine to medium grained sand					S		14,17,22 N = 39
26	- - - - 8 - -								
25	- - - - 9 -				i ii ii		S		15,18,23 N = 41
-	-								

RIG: Scout 4 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:** 

Core drilling
Disturbed sample
Environmental sample

**SAMPLING & IN SITU TESTING LEGEND** A Auger sample B Bulk sample BLK Block sample

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



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill

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

		Description	Degree of	ပ္	Rock Strength Medium   FK Low   Now	Fracture	Discontinuities	Sa	ampling & I	n Situ Testing
뭅	Depth (m)	of	VVCdtricring	Log	Vate	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. % RQD %	Test Results &
24		Strata	EW HW SW SW FS	Ö	Ex Low Medic High Very   Very   Ex High O.01	(m)	S - Shear F - Fault	Ļ	Rec C	Comments
-	-	SAND - dense, light brown, fine to medium grained sand (continued)						s		17,22,25 N = 47
ŧ		, ,							_	N = 47
ŀ	-					ii ii				
£ 22	- -11									
ļ''	- ''									
F						ii ii				
ŧ	-							s		16,22,24 N = 46
22	- - 12								-	N - 40
Ė						ii ii				
ŀ	-									
-	[									
27	- - 13									
F	-									
ŧ									-	
ŀ	-							s		14,17,22 N = 39
2	- 14								1	
ŀ	-									
F									-	15 16 01
ŧ								s		15,16,21 N = 37
-6	- 15 -								1	
ŧ										
ŧ	-									
<u></u>	-					ii ii				
100	- 16 [							s		11,13,18 N = 31
ŀ	-									N = 31
-	[									
_	- - 17									
ŧ,	- '' -									
Ē	-									
ŧ	Ė							s		14,14,17 N = 31
16	- 18			: : :					-	14 - 31
ŧ	-									
ŀ	-									
F	[									
15	- - 19			::::					-	
-	-							s		14,17,19 N = 36
ŧ	19.5	I SAINIS I UNE - EXITERIENTOW			[ <b>,</b>					
ŀ	-	strength, brown, medium grained sandstone								
L		Garagorio		:•:•:						

RIG: Scout 4 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:** 

### **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

LEGENU
PID Photo ionisation detector (ppm)
PL(A) Point load axial test Is(50) (MPa)
PL(D) Point load diametral test Is(50) (MPa)
PD Pocket penetrometer (kPa)
Standard penetration test
V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

	5 "	Description	Degree of Weathering	. <u>S</u>	Rock Strength	Fracture	Discontinuities	Si			n Situ Testing
R	Depth (m)	of		Grapt	Strength Nedium	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Sore %.	RQD %	Test Results &
4	-	Strata	W H W S S E		E E High	0.00	3 - Sileai 1 - Lauit		28	ш.	Comments
13	- 20.2	SANDSTONE - medium and medium to high strength, moderately then moderately to slightly weathered, light grey and brown, medium to coarse grained sandstone					20.32m: B10°, fe				PL(A) = 0.77
12	-22						10mm 21.4m: J40°, pl, ro, fe, cly	С	100	85	PL(A) = 1.57
							22.03m: B0°, cly, 10mm 22.17-22.26m: Ds 22.31m: J45° & 85°, st,				PL(A) = 0.5
- 11	22.55 - - -23	Bore discontinued at 22.55m - limit of investigation		<b>!::::</b>			Tro, ti \22.41-22.43m: Ds				FL(A) - 0.5
-											
10	- 24 - - - -										
- 6	- - 25 -										
-8	- - -26 -										
	- 27										
9	- 28 										
	- 29										

RIG: Scout 4 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:

# SAMPLING & IN SITU TESTING LEGEND A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample B Water seep Water seep Water level SAMPLING & IN SITU TESTING LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) PL(B) Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	. <u>e</u>	Rock Strength ู้	Fracture	Discontinuities	Si		In Situ Testing
귙	Depth (m)	of		Srapt Log	Strength Nedium High KHigh KHigh KHigh Water	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. % RQD %	Test Results &
L	0.05	Strata ∖ASPHALT /	WW HW SW AR		Ex Low Very Very Very Very Very Very Very Very	(m)	S - Shear F - Fault		0 8 8	Comments
ŧ	- 0.00	FILLING - brown to red-brown, sand		XX				A		
ŧ	-	filling with some roadbase gravel		$\otimes$				Α		
-8	-			$\Longrightarrow$						
ŧ	-1			XX				_A_	,	0.7.7
ŧ	1.3	SAND - medium dense, light brown	. ; ; ; ; ;	$\times \times$				s		6,7,7 N = 14
<u></u>	-	to brown, fine to medium grained sand, slightly silty, moist							1	
-83	-	Sand, ongray only, molec			]					
ŧ	-2 -									
ŧ	-									
-8	-							s		6,7,7 N = 14
F	-3								-	14 - 14
ŧ	- -									
Ė	-									
31	-				.					
F	-4								1	589
ŧ	-							S		5,8,9 N = 17
- 08	-								]	
Ŧ"	-									
F	-5 -									
ŧ	-									
-82	-							s		6,10,11 N = 21
ŀ	- -6				.				1	14-21
F	-									
ŧ	-				.					
-82	-									
ŧ	-7 [								1	7,8.12
ŀ	- -							S		7,8,12 N = 20
27	-					ii ii				
•	- - -8				: 					
ŧ	-									
F	-					ii ii				
26	- -				<u> </u>	ii ii		s		10,11,13 N = 24
ŧ	- -9				.	ii ii				
ŧ	- -									
£.~	-				. i i i i i i					
25	- - -									
Щ				· · · ·				1	$\bot$	

RIG: Scout 4 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

_						
		SA	MPLING	6 & IN SITU TESTING	G LEGE	ND
1	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)
- [1]	BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test ls(50) (MPa)
- 10	С	Core drilling	WÎ	Water sample	pp ·	Pocket penetrometer (kPa)
- [1]	D	Disturbed sample	⊳	Water seep	S	Standard penetration test
- [1	E	Environmental sample	Ī	Water level	V	Shear vane (kPa)



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	Degree of Weathering	. <u>o</u>	Rock Strength	Fracture	Discontinuities	Sa			n Situ Testing
귐	Depth (m)	of		Log	Vate	Spacing (m)	B - Bedding J - Joint	Туре	ore c. %	RQD %	Test Results &
Ц		Strata	S M M M M M M M M M M M M M M M M M M M		Nedin Nedin	0.10	S - Shear F - Fault	ŕ	Q &	ية ع	Comments
24	-11	SAND - medium dense, light brown to brown, fine to medium grained sand, slightly silty, moist (continued)						S	-		10,11,14 N = 25
23	11.3	SAND - dense, orange-brown, fine to medium grained sand with some clay (possibly extremely weathered sandstone)					Note: Unless otherwise	s	-		10,12,23 N = 35
22	-13 13.0	CANDOTONE					stated, rock is fractured along rough planar bedding dipping 0°- 10°				
21		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) = 0.7
20	-14						14.11-14.2m: B (x2) 0°-5°, fe	С	100	97	
19	-15						14.9m: B10°, cly vn, ti				PL(A) = 0.81
t t	- 16					<b> </b>	15.78m: B0°, cbs co, 1mm				DI (A) 0.54
	-16 16.08	Bore discontinued at 16.08m - limit of investigation					\15.78m: J30°, pl, ro, cln /				PL(A) = 0.54
- 4	-17										
17	-18										
19	-19										
15											

RIG: Scout 4 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:

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



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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

			Description	Degree of Weathering	. <u>Ö</u>	Rock Strength	Fracture	Discontinuities			n Situ Testing
귐		epth (m)	of		Srapt Log	Ex Low Very Low Nedium High Str High Ex High	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. % RQD %	Test Results &
L			Strata  FILLING - dark grey, fine grained	W H W W R H W		Kery Kery Kery Kery Kery Kery Kery Kery	0.10	S - Shear F - Fault		0 %   K	Comments
F	Ē		FILLING - dark grey, fine grained silty sand filling, humid		$\otimes$						
26	Ė	0.6			$\bigotimes$						
+"	-	0.0	SAND - loose, light grey, fine to medium grained sand, moist								
F	-1		•				 			-	122
ŧ	Ė								S		1,2,2 N = 4
25	-									1	
F											
ŧ	-2	2.0	SAND - medium dense, light grey-brown, fine to medium grained				 				
ŧ	Ė		sand								
24	-						i ii ii l		s		4,5,7 N = 12
F	-3										N = 12
ŧ	Ė						 				
<u>-</u> ا	Ė						 				
23	-										
ŧ	-4						i ii ii l			-	6.0.10
ŧ	Ė								S		6,8,10 N = 18
22	-						 			1	
F	F										
ŧ	-5										
ŧ	Ė										
21	-					.			S		7,11,15
ŧ	-6						 	-		-	N = 26
ŧ	-										
+	-						i ii ii l				
28	Ē										
ŧ	-7						 			-	
ŧ	Ė								S		6,11,16 N = 27
19	-										
ŧ	Ė										
ŧ	-8	8.0	SAND - dense, light brown, medium								
ŀ	-		grained sand, slightly silty, with a trace of organic clay		::::		 				
-8	Ē								S	]	8,14,25 N = 39
ŧ	-9						i ii ii l				N = 39
ŧ	Ę										
F.	[						 				
1	Ė										
Ł	-			<u>Liiiii</u>							

RIG: XC 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:** 

#### SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill 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 2 OF 2

		Description	Degree of Weathering	<u>.</u> 2	Rock Strength	Fracture	Discontinuities				n Situ Testing
굽	Depth (m)	of		Log	Strength Nater Ex High Strength Nater Ex High Strength Nater Ex High Strength Nater Strength Nat	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. %	다. 일 8	Test Results &
			M M M M M M M M M M M M M M M M M M M		Low Nedi High Very	0.00	S - Shear F - Fault	F	Q &	ĕς.	Comments
ŀ	- - -	SAND - dense, light brown, medium grained sand, slightly silty, with a trace of organic clay (continued)						s			10,15,25 N = 40
19	[										
ŀ	-11 11.0	SAND - very dense, light brown, fine									
ŧ		to medium grained sand			1	 					
- 2						 			-		10.00.10
Ė								S			16,33,43 N = 76
ŧ	- 12 [										
ŀ	-										
-4	-				.						
F	- 13								-		
F	-							s			17,23,32 N = 55
-5	-								1		
ŀ	-										
ŧ	- 14 - -										
ŧ					.						45.00/440
12					.	 		S			15,30/140mm refusal
ŧ	- 15				.	 					
ŧ							Note: Unless otherwise stated, rock is fractured				
==							along rough planar bedding dipping 0°- 10°				
ŧ	- -16 16.0										30,30/35mm
E	16.18	SANDSTONE - very low strength, light brown and orange-brown,						S			refusal
Ę.	-	medium grained sandstone SANDSTONE - medium strength,				i    <b>  </b>					PL(A) = 0.75
[	-	highly and slightly weathered, slightly fractured, light grey-brown,				┊┊┟	16.6m: B20°, cly, 5mm				
F	- 17	medium to coarse grained sandstone with some extremely low				┆╠╇┪┆╏	16.83m: B20°, cly co, 2mm 16.94m: B0°, cly, 5mm				
F	-	and very low strength bands					17.0-17.2m: Ds	С	100	78	
-6	-						17.55-17.6m: Cs 17.64 & 17.85m: B (x2)				PL(A) = 0.83
ŧ	- 18					<b>     </b>	10°, cly vn, ti				
ŧ	- -		<del>    </del>		<b>  </b>	<b>  </b>            <b>  </b>	18.18-18.21m: Cs				DI (A) = 0.0
	18.43	Bore discontinued at 18.43m			<del>                                     </del>	<del>                                     </del>					PL(A) = 0.9
ŧ		- limit of investigation				 					
ŧ	- 19 -										
ŧ											
-	-										
Ł	-										

LOGGED: SI/RB CASING: HQ to 10.0m RIG: XC **DRILLER:** Terratest

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:** 

### **SAMPLING & IN SITU TESTING LEGEND** Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level A Auger sample B Bulk sample BLK Block sample

Core drilling
Disturbed sample
Environmental sample



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION:

Victoria Road, Bellevue Hill

SURFACE LEVEL: 25.8 AHD **EASTING:** 338334 **NORTHING:** 6250671

90°/--

DIP/AZIMUTH:

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

**BORE No: 254** 

Rock Degree of Weathering Fracture Discontinuities Sampling & In Situ Testing Description Strength Spacing Depth Core Rec. % RQD % 굺 8 Test Results of Very Low Low Medium High Very High Ex High B - Bedding J - Joint (m) (m) , 06: .00 S - Shear F - Fault Strata EW HW SW SW FB FB FB Comments SILTY SAND - dark brown, fine silty sand, dry SAND - very loose, grey, fine grained sand, dry 1,1,2 s N = 32.0 SILTY SAND - medium dense, dark brown, fine grained silty sand 4.6.6 S - 3 5,10,13 SAND - medium dense, pale yellow, S fine grained sand N = 235.0 SAND - dense, pale yellow, fine grained sand 8,13,18 S N = 3110,17,21 S 8

**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:** 

9

### **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample

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)
Standard penetration test
V Shear vane (kPa)



S

11,18,20 N = 38

CLIENT: Cranbrook School PROJECT: Additional Investigation

LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL: 25.8 AHD** 

**EASTING**: 338334 **NORTHING**: 6250671 **DIP/AZIMUTH:** 90°/-- **PROJECT No:** 84944.02 **DATE:** 24/1/2018 SHEET 2 OF 2

**BORE No**: 254

	<b>5</b>	Description	Degree of Weathering	.ie	Rock Strength	<u>.</u>	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ᅺ	Depth (m)	of Strata	Degree of Weathering	Grapt	Ex Low Very Low Medium High Very High Ex High	Water	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core ec. %	RQD %	Test Results &
15	-11	SAND - dense, pale yellow, fine grained sand (continued)	EW HWW HWW HWW HWW HWW HWW HWW HWW HWW H				0.000		S	-		Comments 11,21,24 N = 45
14	- 11.5- 12 - 12	SANDSTONE - extremely low strength, brown, medium grained sandstone						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S	-		17,30,30/130mm 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
	-14 							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
9	15.4 - 16	Bore discontinued at 15.4m - limit of investigation				- 1						
7	-18											

CASING: HQ to 12.5m **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 B Bulk sample BLK Block sample

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level Core drilling
Disturbed sample
Environmental sample

LECEND
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)



