



**REVISED GEOTECHNICAL REPORT**

**TO**

**URBANGROWTH NSW**

**ON**

**GEOTECHNICAL INVESTIGATION**

**FOR**

**PROPOSED BAYS MARKET DISTRICT**

**AT**

**BLACKWATTLE BAY, PYRMONT, NSW**

**13 July 2017**  
**Ref: 29245SrptRev1**



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## **TABLE OF CONTENTS**

<b>1</b>	<b>INTRODUCTION</b>	<b>4</b>
<b>2</b>	<b>INVESTIGATION PROCEDURE</b>	<b>4</b>
<b>3</b>	<b>RESULTS OF INVESTIGATION</b>	<b>6</b>
3.1	Site Description	6
3.2	Subsurface Conditions	7
3.3	Laboratory Test Results	12
<b>4</b>	<b>GENERAL COMMENTS</b>	<b>13</b>

**STS TABLE A1: MOISTURE CONTENT, ATTERBERG LIMITS & LINEAR SHRINKAGE TEST REPORT**

**STS TABLE B1: PARTICLE SIZE DISTRIBUTION TEST REPORT**

**STS TABLE C1: HYDROMETER TEST REPORT**

**STS TABLE D1: POINT LOAD STRENGTH INDEX TEST REPORT**

**STS TABLE E1: EMERSON CLASS NUMBER TEST REPORT**

**ENVIROLAB SERVICES REPORT NO: 163579**

**ENVIROLAB SERVICES REPORT NO: 169546**

**BOREHOLE LOGS 8 TO 28 INCLUSIVE (WITH CORE PHOTOGRAPHS)**

**FIGURE 1: SITE LOCATION PLAN**

**FIGURE 2: BOREHOLE LOCATION PLAN**

**FIGURE 3: ROCK SURFACE LEVEL CONTOUR PLAN**

**FIGURE 4: SECTION A-A'**

**FIGURE 5: SECTION B-B'**

**FIGURE 6: SECTION C-C'**

**FIGURE 7: SECTION D-D'**

**REPORT EXPLANATION NOTES**



## **1 INTRODUCTION**

This report presents the results of a geotechnical investigation for the proposed Bays Market District, Blackwattle Bay, Pyrmont, NSW. The investigation was completed in two stages commissioned by UrbanGrowth NSW (Project 50594, Contract 3907/16) and was undertaken in accordance with our tender submission (Ref No: P41988S) dated 26 February 2016. Our initial report was dated 3 April 2017 and was based on the scope of work defined in the contract. This report supersedes our previous report and includes the results of seven additional boreholes which were commissioned after submission of the initial report.

## **2 INVESTIGATION PROCEDURE**

The initial fieldwork for the investigation was carried out between 6 February 2017 and 17 February 2017, and comprised the drilling of fourteen boreholes (BH15 to BH28) with our track mounted JK305 drilling rig. A 25m floating barge operated by GPM Constructions was used to provide a platform for our drill rig and was secured at each test location by lowering spuds onto the seabed. The latest investigation was carried out between 29 May 2017 and 6 June 2017, and comprised the drilling of seven boreholes (BH8 to BH14) with our track mounted JK305 drilling rig. A 16m floating barge operated by Harbour Constructions was used to provide a platform for our drill rig and secured similarly to the previous barge.

The boreholes were drilled to depths between 3.01m and 14.65m below the surface of the seabed using rotary washbore drilling techniques with a tri-cone drill bit and casing advancer techniques. Through the soil profile, regular Standard Penetration Tests (SPT), were completed to obtain samples to allow determination of the soil types and determine 'N' values which provide an assessment of relative density and strength of the soils. Undisturbed U50 samples were also collected from some of the cohesive soil horizons to provide supplementary information.

When reading the logs it must be recognised that no sample is returned between the SPT/U50 tests/samples and the continuity of the soil layers is only inferred. Hand penetrometer tests were conducted on cohesive samples from the SPT split tube sampler to provide further information on soil strength. Due to the limitations of the drilling technique, samples could only be obtained from the SPT and U50 samplers and recovery was not always successful in the very soft/weak soils just below seabed level. As a result, samples from immediately below seabed level are limited, despite attempts to obtain samples using a grab sampler. On encountering bedrock these boreholes were then extended to depths ranging from 8.06m to 20.54m below seabed using an NMLC triple core barrel fitted with a diamond coring bit and water flush.