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill

**SURFACE LEVEL: 16.4 AHD EASTING**: 338382 **NORTHING**: 6250756

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

**BORE No**: 256

**DIP/AZIMUTH:** 90°/--

		Description	Degree of Weathering	ပ	Rock Strength 🚡	Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
귒	Depth (m)	of	vveatriering	aphi Log	Strength   Strength   Agter	Spacing (m)	B - Bedding J - Joint	e	<sub>%</sub> و	۵.	Test Results
	(111)	Strata	EW MW SW FR	<u>ن</u> _	Ex Low Very Low Low Medium Medium Very High Ex High Wate	0.05 (111)	S - Shear F - Fault	Type	Rec.	RQD %	& Comments
16	0.4	FILLING - dark grey-brown, silty sand filling with a trace of fine						A			
	0.8 0.8	grained sand with a trace of roadbase gravel, humid (possible filling)						A			400
15	. 1.5	SAND - very loose, brown, fine to medium grained sand, moist  SAND - loose, grey, fine sand with						S			1,0,2 N = 2
	- - -2	some silt, moist									
14	· ¯										
								s			1,2,2 N = 4
13	-3										
12	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
-2	-6										
	· · ·										
	-7							S			4,8,12 N = 20
	· · ·										
- 8	-8 8.0 · · ·	SAND - medium dense, brown, medium grained sand, slightly silty									
								s			8,13,15 N = 28
	-9										
	: : :										

LOGGED: SI CASING: HW to 7.0m RIG: Scout 4 DRILLER: RKE

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

#### **SAMPLING & IN SITU TESTING LEGEND**

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

SURFACE LEVEL: 16.4 AHD EASTING: 338382 NORTHING: 6250756 DIP/AZIMUTH: 90°/--

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

**BORE No**: 256

		Description	Degree of Weathering  A ₹ ₹ % £ £	<u>.0</u>	Rock Strength	Fracture	Discontinuities			n Situ Testing
씸	Depth (m)	of	Wodanomig	raph	ExLow Very Low Low Medium High Very High Ex High Water	Spacing (m)	B - Bedding J - Joint	Туре	Core Rec. % RQD %	Test Results &
	( )	Strata	EW HW SW SW FS	9	Ex Lo	0.01 0.10 0.50 1.00	S - Shear F - Fault	Ту	Rec Co	Comments
9	-	SAND - medium dense, brown, medium grained sand, slightly silty (continued)						S		9,11,14 N = 25
- 22	-11 11.0· - - - - -	CLAYEY SAND - medium dense, orange-brown, medium grained clayey sand						s	-	13,10,9
	- - 12 11.95	Bore discontinued at 11.95m		/.//				<u> </u>		N = 19
-4	. '-	- limit of investigation								
3	- 13 - 13 									
2	- - -14 - -									
-	- - - 15 - -									
- 0	- - -16 - -									
-	- 17									
5	- - - - 18 -									
-3	- 19 - 19 - 19									

RIG: Scout 4 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:** 

**SAMPLING & IN SITU TESTING LEGEND** 

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level



CLIENT: Cranbrook School
PROJECT: Additional Investigation
LOCATION: Victoria Road, Bellevue Hill

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	.≌	Rock Strength	Fracture	Discontinuities			In Situ Testing
귐	L	Depth (m)	of		raph Log	Strength Needium Low Very Low Needium Low Very High Low Ve	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. % RQD %	Test Results &
			Strata	M M M M M M M M M M M M M M M M M M M		Ex L Very Very Very	0.00	S - Shear F - Fault	<u> </u>	O S R	Comments
-9			FILLING - brown, fine grained silty sand filling, humid		$\bowtie$		i ii ii l		_A _A		
	-	0.4	SAND - loose, grey-brown, fine to medium grained sand, slightly silty, moist						A		
-	- - 1										
15							               		S		2,2,3 N = 5
4	-2					·					
-							                  		s		1,1,1 N = 2
ŧ	- - 3					.	 		3		N = 2
[_	-3						 				
-	Ē										
	Ė						i ii ii l				
	-4										
12	Ė								s		2,4,4 N = 8
-	-	4.5	SAND - medium dense, light grey to				 				
	Ē		light grey-brown, fine to medium grained sand, moist								
	-5 -					. ; ; ; ; ; ;					
-=	ŀ										
-	Ē						 		S		3,6,10
ŀ	-6										N = 16
-	ŀ	6.5	SANDSTONE - very low strength,			<u> </u>	i ii ii l				
	-7	7.05	grey-brown, fine to medium grained sandstone								20/20mm
	Ė	7.05	SANDSTONE - medium to high then high strength, slightly weathered						<u>_</u> S_		refusal
-	-		then fresh, slightly fractured and unbroken, light grey, medium				<del>    </del>	7.31m: B20°, pl, ro, fe			PL(A) = 0.93
ŀ	Ē		grained sandstone			:					
	-8										
	-						<b> </b>				PL(A) = 1.04
Ē	F						 		С	100 100	
Ė	Ė						 				
-	-9						i ii ii <b>l</b>	>>			
-	E										
Ė	Ė						 				PL(A) = 1.3
_	Ė						 				

RIG: Scout 4 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:** 

SAMPLING & IN SITU TESTING LEGEND

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

SAMPLING & IN S11 U I ESTING
G Gas sample
P Piston sample
U Tube sample (x mm dia.)
W Water sample
Water seep
Water level

LECEND
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)



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill

**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

		Description	Degree of Weathering	ic	Rock Strength	Fracture	Discontinuities				n Situ Testing
씸	Depth (m)	of		Graph Log	V Cow dium with the state of th	Spacing (m) (90.00)	B - Bedding J - Joint S - Shear F - Fault	Type	Sore	RQD %	Test Results &
9	-11	Strata  SANDSTONE - medium to high then high strength, slightly weathered then fresh, slightly fractured and unbroken, light grey, medium grained sandstone (continued)	EW EW HWW		Rock Strendm Medium Med	0.00	10.84m: B0°, cly co,	<u> </u>	O A	<u> </u>	Comments  PL(A) = 1.4
2	-12						2mm 11.57m: B5°, cbs cly, 1mm	С	100	100	PL(A) = 1.4
4	12.2	Bore discontinued at 12.2m - limit of investigation		·····							
3	-13										
2	-14										
	-15 - - - - - - -										
-0	- -16 - -										
	-17					ii ii					
-2	-18 -18										
-3	-19 -19										

RIG: Scout 4 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:** 

#### **SAMPLING & IN SITU TESTING LEGEND**

Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level A Auger sample B Bulk sample BLK Block sample Core drilling
Disturbed sample
Environmental sample



CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill **SURFACE LEVEL: 16.1 AHD EASTING**: 338339 **NORTHING**: 6250822 **DIP/AZIMUTH:** 90°/--

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

**BORE No**: 258

		Description	Degree of Weathering :	2	Rock Strength ู้	Fracture	Discontinuities		Sampling & In Situ Testing		
귙	Depth (m)	of		Grapt Log	Strength Needium Needi	Spacing (m)	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. % RQD %	Test Results &	
16		Strata  FILLING - dark grey to black fine	W W W W W W	$\overline{\vee}$	EXISTREMENT OF THE PROPERTY OF	0.00 0.1.	5 - Snear F - Fault	_	0 8 8	Comments	
-	-1	FILLING - dark grey to black, fine silty sand filling with a trace of concrete gravel, damp						A			
14	1.3 - - - - - - - - -	SAND - very loose then loose, dark grey and light brown, fine sand with some silt, moist (possible filling)						S	_	3,0,1 N = 1	
-	-							s	-	1,1,1 N = 2	
	-3										
11	-4							S		1,1,1 N = 2	
10	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	
-6	7							S		1,4,6 N = 10	
	-8							S	-	8,9,9 N = 18	
	9.45	SANDSTONE - very low strength, orange-brown, fine to medium grained sandstone						S		20/20mm	

LOGGED: SI CASING: HQ to 10.0m RIG: Explora 130 DRILLER: JS

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:** 

Core drilling
Disturbed sample
Environmental sample

**SAMPLING & IN SITU TESTING LEGEND** A Auger sample B Bulk sample BLK Block sample

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



**SURFACE LEVEL:** 16.1 AHD

CLIENT: Cranbrook School PROJECT: Additional Investigation LOCATION: Victoria Road, Bellevue Hill

**EASTING**: 338339 **NORTHING**: 6250822 **DIP/AZIMUTH:** 90°/-- **BORE No**: 258 **PROJECT No:** 84944.02 **DATE:** 24/1/2018

SHEET 2 OF 2

		Description	Degree of Weathering	. <u>o</u>	Rock Strength	Fracture	Discontinuities				n Situ Testing
씸	Depth (m)	of Strata	Degree of Weathering	Graph	Ex Low Very Low Medium High Strigh Ex High Water	Spacing (m) (m) (m) (m) (m) (m) (m) (m) (m) (m)	B - Bedding J - Joint S - Shear F - Fault	Туре	Core Rec. %	RQD %	Test Results & Comments
-9	10.02 <sup>4</sup> - - - 10.85 - 11 10.95 <sup>4</sup>	SANDSTONE - medium strength, moderately to slightly weathered, slightly fractured, light grey-brown to red-brown, medium grained sandstone					10.8m: CORE LOSS:				refusal PL(A) = 0.54
- 2	- - - - - - -	11.5-11.9m: some coarse sand and quartz gravel					10.85-10.9m: Cs 10.9m: CORE LOSS: 50mm 11.05-11.08m: Cs 11.4m: J45°, un, ro, fe	С	97	94	PL(A) = 0.7
4	- - 12 - 12.08 -	Bore discontinued at 12.08m - limit of investigation			<u>                                      </u>	<u>i ii<b>l</b>ii</u> I II II	11.9-11.93m: some quartz gravel				PL(A) = 0.81
	- - -										
- - -	- -13 -										
	- - -										
- 2	- - - 14 -										
	-										
	- - - - 15										
-	-										
-0	-16 - -										
	- - 17 -					            					
	-					            					
-2	- - 18										
	- - - - 19					            					
						i ii ii I II II I II II					
	- - -										

LOGGED: SI CASING: HQ to 10.0m RIG: Explora 130 DRILLER: JS

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:** 

	SAMPLING	& IN SITU	<b>TESTING</b>	<b>LEGE</b>	ND
uger sample	G	Gas sample		PID	Pho

A Auger sample
B Bulk sample
BLK Block sample
C Core drilling
D Disturbed sample
E Environmental sample Gas sample
Piston sample
Tube sample (x mm dia.)
Water sample
Water seep
Water level



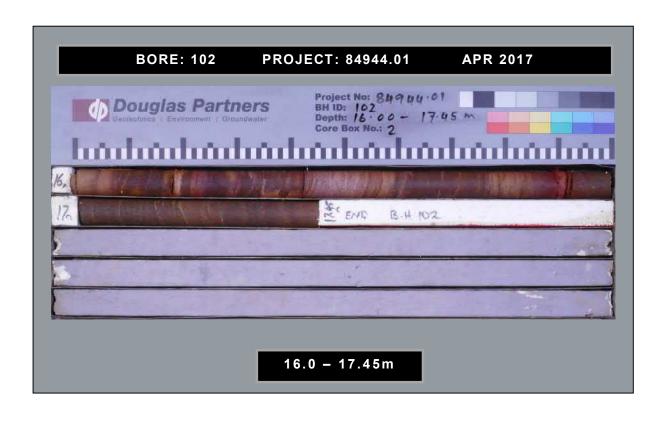


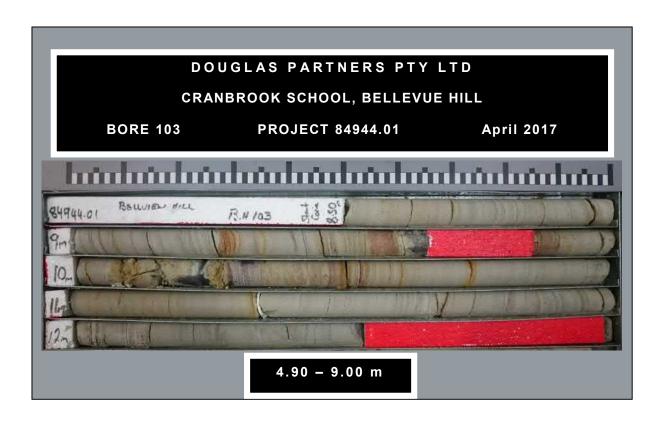


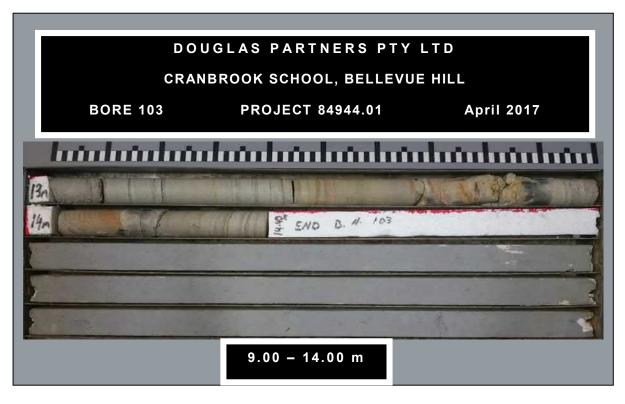
















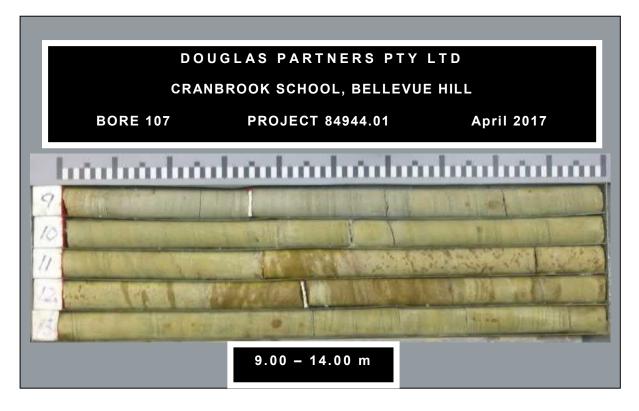




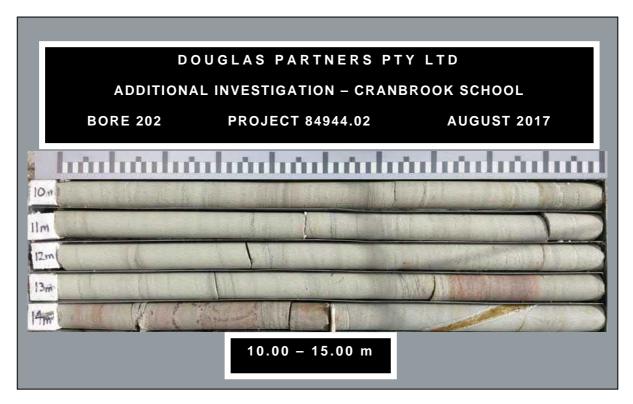




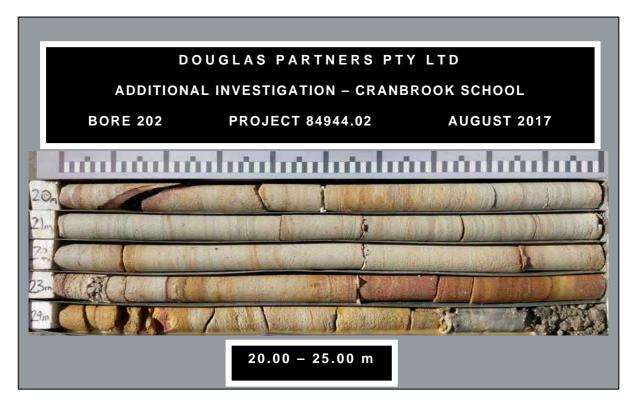






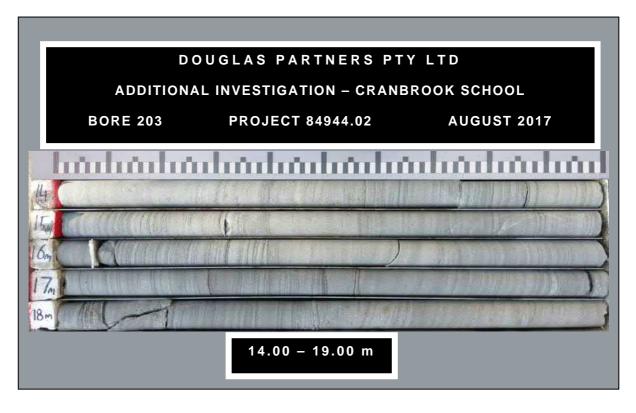




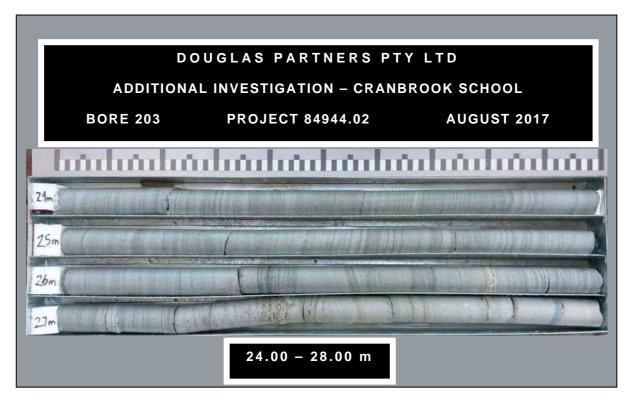








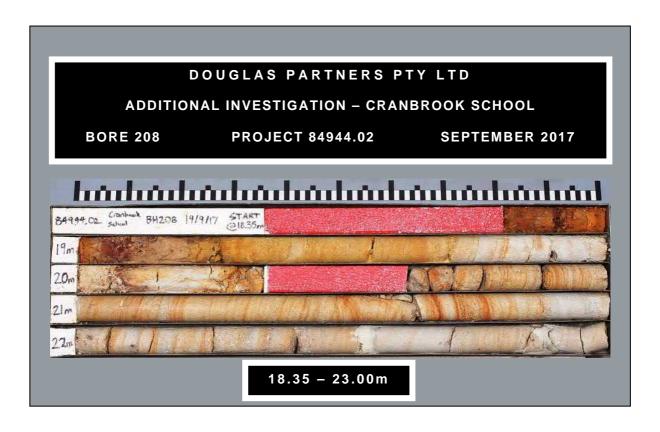


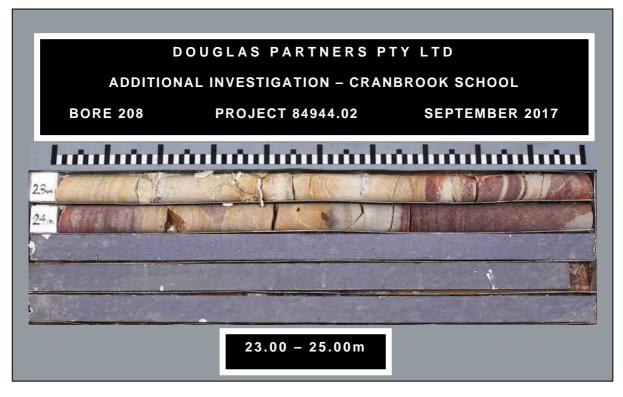


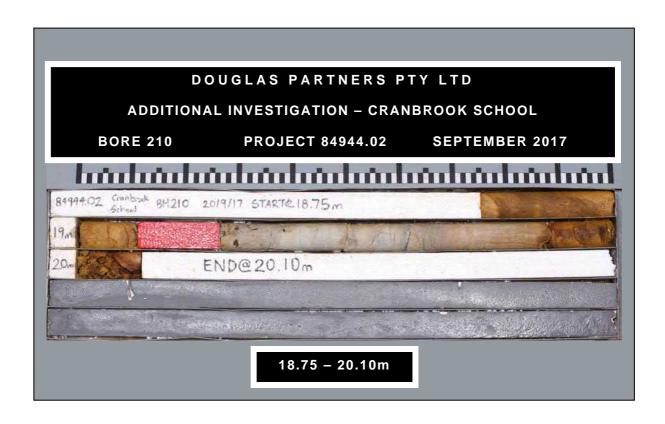


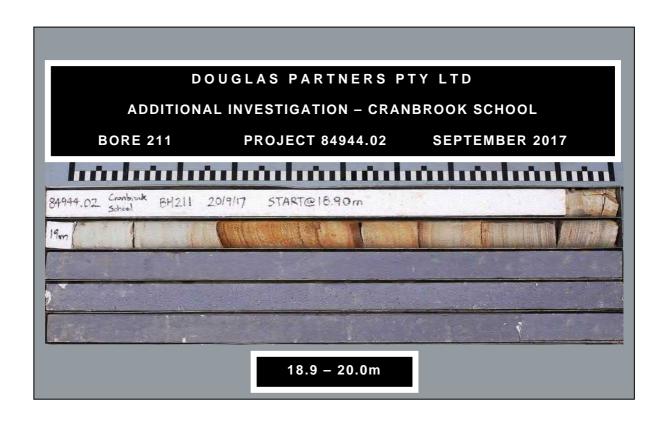


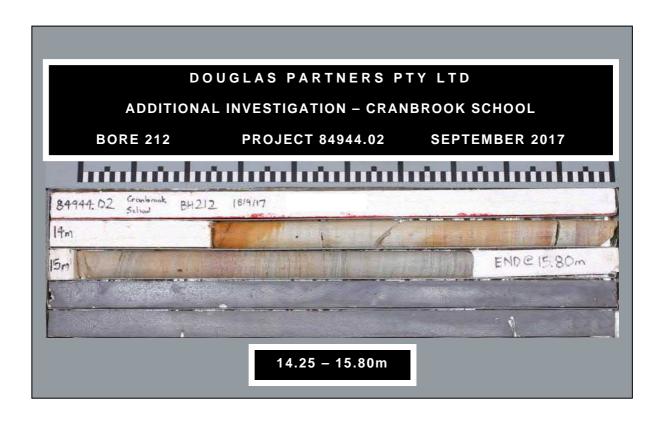














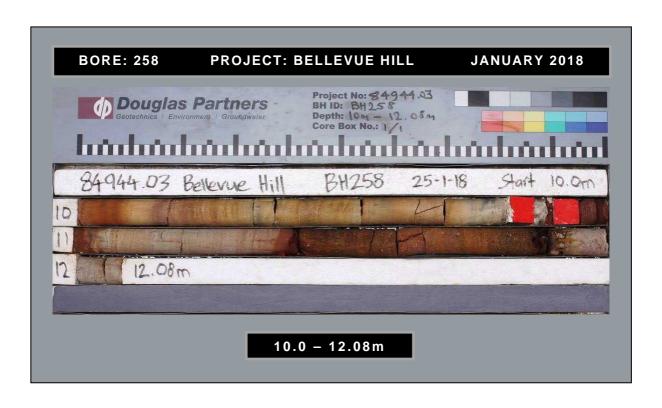












# Appendix D CPT Results

CLIENT: CRANBROOK SCHOOL PROJECT: STAGE 1 DEVELOPMENT

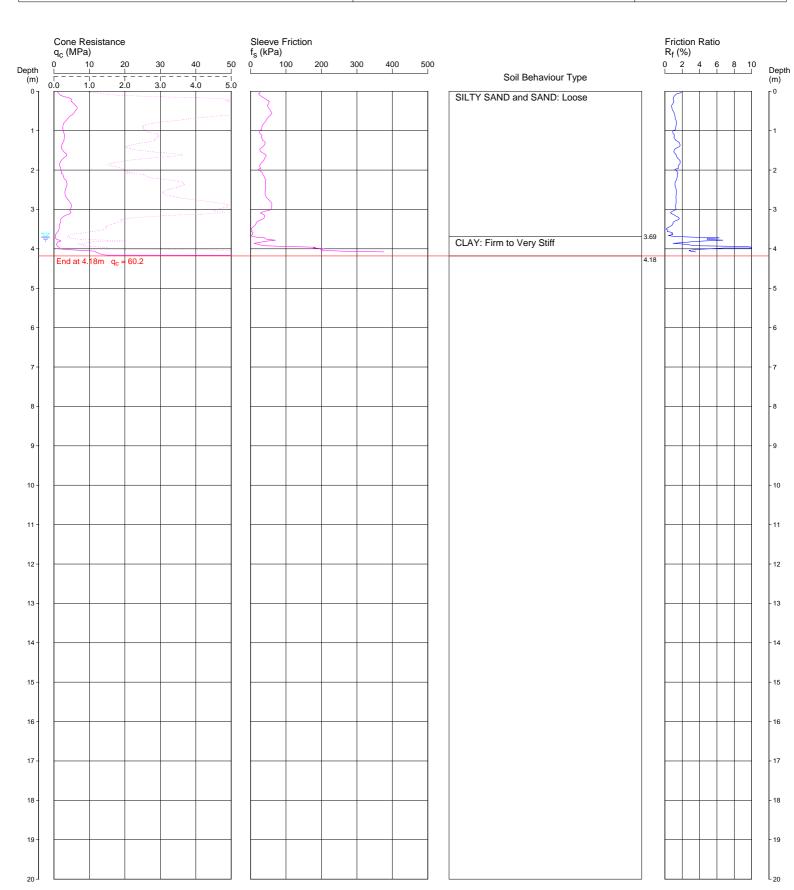
VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 16.50** 

COORDINATES:

CPT1 Page 1 of 1

DATE 1/7/2015 PROJECT No: 84944



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



CLIENT: CRANBROOK SCHOOL PROJECT: STAGE 1 DEVELOPMENT

VICTORIA ROAD, BELLEVUE HILL LOCATION:

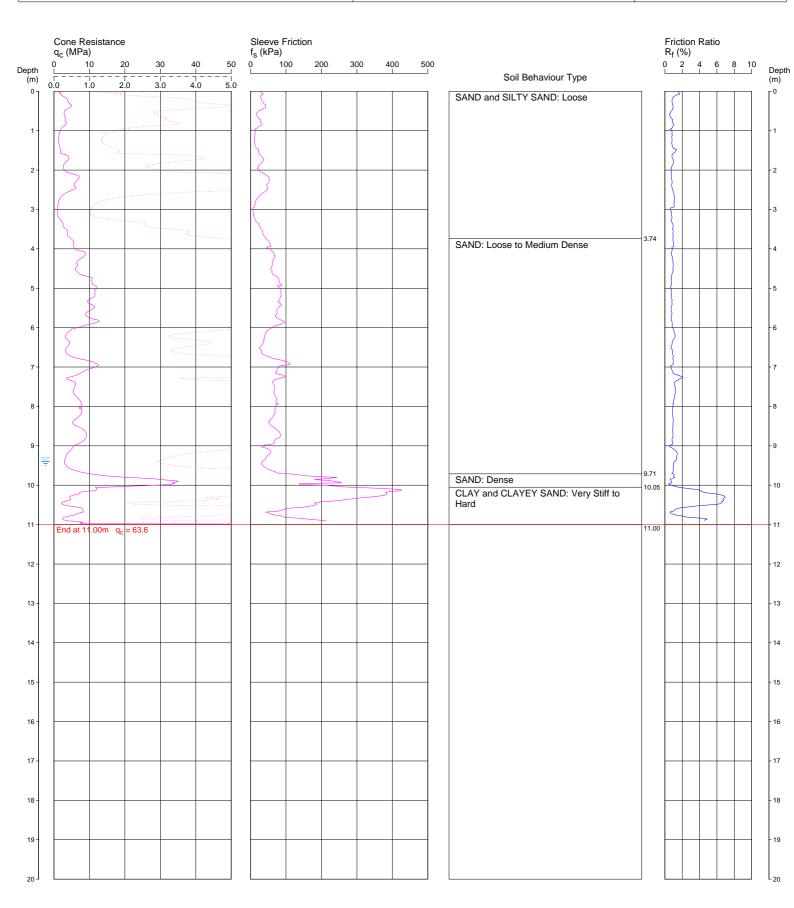
**REDUCED LEVEL: 16.10** 

COORDINATES:

CPT2 Page 1 of 1

DATE

1/7/2015 PROJECT No: 84944



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





ConePlot Version 5.9.1 © 2003 Douglas Partners Pty Ltd

CLIENT: CRANBROOK SCHOOL PROJECT: STAGE 1 DEVELOPMENT

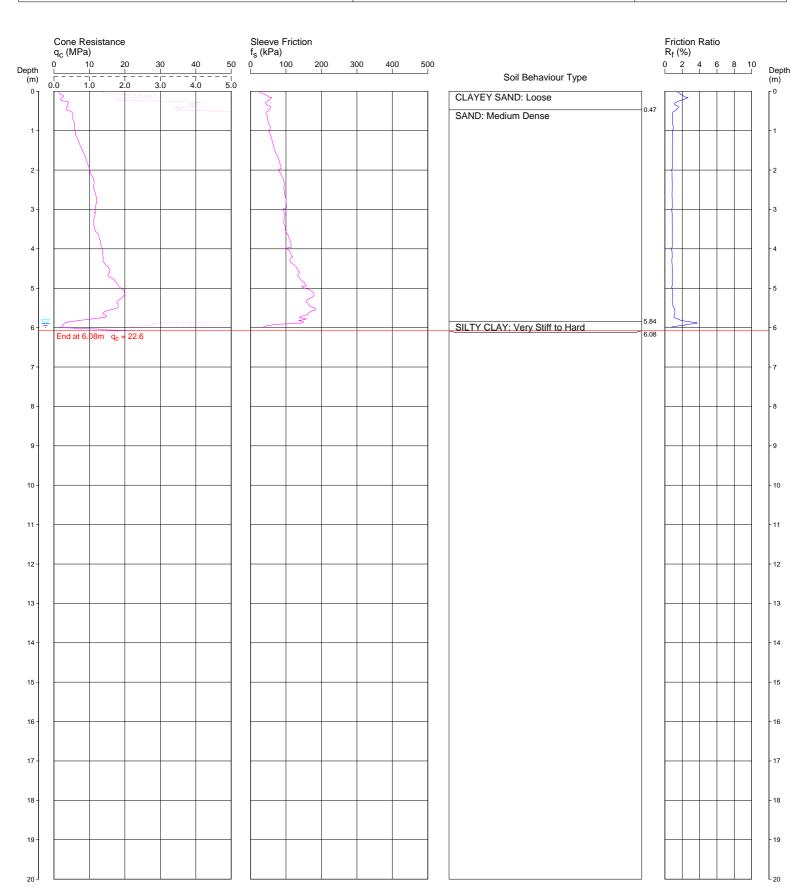
VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 16.60** 