The borehole locations were set out using a Trimble R8 GNSS differential GPS surveying unit. The locations were set out as close as practicable to the nominated locations with the MGA coordinates obtained from Google Earth. The relative levels shown on the attached logs indicate seabed levels at the time of investigation and were calculated using reduced levels displayed on the R8 GNSS unit and tape measurements made from the barge deck to the seabed. The height datum is the Australian Height Datum (AHD). Due to the presence of underwater services at the nominated location for BH28, the borehole was re-positioned to an approved alternative location.

The site location plan is presented on the attached Figure 1. The borehole locations, together with their MGA Coordinates and reduced seabed levels are provided in the following table and are presented on the attached Figure 2.

<b>Borehole</b>	<b>Easting (m)</b>	<b>Northing (m)</b>	<b>Reduced Level (mAHD)</b>
<b>8</b>	332531	6250240	-4.50
<b>9</b>	332545	6250192	-2.08
<b>10</b>	332631	6250245	-3.65
<b>11</b>	332581	6250274	-7.02
<b>12</b>	332658	6250307	-6.39
<b>13</b>	332635	6250360	-7.29
<b>14</b>	332731	6250333	-2.32
<b>15</b>	332748	6250362	-3.79
<b>16</b>	332508	6250253	-5.12
<b>17</b>	332484	6250286	-4.11
<b>18</b>	332552	6250324	-7.86
<b>19</b>	332517	6250358	-7.50
<b>20</b>	332575	6250385	-7.93
<b>21</b>	332665	6250385	-6.14
<b>22</b>	332636	6250427	-6.42
<b>23</b>	332671	6250417	-5.94
<b>24</b>	332677	6250483	-5.04
<b>25</b>	332641	6250575	-2.73
<b>26</b>	332499	6250667	-4.57
<b>27</b>	332415	6250682	-5.35
<b>28</b>	332311	6250870	-4.92



The fieldwork was completed in the full-time presence of a geotechnical engineer who set out the borehole locations, nominated the sampling and testing, and prepared the borehole logs. The borehole logs are attached with this report, together with a glossary of the terms and symbols used in the logs. The soil and rock descriptions contained in the logs are in accordance with AS1726-1993.

Samples of the soils were returned to a NATA registered laboratory, Soil Test Services (STS), where they were tested for moisture content, Atterberg limits, linear shrinkage, particle size distribution (including hydrometer analysis) and Emerson Class Number dispersion tests. The results of these tests are summarised in the attached Tables A1, B1, C1 and E1. Additional samples were delivered to a NATA registered analytical laboratory, Envirolab Services, where they were tested for soil pH, chloride content, sulphate content and resistivity. The results of these tests are provided in the attached Envirolab Services Certificate of Analysis 163579.

The rock core samples of the underlying sandstone bedrock were returned to our NATA registered laboratory (Soil Test Services (STS)) for photographing and Point Load Strength Index ( $Is_{50}$ ) testing. Using established correlations the Unconfined Compressive Strength (UCS) of the bedrock was then calculated from the  $Is_{50}$  results. Table D1 presents the results of these tests. Copies of the colour photographs are provided with the borehole logs.

For further details of the investigation techniques adopted, and their limitations, reference should be made to the attached Report Explanation Notes.

### **3 RESULTS OF INVESTIGATION**

#### **3.1 Site Description**

As shown on the attached Figure 1, Blackwattle Bay is located between the Pyrmont Peninsula to its east and north-east, the foreshores of Glebe to its west and Pyrmont Bridge Road and Wentworth Park to its south. Parts of the existing developed areas have been built on reclaimed land.

On the western shore of Blackwattle Bay are The Boathouse and Glebe Rowing Club; to the south of these developments a sandstone block seawall, typically about 1.5m to 2.0m high, runs along the western shoreline towards its south-western corner. Sydney Secondary College is located immediately south-west of the site.





Along the southern boundary of Blackwattle Bay there are several wharf structures built on piles over submerged land, including the existing Hanson Concrete Facility, the Charter Vessel Blackwattle Bay Marina for charter vessels and the heritage coal bunker structure.