COORDINATES:

CPT3 Page 1 of 1

DATE 1/7/2015 PROJECT No: 84944



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



CLIENT: CRANBROOK SCHOOL
PROJECT: STAGE 1 DEVELOPMENT

LOCATION: VICTORIA ROAD, BELLEVUE HILL

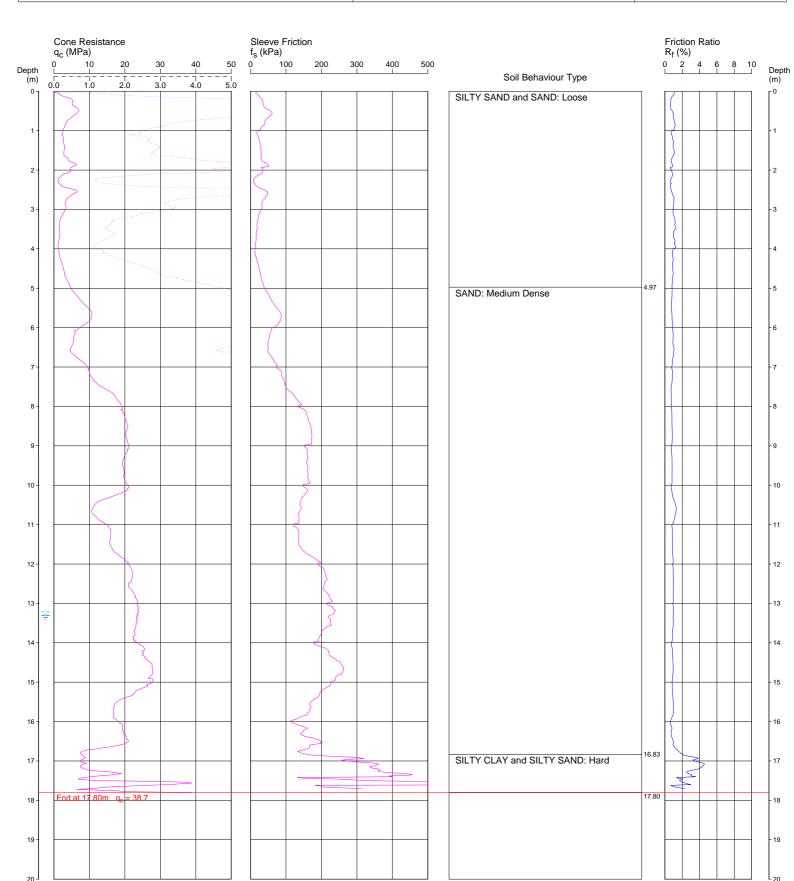
**REDUCED LEVEL:** 16.35

COORDINATES:

CPT4

Page 1 of 1

**DATE** 1/7/2015 **PROJECT No:** 84944



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



CLIENT: CRANBROOK SCHOOL PROJECT: STAGE 1 DEVELOPMENT

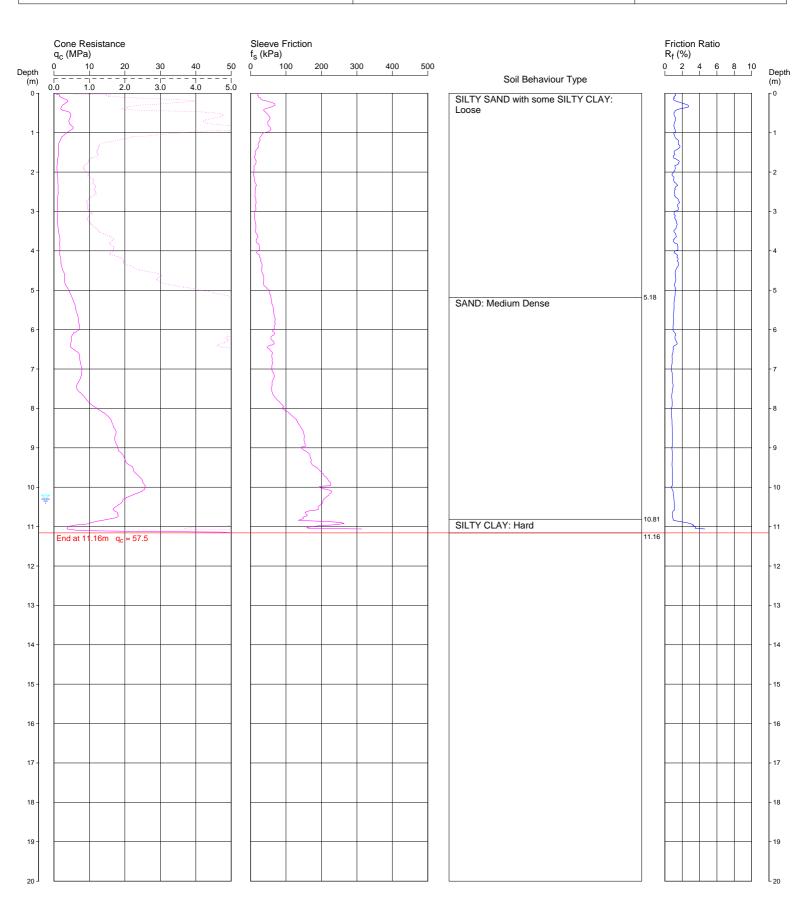
VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 16.40** 

COORDINATES:

CPT5 Page 1 of 1

DATE 1/7/2015 PROJECT No: 84944



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

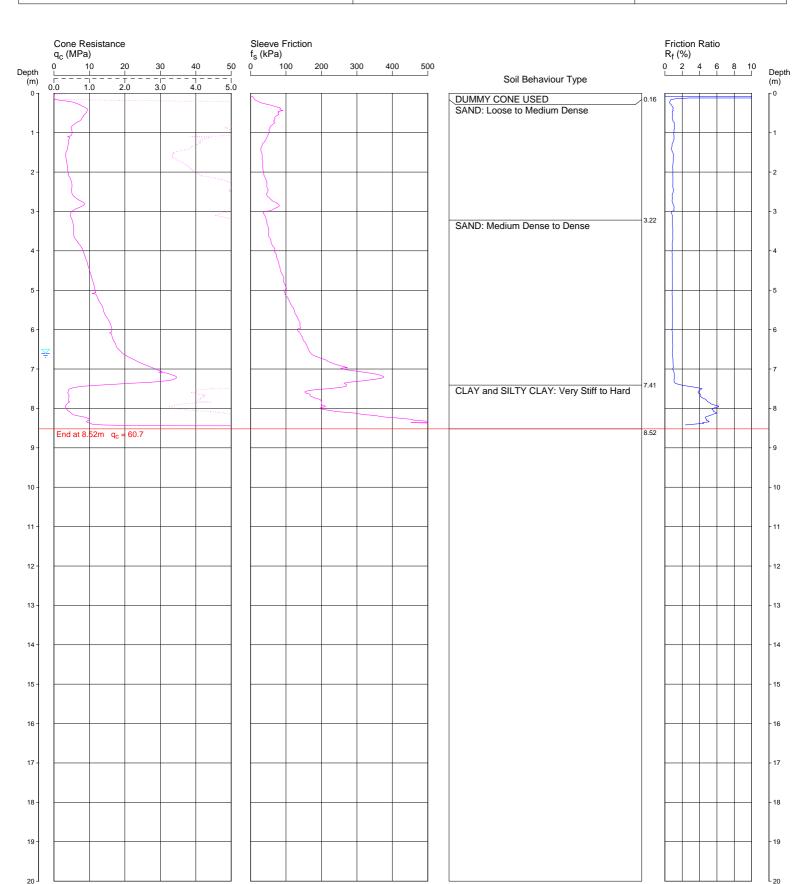
VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 22.90** 

COORDINATES:

CPT6

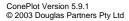
DATE 1/7/2015 PROJECT No: 84944



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

LOCATION: VICTORIA ROAD, BELLEVUE HILL

**REDUCED LEVEL:**16.13

COORDINATES:

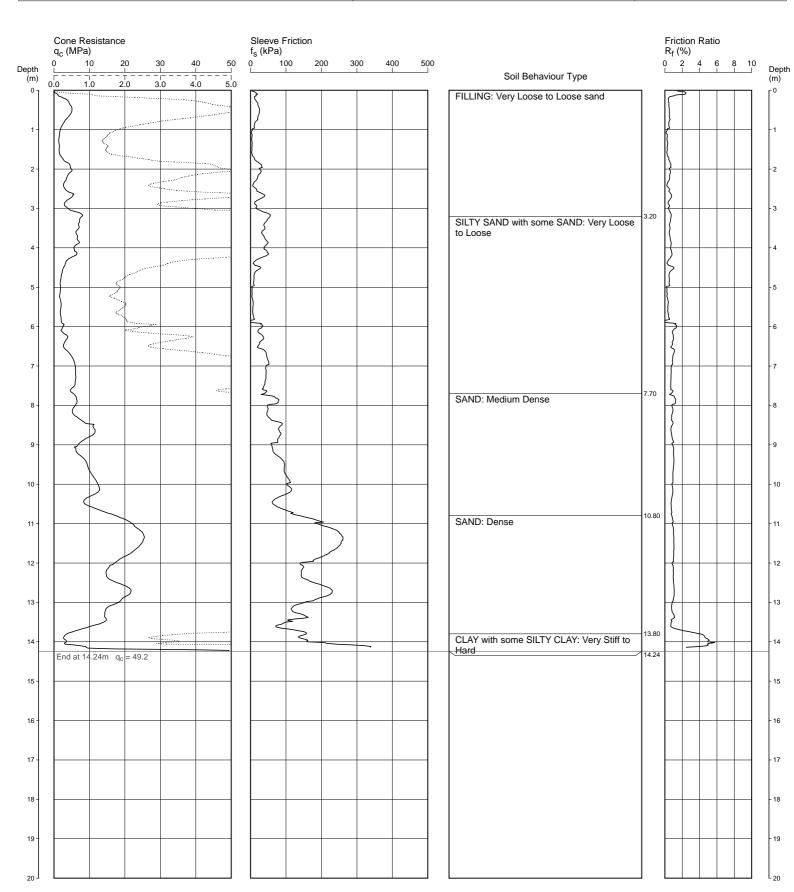
**CPT 101** 

Page 1 of 1

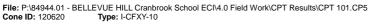
DATE

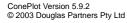
12/04/2017

PROJECT No: 84944.01



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







CLIENT: CRANBROOK SCHOOL

PROJECT: CRANBROOK SCHOOL ECI

LOCATION: VICTORIA ROAD, BELLEVUE HILL

**REDUCED LEVEL:**16.28

COORDINATES:

**CPT 102** 

PROJECT No: 84944.01

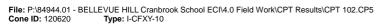
Page 1 of 1

DATE

12/04/2017

Cone Resistance q<sub>c</sub> (MPa) Sleeve Friction Friction Ratio f<sub>s</sub> (kPa) R<sub>f</sub> (%) 10 100 300 400 500 Depth (m) Depth Soil Behaviour Type (m) 4.0 50 0.0 FILLING: Loose sand SILTY SAND with some SAND: Very Loose to Loose SAND: Medium Dense to Dense 10 11.54 End at 11.54m  $q_c = 63.6$ 12 13 14 15 16 17 18 19

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







CLIENT: CRANBROOK SCHOOL PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 16.75** 

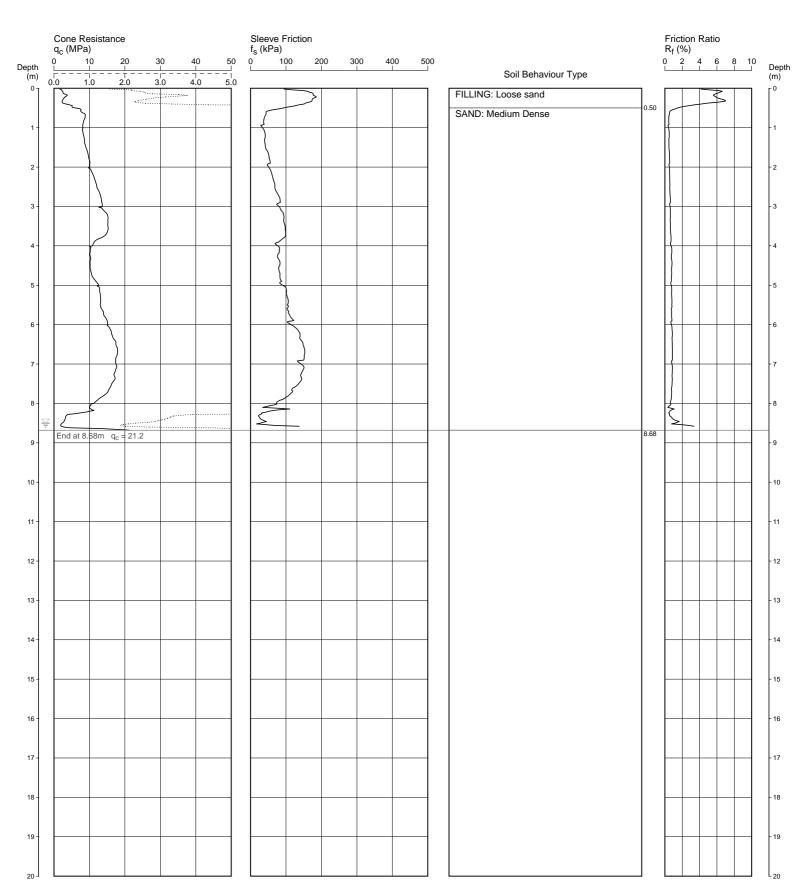
COORDINATES:

DATE

**CPT 103** 

11/04/2017

PROJECT No: 84944.01

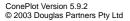


**REMARKS:** TEST DISCONTINUED DUE TO EXCESSIVE BENDING ON ROCK GROUNDWATER WAS OBSERVED AT 8.5 m DEPTH AFTER WITHDRAWAL OF RODS

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

VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL:16.34** 

COORDINATES:

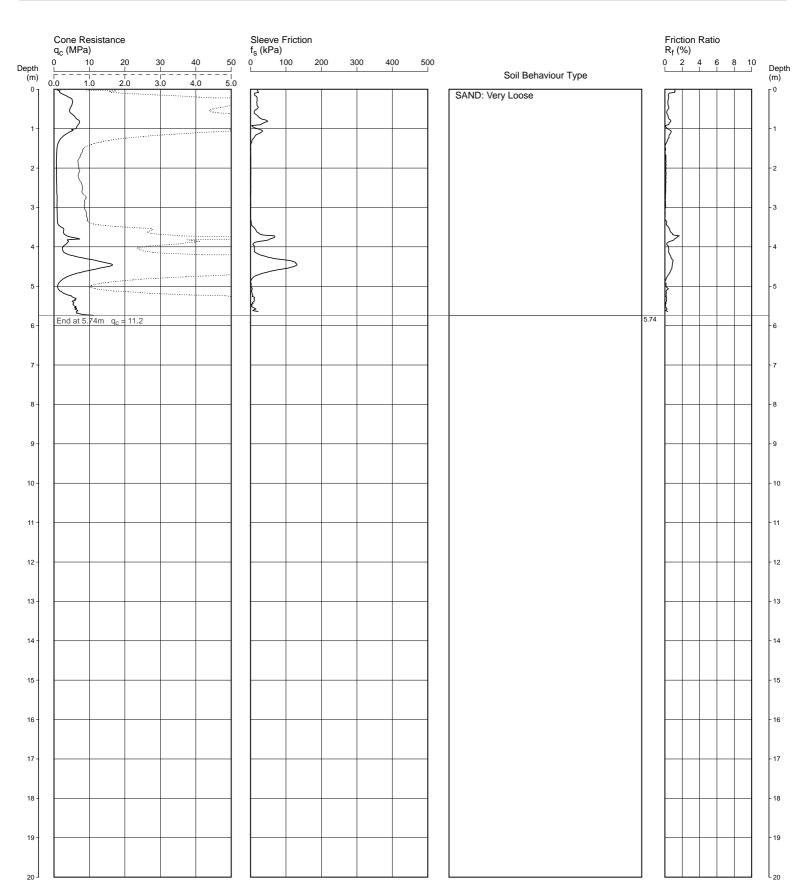
Page 1 of 1

DATE

12/04/2017

PROJECT No: 84944.01

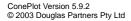
**CPT 104** 



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:

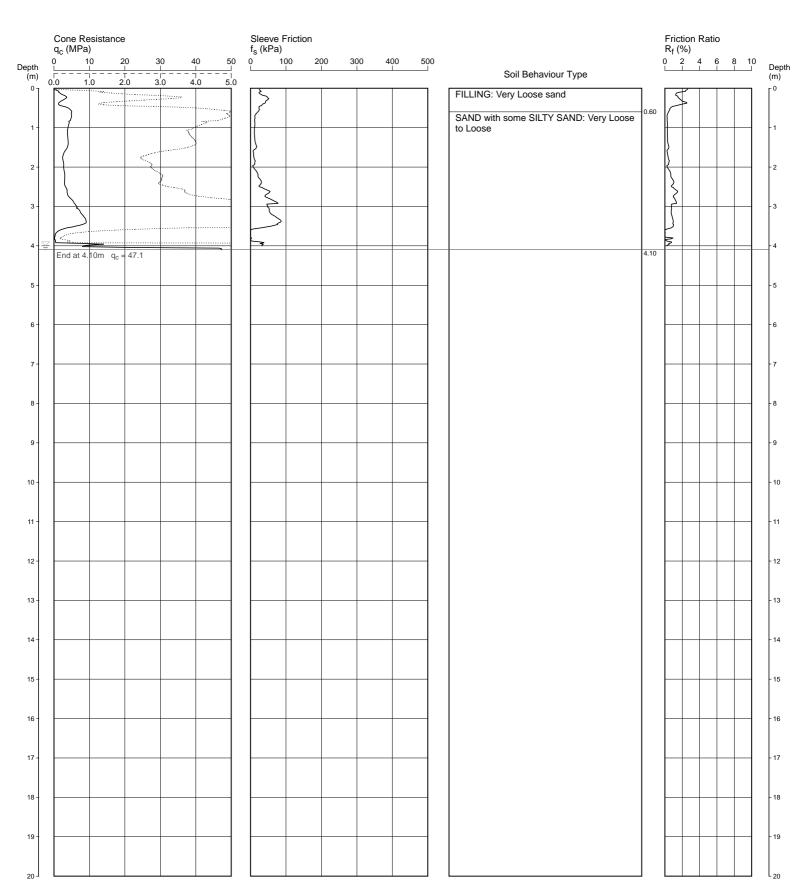
**CPT 105** 

Page 1 of 1

DATE

11/04/2017

PROJECT No: 84944.01

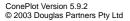


**REMARKS:** TEST DISCONTINUED DUE TO CONE TIP REFUSUAL; GROUNDWATER WAS OBSERVED AT 4.0 m DEPTH AFTER WITHDRAWAL OF RODS

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

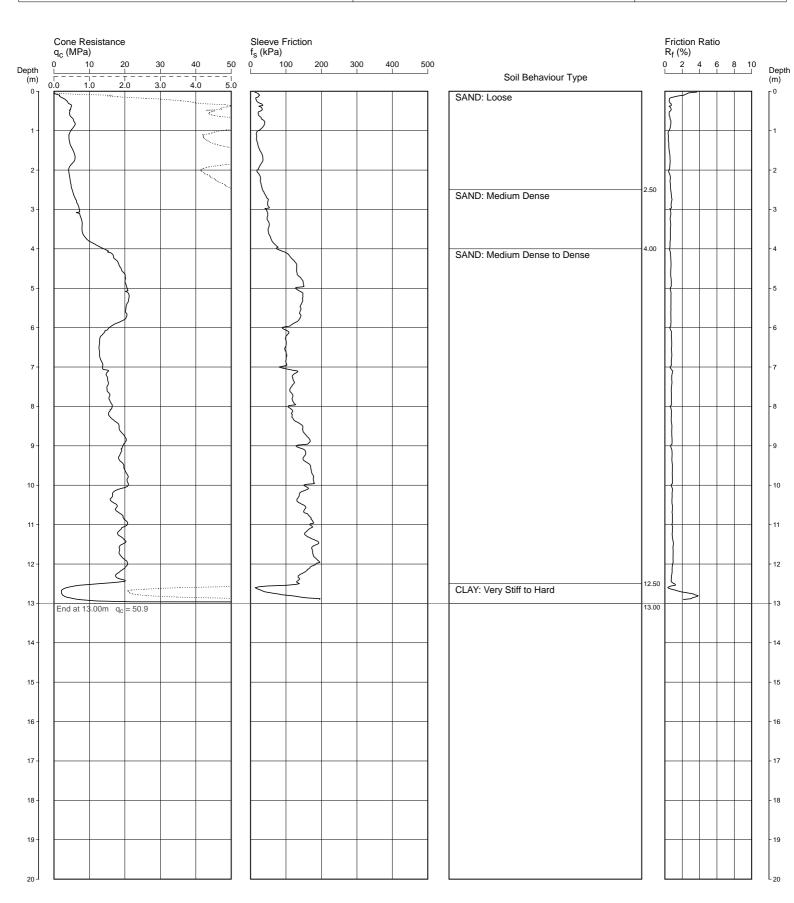
**REDUCED LEVEL:**16.44

COORDINATES:

**CPT 108** 

**DATE** 11/04/2017

PROJECT No: 84944.01



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

VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL: 16.51** 

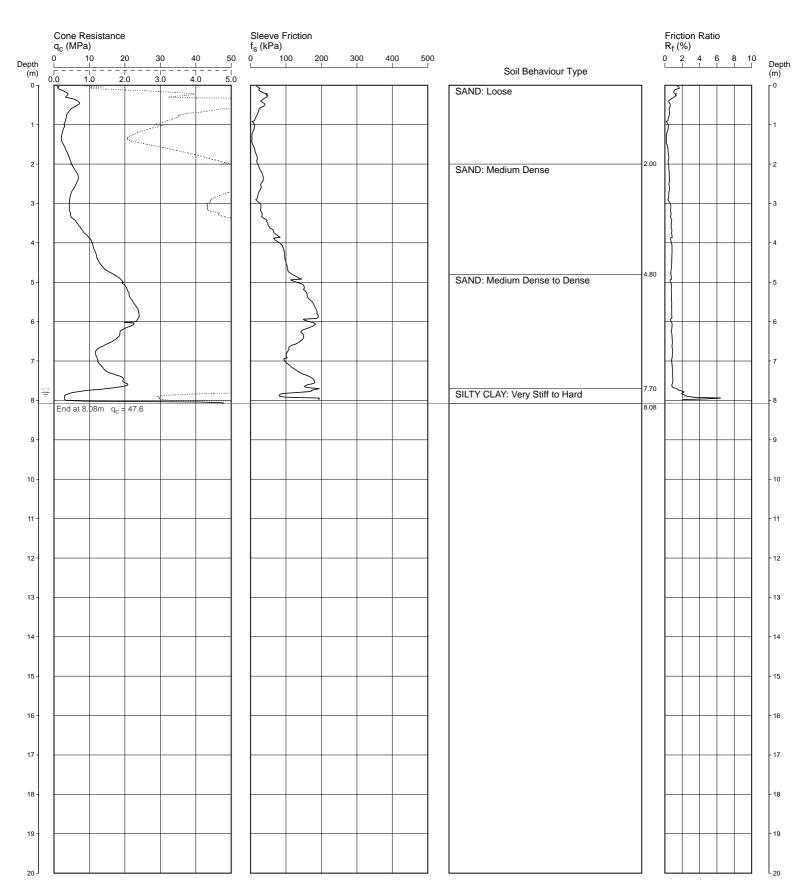
COORDINATES:

**CPT 109** 

DATE

11/04/2017

PROJECT No: 84944.01



**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 Cristophook School ECI\4.0 Field Work\CPT Results\CPT 109.CP5

Cone ID: 120620

ConePlot Version 5.9.2

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CLIENT: CRANBROOK SCHOOL PROJECT: CRANBROOK SCHOOL ECI

VICTORIA ROAD, BELLEVUE HILL LOCATION:

**REDUCED LEVEL:**16.22

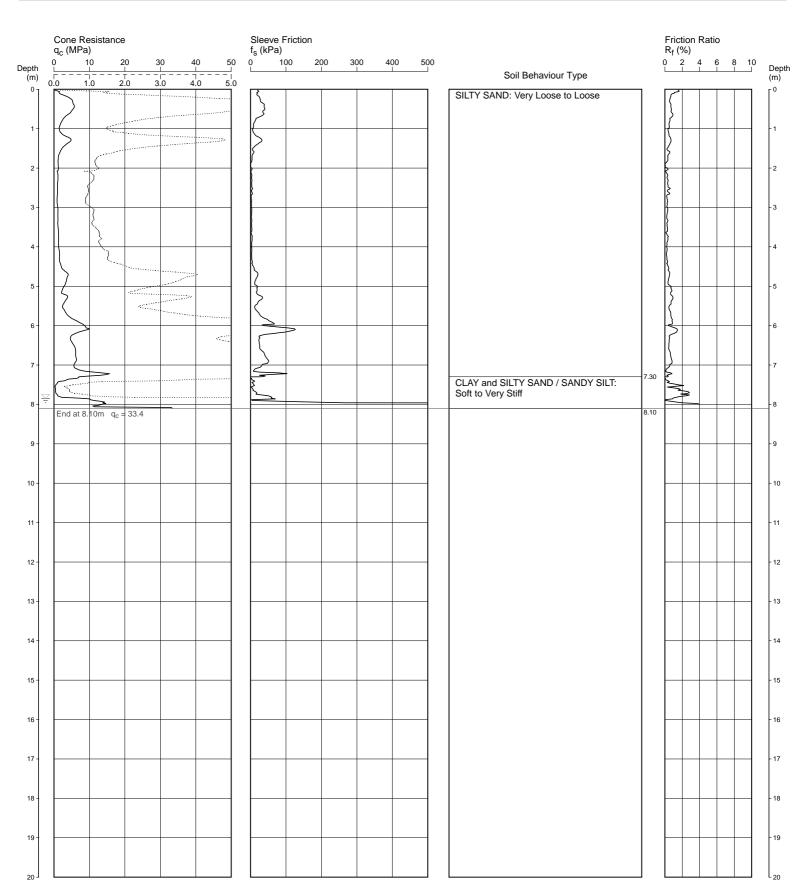
COORDINATES:

**CPT 110** 

DATE

12/04/2017

PROJECT No: 84944.01



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 Cristophook School ECI\4.0 Field Work\CPT Results\CPT 110.CP5

Cone ID: 120620

ConePlot Version 5.9.2

© 2003 Douglas Partners Pty Ltd



CLIENT: CRANBROOK SCHOOL

PROJECT: ADDITIONAL INVESTIGATION

LOCATION: VICTORIA ROAD, BELLEVUE HILL

**REDUCED LEVEL:**30.53

COORDINATES:

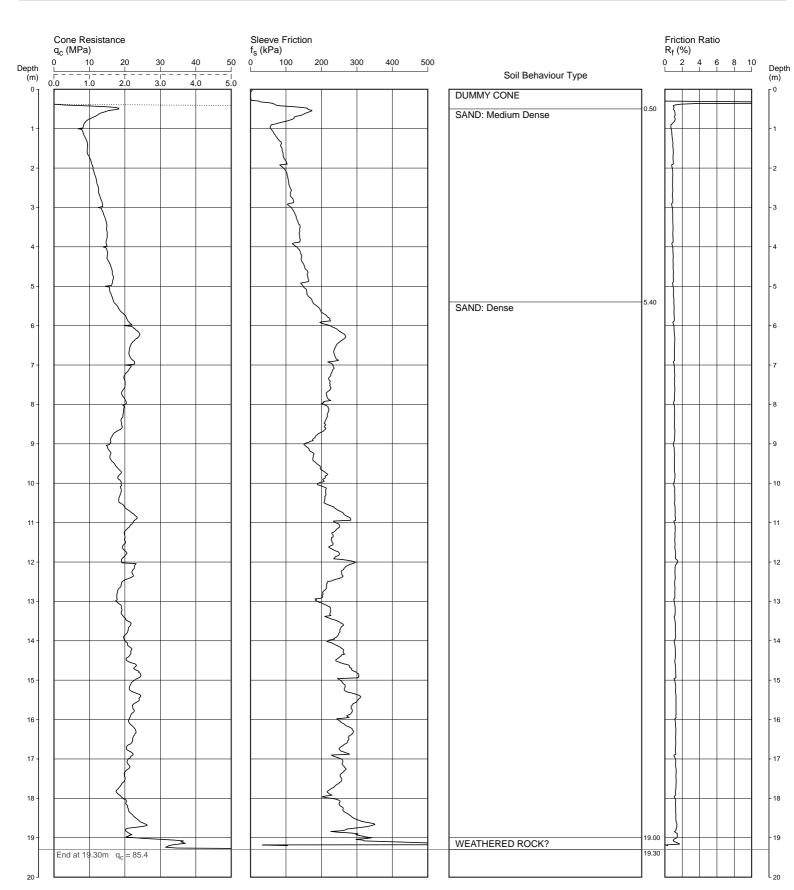
**CPT208** 

age 1 of 1

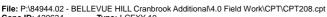
DATE

18/09/2017

PROJECT No: 84944.02



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



**Cone ID:** 120634 **Type:** I-CFXY-10

ConePlot Version 5.9.2 © 2003 Douglas Partners Pty Ltd





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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. 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)		Penetration Resistance Blows/150 mm									
0 - 0.15	E	E	E	1	Ę	E	E				
0.15 - 0.30				2							
0.30 - 0.45		$\downarrow$	$\downarrow$	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	$\downarrow$	$\downarrow$				
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