Along the eastern shoreline there are The Sydney Fish Markets including a large car park, the Hymix batching plant, a marina, various industrial and commercial buildings, a Roads and Maritime Services compound and up towards north-eastern end of the site, the Blackwattle Bay Dragon Boat Club which includes a plastic mesh boat ramp. A seawall typically between 1.0m and 2.0m in height runs along the eastern shoreline and comprises sections of both sandstone and concrete blocks. There is sandstone boulder/rubble scour protection along much of its length together with various wharf structures along the foreshore.

The site extends north of the south-east abutment of the Anzac bridge towards Glebe Island Bridge. Along the eastern foreshore, between Anzac Bridge and Glebe Island Bridge are several one and two level disused and dilapidated brick buildings and a sandstone block seawall about 1.0m to 1.5m in height. Both Telstra and Ausgrid submarine cables are located in the area.

### **3.2 Subsurface Conditions**

The 1:100,000 Geological Map of Sydney indicates the site to be underlain by Hawkesbury Sandstone of the Wianamatta Group comprising medium to coarse grained quartz sandstone with very minor shale and laminite lenses. It should be noted that at least two dykes are believed to be extend through the site in a rough north-west alignment, an offshoot of one we believe was encountered within BH15 and associated alteration was observed in BH14.

The boreholes disclosed a subsurface profile generally comprising natural clays and sandy clays of medium to high plasticity and clayey sands overlying sandstone bedrock. The sandstone was generally initially of variable quality, ranging from extremely weathered to slightly weathered sandstone but improving to medium to very high strength with depth. Some minor shale bands were found in the sandstone and an offshoot of an igneous dyke in BH15. Reference should be made to the attached borehole logs for detailed subsurface descriptions at specific locations. A summary of the subsoil conditions, as encountered, is presented below:

#### ***Fill***

The boreholes typically encountered no fill from the seabed level, except the boreholes close to the existing shoreline (BH9, BH10, BH14 and BH15) where fill extending up to 4.7m depth was encountered. The fill in BH15 comprised a clayey sand and silty clay with trace amounts of fine to



medium grained sand and coal and plastic fragments. The fill was assessed as being poorly compacted. Please note, due to the drilling technique samples were typically only obtained from SPT and U50 sampler and so samples from the seabed were limited.

### ***Natural Soils***

The natural soils were encountered below the fill in BH9, BH10, BH14 and BH15 and, depending on the first sampling depth, either from seabed level or typically at least 0.5m depth. We note that natural soils were encountered at the first sampling depth in all boreholes (except those above) but thin layers of fill may be present where seabed sampling was not possible.

The natural soils within the boreholes typically comprised interbedded layers of silty clay, sandy clay and clayey sand soils. The predominantly clay samples were assessed as having moisture content greater than their plastic limits and based upon hand penetrometer tests completed on the samples, ranged in strength from very soft to very stiff. The clays were assessed as being of medium to high plasticity. The predominantly sandy samples were assessed as wet and ranged from very loose to dense relative density. The natural soils contained varying amounts of fine to coarse grained gravel, shell fragments and other organic materials.

Generally an upper layer of soft or very soft clay was often present on the eastern side of the bay and also deeper out in the bay, such as along Section B. Below these weaker soils, clays of at least very stiff strength were typically encountered, similar to those encountered from seabed over the western side of the bay. There also generally appears to be a fill layer close to the Wharf shoreline. Below the clays and overlying the bedrock, typically more sandy soils were encountered varying from loose to dense relative density, with more loose sands encountered closer to the shorelines.

### ***Bedrock***

Sandstone bedrock was present at all investigated locations and has been classified in accordance with Reference 1<sup>1</sup>. The reduced level for the top of each rock class for each borehole at this site is provided in the following table. The rock levels in the boreholes were also used to prepare a rock surface contour plan which is attached as Figure 3; the contours shown on the plan are interpolated between the levels shown on the boreholes and should be considered approximate only. We note the classification is strictly dependent upon pile diameter and the generalised classification shown in the table has been based upon representative lengths of core

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<sup>1</sup> Reference 1: Rock classification in accordance with Foundations on Sandstone and Shale in the Sydney Region, Pells, Mostyn and Walker, Australian Geomechanics, Dec 1998





and some judgement within the overlying washbored portions of the boreholes and should be treated as indicative only. Further, within each rock class given below, there may be some subsections of rock which may be say one class higher or lower than the overall class of that band. Therefore, further determination of the classification must be made when details of the pile diameter/socket length are known.

		Reduced Level at the Top of Each Rock Class (mAHD)				
		Rock Class				
Borehole	Seabed RL (mAHD)	V	IV	III	II	I
8	-4.50	-	-16.50	-	-18.90	-
9	-2.08	-11.18	-	-13.52	-	-
10	-3.65	-14.65	-15.35	-17.45	-	-
11	-7.02	-15.72	-16.16	-18.32	-	-
12	-6.39	-20.39	-	-21.44	-	-23.81
13	-7.29	-21.25	-	-	-22.70	-
14	-2.32	-9.42	-10.55	-	-	-
15	-3.79	-9.28 -13.79 -19.76	-12.34 -15.29	-	-	-
16	-5.12	-	-18.72	-20.22	-20.92	-
17	-4.11	-10.71 -16.24	-	-13.95 -18.18	-	-
18	-7.86	-21.45	-	-24.25	-	-
19	-7.5	-	-	-17.20	-	-
20	-7.93	-	-	-21.52	-	-22.63
21	-6.14	-18.10	-	-	-18.65	-
22	-6.42	-15.72	-	-	-20.42	-18.92
23	-5.94	-15.44	-	-15.95	-18.04	-
24	-5.04	-9.74	-10.75	-11.19	-	-
25	-2.73	-5.13	-	-8.78	-11.78	-
26	-4.57	-13.77	-14.46	-14.69	-	-
27	-5.35	-	-	-10.73	-12.68	-
28	-4.92	-12.93	-	-15.11	-	-16.32



At first contact, the bedrock varies across the site with either extremely weathered bedrock of extremely low to very low strength or distinctly weathered bedrock of low to medium strength encountered, although there does appear to be a trend of better rock at first contact within the boreholes closer to the shore than those deeper out in the bay. The bedrock strength improves to at least medium strength within all boreholes, although the sandstone within BH14 and BH15 was highly fractured due to suspected presence of the dyke and associated faulting. A rock contour representing the top of bedrock is presented in Figure 3 but please note, the contour lines have been interpolated from the borehole logs only and some variation of the rock level may be present between borehole locations.

We note that the sandstone in BH14 and BH15 was classified as Class V and IV throughout due to the significant core loss and the high number of defects present. Given that dolerite bedrock within BH15 was encountered at RL-19.76m we believe the boreholes are positioned over or within very close proximity of a dyke that is known to pass through the site. Faulting associated with the presence of the dyke is the most likely cause for the abnormally high number of defects present within the upper sandstone portion of the borehole.

The recovered core within all boreholes generally contained a high number defects which included:

- Sub-horizontal bedding
- A large number of planar (occasionally undulating) joint defects typically dipping at between 50° and 90°, although occasionally less steeply sloping joints dipping at 10° to 30° were encountered. The joint interfaces were typically tight and rough with occasional iron-staining.
- Some generally sub-horizontal extremely weathered and clay seams dipping at between 0° and 10° ranging between 1mm to 130mm thickness.

In addition, in many of the boreholes, core loss zones were encountered ranging from 0.1m to 2.04 in thickness. Core loss zones are generally considered to represent extremely weathered or clay seams that have been washed away during the coring process.





### **3.3 Stratigraphic Units**

Sections A to D (Figures 4 to 7) provide a graphical summary of the soil and rock profile across the bay area. We have conceptualised soil profile by subdividing the soils into the following units, although it must be noted that there may be variations within these soil units as they have been generalised. Note also that the unit boundaries are drawn as straight lines between the boreholes, however, in reality there are likely to be variations along the unit boundaries, for instance, the bedrock is likely to have a stepped profile. Reference should be made to the individual borehole logs for details at each location. The units selected are relatively judgemental, as there is not always a definitive boundary between the units.

**Unit 1 – Clayey Fill:** This unit comprises of the clayey fill present within the boreholes that are within close proximity to the existing wharf area along the southern shoreline.

**Unit 2 – Silty Clay:** This unit generally comprises of the very soft to soft clays present near the eastern shoreline and through the middle of the bay, roughly along the line of Section A.