Tested By JDB

AS 1289.6.3.3, Flat End Penetrometer

Checked By

LJH

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)		Penetration Resistance Blows/150 mm									
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 1289.6.3.2, Cone Penetrometer

Tested By JDB

AS 1289.6.3.3, Flat End Penetrometer

**Checked By** 

LJH

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

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



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	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							

**Test Method** 

AS 1289.6.3.3, Flat End Penetrometer

AS 1289.6.3.2, Cone Penetrometer

Tested By Checked By RK PMO

Remarks

Appendix E	
Laboratory Test Results	

ι	JNIAX	IAL	COMP	RESSIVE S	TRENG	тн о	F ROCK RE	PORT	
Client:	Douglas Pa	artners			Source:	202 9-9.2m	ı		
Address:	PO Box 47	2 West R	yde NSW 1685	5	Sample Description:	Sandstone			
Project:	Cranbrook	School (8	34944.02)		Report No.:	S27795-U0	CS		
Job No.:	S17389				Lab No.:	S27795			
Test Proce	edure:			Rock strength tests - Determination of Rock strength tests - Determination of					
Sampling:	ng: Sampled by Client Date Sampled: Unknown								
Preparation	n:	Prepared	in accordance w	rith the test method					
Date '	Date Tested         28/09/2017         Machine Type         Matest         Sample Storage Conditions         Wrapped						Wrapped		





#### TEST RESULTS

Average Diameter (mm)	Specimen Height (mm)	Length/ Diameter Ratio	Specimen Condition	Description of Failure	Duration of Test (Sec)	Load at Fracture (kN)	Moisture Content at Time of Test (%)	Compressive Strength (MPa)
52.10	135.6	2.60	As received	Mixed mode	614	5	6.8	2.28

Notes:



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

5/10/2017

Date:



Ų	JNIAX	IAL CO	OMP	RESSIVE S	TRENG	тн о	F ROCK RE	PORT	
Client:	Douglas Pa	artners			Source:	203 11.74-	11.92m		
Address:	PO Box 47	PO Box 472 West Ryde NSW 1685				Sandstone			
Project:	Cranbrook	School (8494	4.02)		Report No.:	S27796-U	CS		
Job No.:	S17389				Lab No.:	S27796			
Test Proce	edure:			Rock strength tests - Determination of Rock strength tests - Determination of					
Sampling:	g: Sampled by Client Date Sampled: Unknown							Unknown	
Preparation	n:	Prepared in ac	cordance w	vith the test method					
Date '	Date Tested         28/09/2017         Machine Type         Matest         Sample Storage Conditions         Wrapped						Wrapped		





#### **TEST RESULTS**

Average Diameter (mm)	Specimen Height (mm)	Length/ Diameter Ratio	Specimen Condition	Description of Failure	Duration of Test (Sec)	Load at Fracture (kN)	Moisture Content at Time of Test (%)	Compressive Strength (MPa)
51.80	135.7	2.62	As received	Mixed mode	607	16	7.5	7.59

Notes:



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Date:



ι	JNIAX	IAL COMP	RESSIVE S	TRENG	TH OF	<b>ROCK RE</b>	PORT	
Client:	Douglas Pa	artners		Source:	204 20.1-20.2	'8m		
Address:	PO Box 47	'2 West Ryde NSW 168	35	Sample Description:	Sandstone			
Project:	Cranbrook	School (84944.02)		Report No.:	S27797-UCS			
Job No.:	S17389			Lab No.:	S27797			
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	
Preparation	n:	Prepared in accordance	with the test method					
Date	Date Tested         28/09/2017         Machine Type         Matest         Sample Storage Conditions         Wrapped					Wrapped		





#### **TEST RESULTS**

Average Diameter (mm)	Specimen Height (mm)	Length/ Diameter Ratio	Specimen Condition	Description of Failure	Duration of Test (Sec)	Load at Fracture (kN)	Moisture Content at Time of Test (%)	Compressive Strength (MPa)
51.80	97.2	1.88	As received	Mixed mode	612	23	3.1	10.9

Notes: Test specimen length to diameter ratio falls outside of standard limitations of 2.5-3.0.



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5/10/2017

Date:



ι	JNIA	XIAL	COMPRESSIVE S	TRENG	TH O	F ROCK RE	PORT	
Client:	Douglas	Partners		Source:	205 22.78-2	23m		
Address:	PO Box 4	72 West R	Ryde NSW 1685	Sample Description:	Sandstone			
Project:	Cranbroo	k School (	84944.02)	Report No.:	S27798-UCS			
Job No.:	S17389			Lab No.:	S27798			
Test Procedure:  AS4133 4.2.1 Rock strength tests - Determination of uniaxial compressive strength - Rock Strength >50MPa  AS4133 4.2.2 Rock strength tests - Determination of uniaxial compressive strength - Rock Strength < 50 Mpa								
Sampling:		Sampled	by Client			Date Sampled:	Unknown	
Preparatio	ation: Prepared in accordance with the test method							





#### **TEST RESULTS**

Average Diameter (mm)	Specimen Height (mm)	Length/ Diameter Ratio	Specimen Condition	Description of Failure	Duration of Test (Sec)	Load at Fracture (kN)	Moisture Content at Time of Test (%)	Compressive Strength (MPa)
51.80	134.8	2.60	As received	Mixed mode	614	24	9.4	11.3

Notes:



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Authorised Signatory:

Chris Lloyd

5/10/2017

Date:



l	UNIAXIAL COMPRESSIVE STRENGTH OF ROCK REPORT								
Client:	Douglas Pa	artners		Source:	208 24-24.2	2m			
Address:	PO Box 47	'2 West Ryde NSW 168	35	Sample Description:	Sandstone				
Project:	Cranbrook	School (84944.02)		Report No.:	S27799-UCS				
Job No.:	S17389			Lab No.:	S27799				
Test Proce	AS4133 4.2.1 Rock strength tests - Determination of uniaxial compressive strength - Rock Strength >50MPa  AS4133 4.2.2 Rock strength tests - Determination of uniaxial compressive strength - Rock Strength < 50 Mpa								
Sampling:	Sampling: Sampled by Client Date Sampled: Unknown								
Preparation	Preparation: Prepared in accordance with the test method								
Date	Date Tested         28/09/2017         Machine Type         Matest         Sample Storage Conditions         Wrapped								





#### **TEST RESULTS**

Average Diameter (mm)	Specimen Height (mm)	Length/ Diameter Ratio	Specimen Condition	Description of Failure	Duration of Test (Sec)	Load at Fracture (kN)	Moisture Content at Time of Test (%)	Compressive Strength (MPa)
51.70	134.5	2.60	As received	Mixed mode	606	26	4.0	12.4

Notes:



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

5/10/2017

Date:

Macquarie Geotechnical



U8 10 Bradford Street Alexandria NSW 2015

			1	1	1	1
Misc Inorg - Soil						
Our Reference:	UNITS	165477-1	165477-2	165477-3	165477-4	165477-5
Your Reference		BH101	BH101	BH102	BH102	BH103
5 "	-	0.5	4.0	0.5	0.0	0.4
Depth		0.5	4.0	0.5	2.0	0.1
Date Sampled Type of sample		12/04/2017 Soil	12/04/2017 Soil	12/04/2017 Soil	12/04/2017 Soil	11/04/2017 Soil
Type of Sample		3011	3011	3011	3011	3011
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		T	T	T	T
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
	_	22/04/2017	22/04/2017	22/04/2017	22/04/2017	22/04/2017
Date prepared	-					
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	μS/cm	31	11	18	12	10
soil:water						
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	μο/σπ	υ <del>1</del>	14		52	'7
	1		l	l	l	l
Misc Inorg - Soil						
			Ĩ	1	I	105177.00
Our Reference:	UNITS	165477-16	165477-17	165477-18	165477-19	165477-20
Our Reference: Your Reference	UNITS	165477-16 BH117	165477-17 BH118	165477-18 BH119	165477-19 BH120	BH121
Your Reference	UNITS 	BH117	BH118	BH119	BH120	BH121
Your Reference Depth	UNITS	BH117	BH118 0.1-0.15	BH119 0.5	BH120 0.5	BH121 1.0
Your Reference  Depth  Date Sampled	UNITS	BH117 1.95-2.0 13/04/2017	BH118 0.1-0.15 13/04/2017	BH119 0.5 10/04/2017	BH120 0.5 11/04/2017	BH121 1.0 12/04/2017
Your Reference  Depth  Date Sampled  Type of sample	UNITS	BH117 1.95-2.0 13/04/2017 Soil	BH118 0.1-0.15 13/04/2017 Soil	BH119 0.5 10/04/2017 Soil	BH120 0.5 11/04/2017 Soil	BH121 1.0 12/04/2017 Soil
Your Reference  Depth  Date Sampled	UNITS	BH117 1.95-2.0 13/04/2017	BH118 0.1-0.15 13/04/2017	BH119 0.5 10/04/2017	BH120 0.5 11/04/2017	BH121 1.0 12/04/2017
Your Reference  Depth  Date Sampled  Type of sample	UNITS	BH117 1.95-2.0 13/04/2017 Soil	BH118 0.1-0.15 13/04/2017 Soil	BH119 0.5 10/04/2017 Soil	BH120 0.5 11/04/2017 Soil	BH121 1.0 12/04/2017 Soil
Your Reference  Depth  Date Sampled  Type of sample  Date prepared	UNITS pHUnits	BH117 1.95-2.0 13/04/2017 Soil 22/04/2017	BH118 0.1-0.15 13/04/2017 Soil 22/04/2017	BH119 0.5 10/04/2017 Soil 22/04/2017	BH120 0.5 11/04/2017 Soil 22/04/2017	1.0 12/04/2017 Soil 22/04/2017
Your Reference  Depth Date Sampled Type of sample  Date prepared Date analysed	-	BH117  1.95-2.0  13/04/2017  Soil  22/04/2017  22/04/2017	BH118 0.1-0.15 13/04/2017 Soil 22/04/2017 22/04/2017	BH119  0.5  10/04/2017  Soil  22/04/2017  22/04/2017	BH120 0.5 11/04/2017 Soil 22/04/2017 22/04/2017	BH121  1.0  12/04/2017  Soil  22/04/2017  22/04/2017

Envirolab Reference: 165477 Revision No: R 00

Misc Inorg - Soil Our Reference:	UNITS	165477-21	165477-22	165477-23	165477-24	165477-25
Your Reference		BH122	BH123	BH124	BH125	BH126
Depth Date Sampled Type of sample		1.0 11/04/2017 Soil	0.5 11/04/2017 Soil	0.1 10/04/2017 Soil	0.5 10/04/2017 Soil	2.0 12/04/2017 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	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 Reference: 165477 Revision No: R 00



**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					
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Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *						

**Results Approved By** 

Priya Samarawickrama, Senior Chemist

**Authorised By** 

David Springer, General Manager

Envirolab Reference: 176470 Revision No: R00



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

Envirolab Reference: 176470 Revision No: R00

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.

Envirolab Reference: 176470 Page | 3 of 6

Revision No: R00

QUALITY CONTROL: Soil Aggressivity						Du	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]

Envirolab Reference: 176470 Revision No: R00 Page | 4 of 6

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

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.
<b>Duplicate</b> 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 sp is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b> 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 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Envirolab Reference: 176470 Revision No: R00

#### **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.

Envirolab Reference: 176470 Page | 6 of 6

Revision No: R00

#### SHEAR STRENGTH BY DIRECT SHEAR REPORT AS1289 6.2.2 Client: Douglas Partners Source: Sample 1 PO Box 472 West Ryde NSW 1685 Address: Sample Description: SAND Project: 84944 02 Report No.: S30724-DS Job No.: S18046 Lab No.: S30724 Test Procedure: AS1289 6,2,2 Soil strength and consolidation tests - Determination of the shear strength of a soil - Direct shear test using a shear box Sampling: Sampled by Client Date Sampled: 08.02.18 Prepared in accordance with the test method Preparation: **Test Details** Remoulding Details: 95% Standard Compaction @ 100% Optimum Moisture Content Date Tested: 27.02.18 100mm square Size of Shear Box (mm) **Test 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/m3): 1.86 1.86 1.86 Placement Dry Density (t/m3): 1.62 1.62 1.62 **Peak Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Peak Shear Stress (kPa) 50.0 100.0 200.0 \_ Peak Shear Stress (kPa) 35.3 71.4 134.4 Normal Stress at Constant Volume (kPa) Shear Stress at Constant Volume (kPa) **Residual Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Residual Shear Stress (kPa) Residual Shear Stress (kPa) Normal Stress at Constant Volume (kPa) Shear Stress at Constant Volume (kPa) **Failure Envelopes** Peak Values Residual Values Friction Angle (°) At Displacement Cohesion (kPa) \_ \_ Correlation \_ \_ Friction Angle (°) 33.3 \_ **Shear Stress** Cohesion (kPa) 3.8 0.9994 Correlation Friction Angle (°) Cohesion (kPa) At Constant Volume Correlation -



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Authorised Signatory:

aje

6/03/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015
Site No.: 22365

## SHEAR STRENGTH BY DIRECT SHEAR REPORT

AS1289 6.2.2

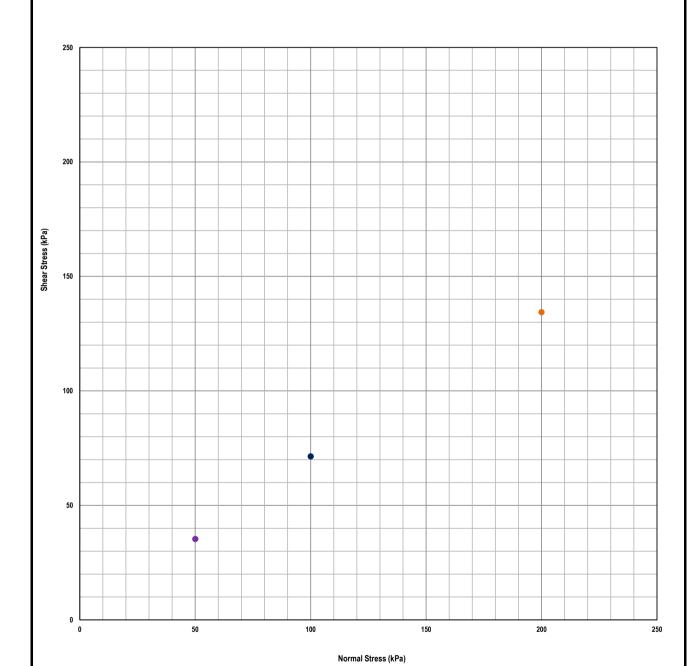
Client: Douglas Partners Report No: S30724-DS

## **Peak Shear Stress / Normal Stress**

• Stage 1 Peak

• Stage 2 Peak

Stage 3 Peak





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aje

6/03/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site

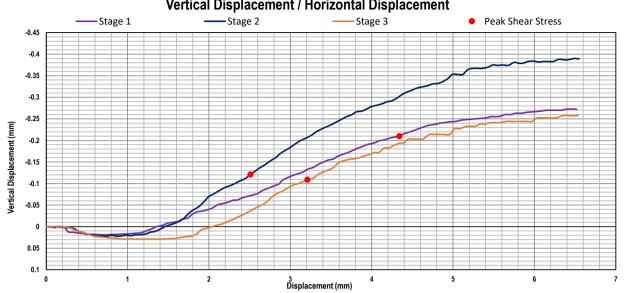
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015

Site No.: 22365

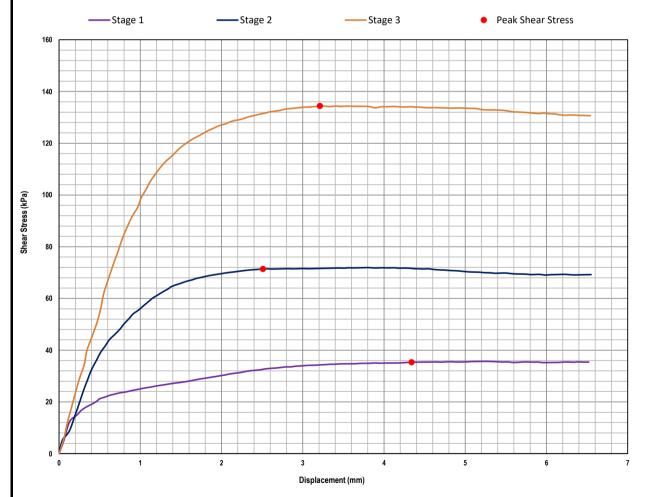
## SHEAR STRENGTH BY DIRECT SHEAR REPORT

AS1289 6.2.2





## Peak Shear Stress / Horizontal Displacement



NATA

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Authorised Signatory:

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6/03/2018

Date:

NATA Accredited Laboratory Number: 14874



Facility Name: Sydney Branch Site
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015
Site No.: 22365

	DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT		
Client:	Douglas Partners	Source:	Sample 1
Address:	PO Box 472 West Ryde NSW 1685	Sample Description:	SAND

 Project:
 84944 02
 Report No:
 \$30724-MDD

 Job No:
 \$18046
 Lab No:
 \$30724

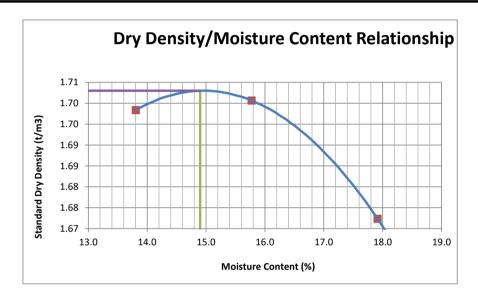
Test Procedure:

AS1289.5.1.1 Determination of the dry density/moisture content relation of a soil using standard compactive effort

AS1289.2.1.1 Determination of the moisture content of a soil - Oven drying method (Standard method)

Sampling: Sampled by Client Date Sampled: 8/02/2018

Preparation: Prepared in accordance with the test method



Maximum Dry Density (t/m³)	1.703
Optimum Moisture Content (%)	14.9
	•
Percentage Oversize on 19mm sieve (%)	0
Percentage Oversize on 37.5mm sieve (%)	0



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Christland

6/03/2018

Chris Lloyd

Date:

MACQUARIE GEOTECH

#### SHEAR STRENGTH BY DIRECT SHEAR REPORT AS1289 6.2.2 Client: Douglas Partners Source: Sample 2 PO Box 472 West Ryde NSW 1685 Address: Sample Description: SAND Project: 84944 02 Report No.: S30725-DS Job No.: S18046 Lab No.: S30725 Test Procedure: AS1289 6,2,2 Soil strength and consolidation tests - Determination of the shear strength of a soil - Direct shear test using a shear box Sampling: Sampled by Client Date Sampled: 08.02.18 Prepared in accordance with the test method Preparation: **Test Details** Remoulding Details: 95% Standard Compaction @ 100% Optimum Moisture Content Date Tested: 22.02.18 100mm square Size of Shear Box (mm) **Test 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/m3): 1.86 1.86 1.86 Placement Dry Density (t/m3): 1.64 1.64 1.64 **Peak Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Peak Shear Stress (kPa) 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) **Residual Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Residual Shear Stress (kPa) Residual Shear Stress (kPa) Normal Stress at Constant Volume (kPa) Shear Stress at Constant Volume (kPa) **Failure Envelopes** Peak Values Residual Values Friction Angle (°) At Displacement Cohesion (kPa) \_ \_ Correlation \_ \_ Friction Angle (°) 34.6 \_ **Shear Stress** Cohesion (kPa) 0.0 1.0000 Correlation Friction Angle (°) Cohesion (kPa) At Constant Volume Correlation -



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Authorised Signatory:

and

26/02/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015
Site No.: 22365

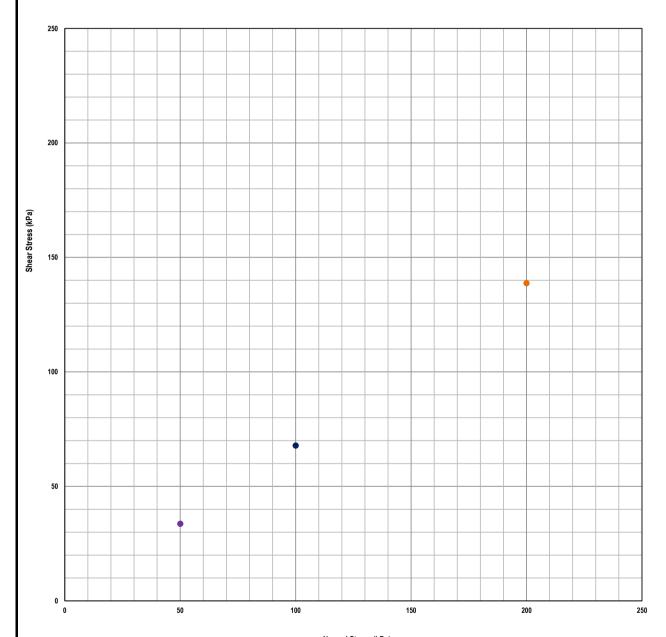
## SHEAR STRENGTH BY DIRECT SHEAR REPORT

AS1289 6.2.2

Client: Douglas Partners Report No: S30725-DS

## Peak Shear Stress / Normal Stress





Normal Stress (kPa)



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26/02/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site

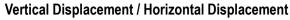
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015

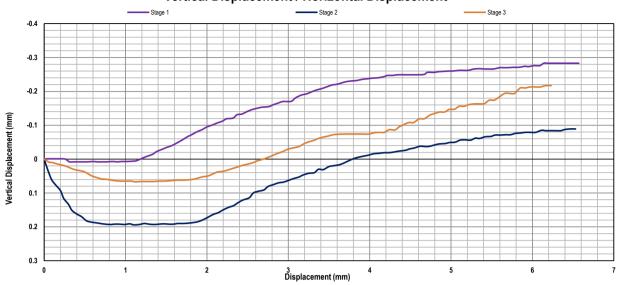
Site No.: 22365

## SHEAR STRENGTH BY DIRECT SHEAR REPORT

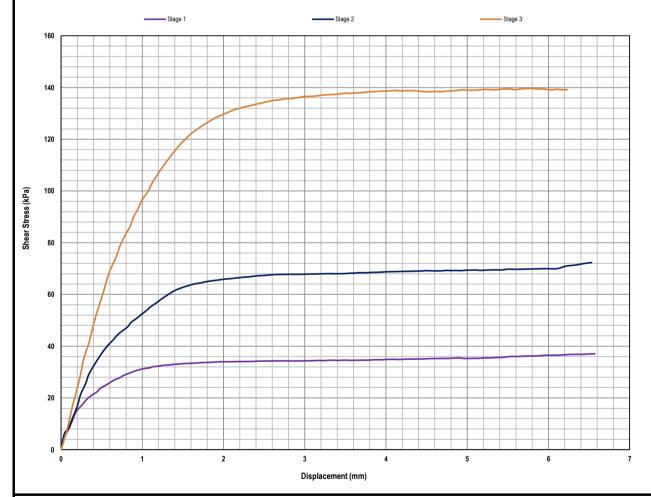
AS1289 6.2.2







## Peak Shear Stress / Horizontal Displacement





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Authorised Signatory:



26/02/2018

Date:

NATA Accredited Laboratory Number: 14874



Facility Name: Sydney Branch Site

Facility Location: 8/10 Bradford Street, Alexandria NSW 2015

Site No.: 22365

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT				
Client:	Douglas Partners	Source:	Sample 2	
Address:	PO Box 472 West Ryde NSW 1685	Sample Description:	SAND	
Project:	84944 02	Report No:	S30725-MDD	
Job No:	S18046	Lab No:	S30725	

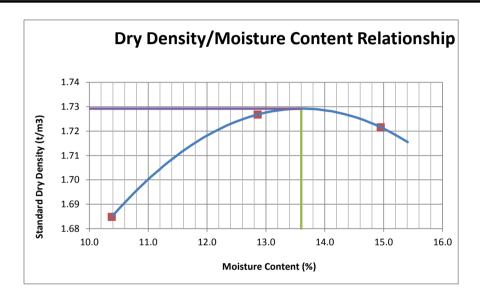
Test Procedure:

AS1289.5.1.1 Determination of the dry density/moisture content relation of a soil using standard compactive effort

AS1289.2.1.1 Determination of the moisture content of a soil - Oven drying method (Standard method)

Sampling:Sampled by ClientDate Sampled:8/02/2018

**Preparation:** Prepared in accordance with the test method



Maximum Dry Density (t/m³)	1.729
Optimum Moisture Content (%)	13.6
Percentage Oversize on 19mm sieve (%)	0
Percentage Oversize on 37.5mm sieve (%)	0



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

21/02/2018

Date:

MACQUARIE GEOTECH

#### SHEAR STRENGTH BY DIRECT SHEAR REPORT AS1289 6.2.2 Client: Douglas Partners Source: Sample 2 PO Box 472 West Ryde NSW 1685 Address: Sample Description: SAND Project: 84944 02 Report No.: S30725-DS Job No.: S18046 Lab No.: S30725 Test Procedure: AS1289 6,2,2 Soil strength and consolidation tests - Determination of the shear strength of a soil - Direct shear test using a shear box Sampling: Sampled by Client Date Sampled: 08.02.18 Prepared in accordance with the test method Preparation: **Test Details** Remoulding Details: 95% Standard Compaction @ 100% Optimum Moisture Content Date Tested: 22.02.18 100mm square Size of Shear Box (mm) **Test 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/m3): 1.86 1.86 1.86 Placement Dry Density (t/m3): 1.64 1.64 1.64 **Peak Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Peak Shear Stress (kPa) 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) **Residual Values** Normal Stress at Nominated Displacement (kPa) Shear Stress at Nominated Displacement (kPa) Normal Stress at Residual Shear Stress (kPa) Residual Shear Stress (kPa) Normal Stress at Constant Volume (kPa) Shear Stress at Constant Volume (kPa) **Failure Envelopes** Peak Values Residual Values Friction Angle (°) At Displacement Cohesion (kPa) \_ \_ Correlation \_ \_ Friction Angle (°) 34.6 \_ **Shear Stress** Cohesion (kPa) 0.0 1.0000 Correlation Friction Angle (°) Cohesion (kPa) At Constant Volume Correlation -



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Authorised Signatory:

and

26/02/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015
Site No.: 22365

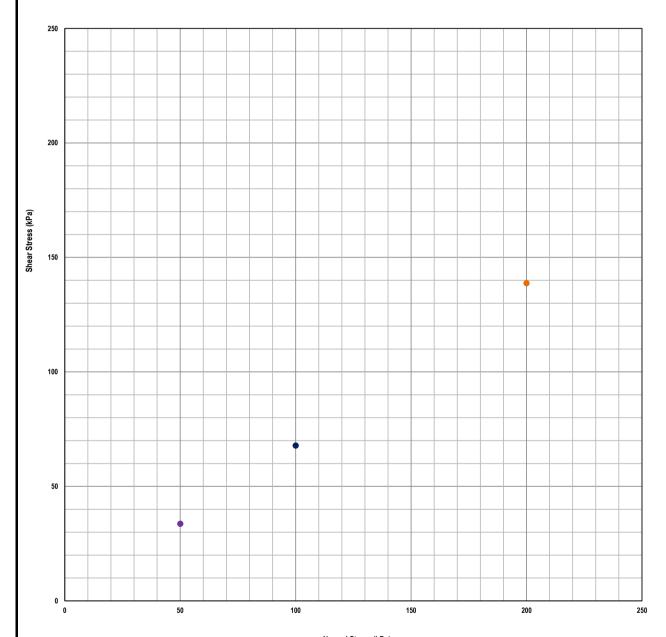
## SHEAR STRENGTH BY DIRECT SHEAR REPORT

AS1289 6.2.2

Client: Douglas Partners Report No: S30725-DS

## Peak Shear Stress / Normal Stress





Normal Stress (kPa)



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.