**Unit 3a – Silty clay:** This unit generally comprises of the stiff to hard strength clays present either below the Unit 2 clays or roughly from seabed level (or from start of borehole logging).

**Unit 3b – Clayey sand/Sandy clay or Silty Clay with sand:** This unit typically comprises of the soils with higher sand contents that appeared to generally directly overlay the sandstone bedrock. The soils were generally of medium dense to dense relative density and very stiff to hard strength, although we note there were some bands of lower relative density and strength soils present within the unit.

**Unit 4a – Sandstone:** Class V and IV sandstone

**Unit 4b – Sandstone:** Class III or better sandstone

**Unit 4c – Dolerite:** Igneous dolerite rock encountered within BH15.



### **3.4 Laboratory Test Results**

The results of the Atterberg Limits and Linear Shrinkage tests on the natural clays indicated to range from medium to high plasticity and showed good correlation with the field logging, as shown in Table A1. Furthermore, as expected, the moisture content of the soils near the seabed have relatively high moisture contents of up to 53.2% with the deeper soils generally ranging between about 20% to 34%.

The Particle Size Distribution tests, as shown in Table B1, indicated that the clayey sand samples generally comprised medium to coarse grained sands with minor amounts of fine grained sand and between 19% and 49% of silt and clay content.

Hydrometer tests, as shown in Table C1, were carried out on samples of the finer grained soils, the clay contents ranged from 51% to 72% in four samples whilst three samples indicated lower clay content. The clay soils contained varying amounts of fine to coarse grained sand, generally varying from 4% to 25%, with one exception in BH22 at 0.0m to 0.5m where the sample contained 44% sand.

The Point Load Strength Index Test results, shown in Table D1, indicated that the rock core ranged between very low strength to very high strength sandstone with estimated Unconfined Compressive Strengths (UCS) varying from 1MPa to 86MPa. The strengths correlated well with the field logging as shown on the borehole logs.

The Emerson Class Number test results, shown in Table E1, indicated that the samples were generally classified as either Emerson Class Number 2 or 4, whereby Class 2 indicates slaking of the samples with some dispersion when placed in water. Class 4 indicates slaking of the sample but no dispersion of the soil. The test completed on a sample taken from BH14 at 4.00 to 4.30m depth returned an Emerson Class 7 indicating no slaking occurred throughout the test.

The Envirolab Services Pty Ltd chemical testing results indicated that the soil pH ranged from 4.8 to 8.6, chloride content ranged from 1,900mg/kg to 11,000mg/kg, sulphate ranged from 110mg/kg to 5,700mg/kg and the electrical resistivity ranged from 1.1ohm.m to 7.1ohm.m. The test values should be compared to those in the piling code, AS2159-2009, with regard to the design of steel and reinforced concrete structures in soil. However, as the structures are all in a marine environment other standards may apply.





#### **4 GENERAL COMMENTS**

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

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

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**TABLE A1**  
**MOISTURE CONTENT, ATTERBERG LIMITS AND**  
**LINEAR SHRINKAGE TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** A1  
**Report Date:** 26/06/2017  
**Page 1 of 2**

AS 1289	TEST METHOD	2.1.1	3.1.2	3.2.1	3.3.1	3.4.1
BOREHOLE NUMBER	DEPTH m	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	LINEAR SHRINKAGE %
9	3.75-4.20	23.3	45	16	29	12.0
9	5.15-5.60	15.3				
10	4.55-5.00	22.6				
10	5.85-6.30	27.9	53	19	34	15.0
10	7.35-7.80	32.5				
11	1.60-2.05	34.0	63	23	40	16.5
11	3.15-3.60	34.6				
11	6.40-6.85	13.8				
12	3.95-4.40	30.8	57	20	37	15.0
12	10.20-10.65	60.4				
13	3.20-3.70	23.5				
13	4.15-4.60	34.7				
13	5.65-6.10	25.8				
13	7.20-7.65	32.2				
16	0.85-1.25	19.3	37	14	23	6.5
16	2.45-2.90	18.8				
16	3.90-4.35	24.5				
16	5.30-5.75	20.8				
17	2.19-2.64	13.9	33	11	22	5.5
17	5.62-7.07	18.5				
18	0.37-0.82	17.7				
18	2.20-2.65	27.5	58	20	38	14.5