Authorised Signatory:

26/02/2018

NATA Accredited Laboratory Number: 14874

Date:



Facility Name: Sydney Branch Site

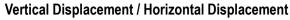
Facility Location: 8/10 Bradford Street, Alexandria NSW 2015

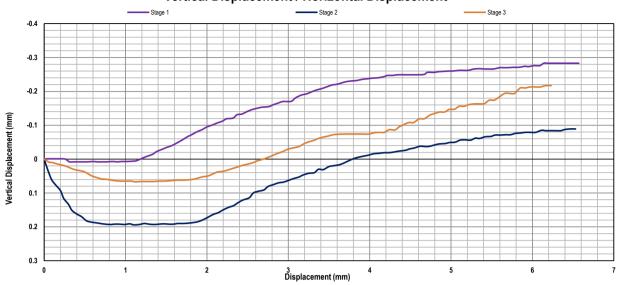
Site No.: 22365

## SHEAR STRENGTH BY DIRECT SHEAR REPORT

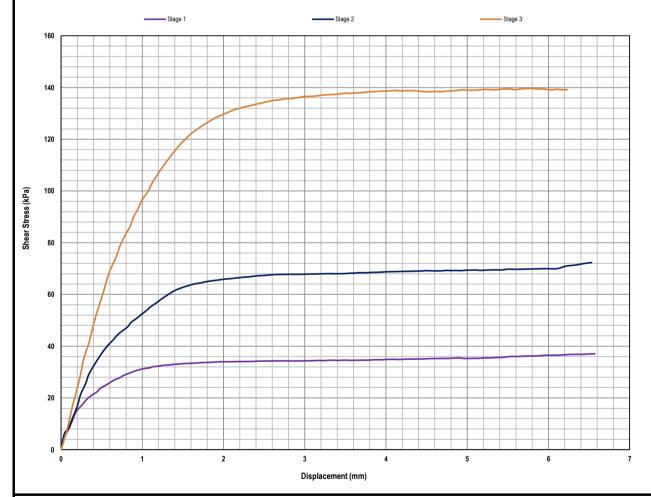
AS1289 6.2.2







## Peak Shear Stress / Horizontal Displacement





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Authorised Signatory:



26/02/2018

Date:

NATA Accredited Laboratory Number: 14874



Facility Name: Sydney Branch Site

Facility Location: 8/10 Bradford Street, Alexandria NSW 2015

Site No.: 22365

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT				
Client:	Douglas Partners	Source:	Sample 2	
Address:	PO Box 472 West Ryde NSW 1685	Sample Description:	SAND	
Project:	84944 02	Report No:	S30725-MDD	
Job No:	S18046	Lab No:	S30725	

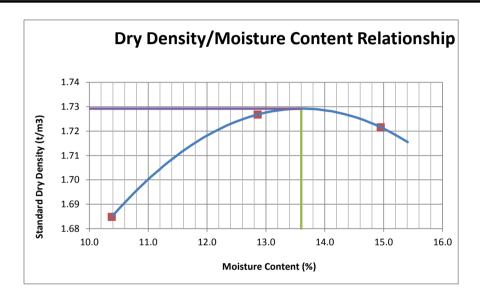
Test Procedure:

AS1289.5.1.1 Determination of the dry density/moisture content relation of a soil using standard compactive effort

AS1289.2.1.1 Determination of the moisture content of a soil - Oven drying method (Standard method)

Sampling:Sampled by ClientDate Sampled:8/02/2018

**Preparation:** Prepared in accordance with the test method



Maximum Dry Density (t/m³)	1.729
Optimum Moisture Content (%)	13.6
Percentage Oversize on 19mm sieve (%)	0
Percentage Oversize on 37.5mm sieve (%)	0



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

21/02/2018

Date:

MACQUARIE GEOTECH

**Report Number:** 84944.02-1

Issue Number:

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

	on (AS1289 3.6.1)	Deceir a Limite
Sieve	Passed %	Passing Limits
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	



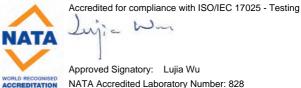
Douglas Partners Pty Ltd Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Fax: (02) 9809 0666

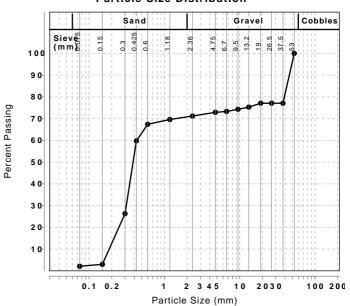
Email: lujia.wu@douglaspartners.com.au



Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

#### Particle Size Distribution



Report Number: 84944.02-1 Page 1 of 6

**Report Number:** 84944.02-1

Issue Number:

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: 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)		
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	



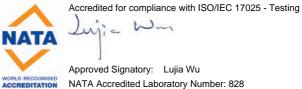
Douglas Partners Pty Ltd Sydney Laboratory

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Phone: (02) 9809 0666

Fax: (02) 9809 0666

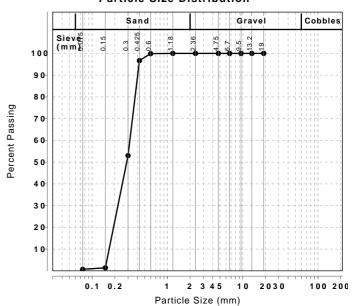
Email: lujia.wu@douglaspartners.com.au



Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

#### Particle Size Distribution



Report Number: 84944.02-1 Page 2 of 6

84944.02-1 **Report Number:** 

Issue Number:

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)

Filling - Yellow brown, slightly gravelly, sand filling with trace of silt Material:

Particle Distribution (AS1289 3.6.1)		
Sieve	Passed %	Passing Limits
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	



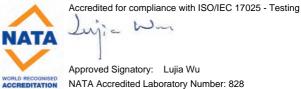
Douglas Partners Pty Ltd Sydney Laboratory

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Phone: (02) 9809 0666

Fax: (02) 9809 0666

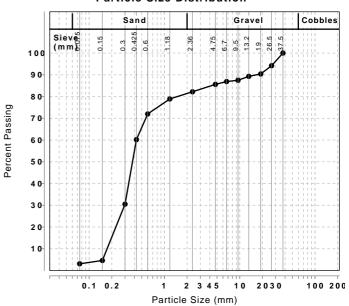
Email: lujia.wu@douglaspartners.com.au



Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

#### **Particle Size Distribution**



Report Number: 84944.02-1 Page 3 of 6

84944.02-1 **Report Number:** 

Issue Number:

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

	on (AS1289 3.6.1)	
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	



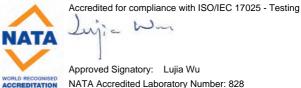
Douglas Partners Pty Ltd Sydney Laboratory

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Phone: (02) 9809 0666

Fax: (02) 9809 0666

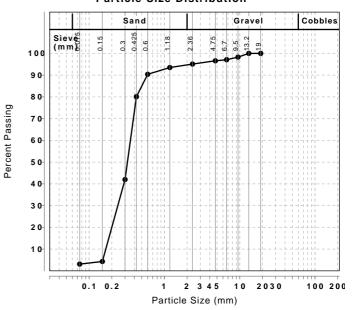
Email: lujia.wu@douglaspartners.com.au



Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

#### Particle Size Distribution



Report Number: 84944.02-1 Page 4 of 6

Report Number: 84944.02-1

Issue Number:

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)		
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	



Douglas Partners Pty Ltd Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Fax: (02) 9809 0666

Email: lujia.wu@douglaspartners.com.au

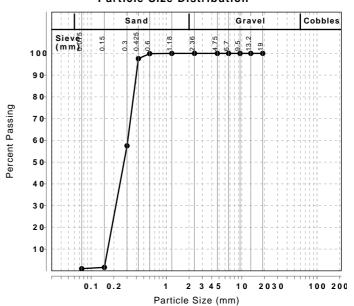


Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

#### Particle Size Distribution



Report Number: 84944.02-1 Page 5 of 6

**Report Number:** 84944.02-1

Issue Number:

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)								
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							



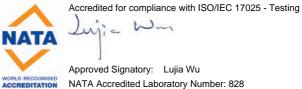
Douglas Partners Pty Ltd Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Fax: (02) 9809 0666

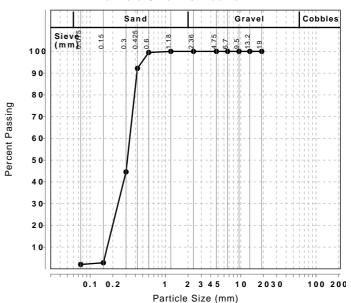
Email: lujia.wu@douglaspartners.com.au



Approved Signatory: Lujia Wu

NATA Accredited Laboratory Number: 828

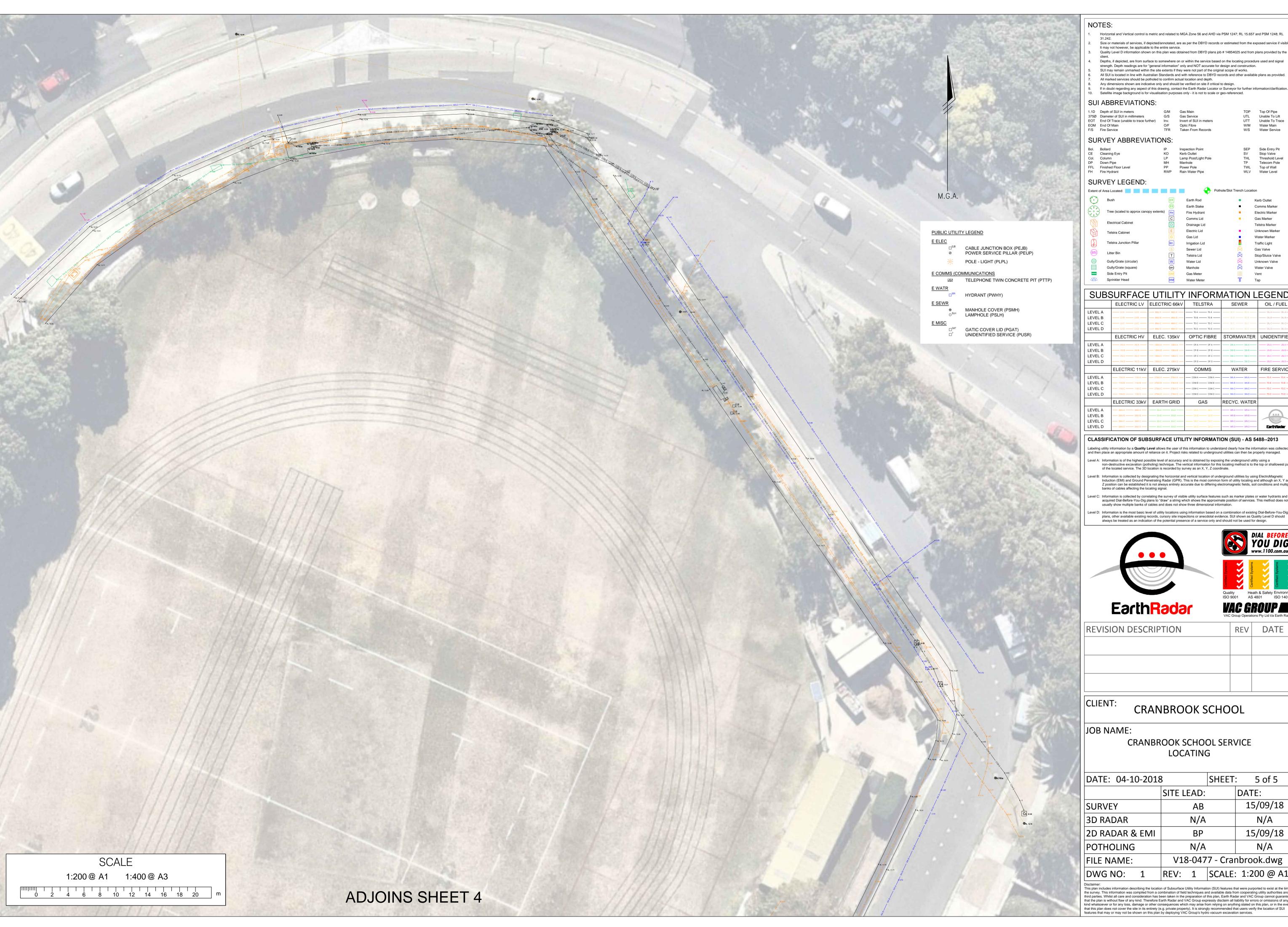
#### Particle Size Distribution



Report Number: 84944.02-1 Page 6 of 6



Appendix F - Utilities Survey



Horizontal and Vertical control is metric and related to MGA Zone 56 and AHD via PSM 1247; RL 15.657 and PSM 1248; RL

- Size or materials of services, if depicted/annotated, are as per the DBYD records or estimated from the exposed service if visible.
- Depths, if depicted, are from surface to somewhere on or within the service based on the locating procedure used and signal
- strength. Depth readings are for "general information" only and NOT accurate for design and construction. SUI may remain unmarked within the site extents if they were not part of the original scope of works. All SUI is located in line with Australian Standards and with reference to DBYD records and other available plans as provided.
- Any dimensions shown are indicative only and should be verified on site if critical to design. If in doubt regarding any aspect of this drawing, contact the Earth Radar Locator or Surveyor for further information/clarification. O. Satellite image background is for visualisation purposes only - it is not to scale or geo-referenced.

## **SUI ABBREVIATIONS:**

TOP Top Of Pipe G/S Gas Service UTL Unable To Lift
UTT Unable To Trace
W/M Water Main EOT End Of Trace (unable to trace further) Inv. Invert of SUI in meters Taken From Records W/S Water Service

Kerb Outlet Stop Valve THL Threshold Level TP Telecom Pole Lamp Post/Light Pole Manhole Power Pole Telecom Pole TWL Top of Wall
WLV Water Level RWP Rain Water Pipe

		Lattii Stake
Tree (scaled to approx canopy extents)	FH	Fire Hydrant
	С	Comms Lid
Electrical Cabinet	D	Drainage Lid
Telstra Cabinet	Е	Electric Lid
	G	Gas Lid
Telstra Junction Pillar	Irr.	Irrigation Lid
Litter Die	S	Sewer Lid
Litter Bin	Т	Telstra Lid
Gully/Grate (circular)	W	Water Lid
Gully/Grate (square)	MH	Manhole
Side Entry Pit	GM	Gas Meter

Unknown Marker Water Marker Traffic Light Gas Valve Stop/Sluice Valve Water Valve

Kerb Outlet

Electric Marker Gas Marker

SUBSURFACE UTILITY INFORMATION LEGEND ELECTRIC LV ELECTRIC 66kV TELSTRA ELECTRIC HV | ELEC. 135kV | OPTIC FIBRE | STORMWATER | UNIDENTIFIED | ELECTRIC 11kV ELEC. 275kV COMMS WATER FIRE SERVICE

ELECTRIC 33kV EARTH GRID GAS RECYC. WATER

## CLASSIFICATION OF SUBSURFACE UTILITY INFORMATION (SUI) - AS 5488--2013

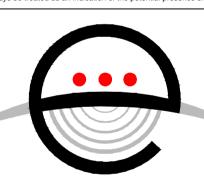
Labeling utility information by a **Quality Level** allows the user of this information to understand clearly how the information was collected and then place an appropriate amount of reliance on it. Project risks related to underground utilities can then be properly managed. Level A: Information is of the highest possible level of accuracy and is obtained by exposing the underground utility using a

non-destructive excavation (potholing) technique. The vertical information for this locating method is to the top or shallowest part of the located service. The 3D location is recorded by survey as an X, Y, Z coordinate. Level B: Information is collected by designating the horizontal and vertical location of underground utilities by using ElectroMagnetic

Induction (EMI) and Ground Penetrating Radar (GPR). This is the most common form of utility locating and although an X, Y and Z position can be established it is not always entirely accurate due to differing electromagnetic fields, soil conditions and multiple banks of cables affecting the locating signal. acquired Dial-Before-You-Dig plans to "draw" a string which shows the approximate position of services. This method does not

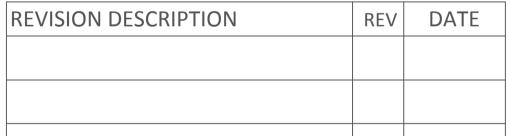
usually show multiple banks of cables and does not show three dimensional information.

Level D: Information is the most basic level of utility locations using information based on a combination of existing Dial-Before-You-Dig plans, other available existing records, cursory site inspections or anecdotal evidence. SUI shown as Quality Level D should always be treated as an indication of the potential presence of a service only and should not be used for design.









# **CRANBROOK SCHOOL**

CRANBROOK SCHOOL SERVICE LOCATING

	DATE: 04-10-2018		SHEET: 5 of 5		
Į		SITE LE	AD:		DATE:
	SURVEY		AB		15/09/18
	3D RADAR		N/A		N/A
4	2D RADAR & EMI		BP		15/09/18
	POTHOLING		N/A		N/A
	FILE NAME:	V18-0477 - Cranbrook.dwg		nbrook.dwg	
	DWG NO: 1	REV:	1	SCALE:	1:200 @ A1

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