**Notes:** See Page 2 of 2



**SOIL TEST SERVICES**

ABN 43 002 145 173

**TABLE A1**  
**MOISTURE CONTENT, ATTERBERG LIMITS AND**  
**LINEAR SHRINKAGE TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** A1  
**Report Date:** 26/06/2017  
**Page 2 of 2**

AS 1289	TEST METHOD	2.1.1	3.1.2	3.2.1	3.3.1	3.4.1
BOREHOLE NUMBER	DEPTH m	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	LINEAR SHRINKAGE %
18	3.53-3.98	22.0				
18	5.55-6.00	23.3				
18	7.05-7.50	24.2				
19	0.95-1.30	25.3				
19	2.45-2.90	27.6	70	23	47	17.0
19	4.15-4.60	27.7				
19	5.90-6.35	24.8				
20	0.00-0.50	45.2				
20	4.15-4.60	30.7				
20	5.35-5.80	25.6				
20	6.55-7.00	25.9				
20	8.20-8.65	33.2				
21	1.10-1.55	43.0	57	24	33	15.0
21	2.45-2.90	24.6				
22	3.30-3.60	24.6				
22	6.33-6.78	32.6				
23	1.50-1.95	40.4	47	22	25	13.0
23	3.06-3.51	42.2				
23	5.75-6.20	23.8				
28	3.50-3.95	53.2	44	19	25	12.0
28	4.80-4.90	34.3				

**Notes:**

- The test sample for liquid and plastic limit was air-dried & dry-sieved
- The linear shrinkage mould was 125mm
- Refer to appropriate notes for soil descriptions
- Date of receipt of sample: 1/03/2017 & 8/06/2017



## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

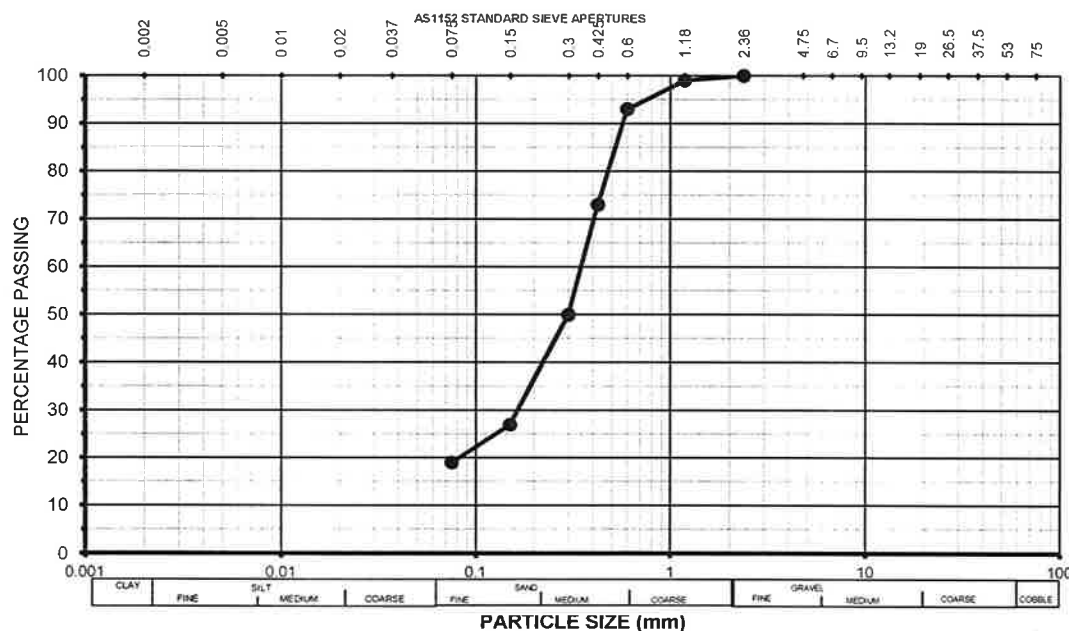
**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page:** 1 of 10

**Borehole Number:** 8  
**Depth (m):** 9.30-9.75

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
2.36 mm	100
1.18 mm	99
600 µm	93
425 µm	73
300 µm	50
150 µm	27
75 µm	19



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

### • Notes:

- Please refer to appropriate notes for soil descriptions

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

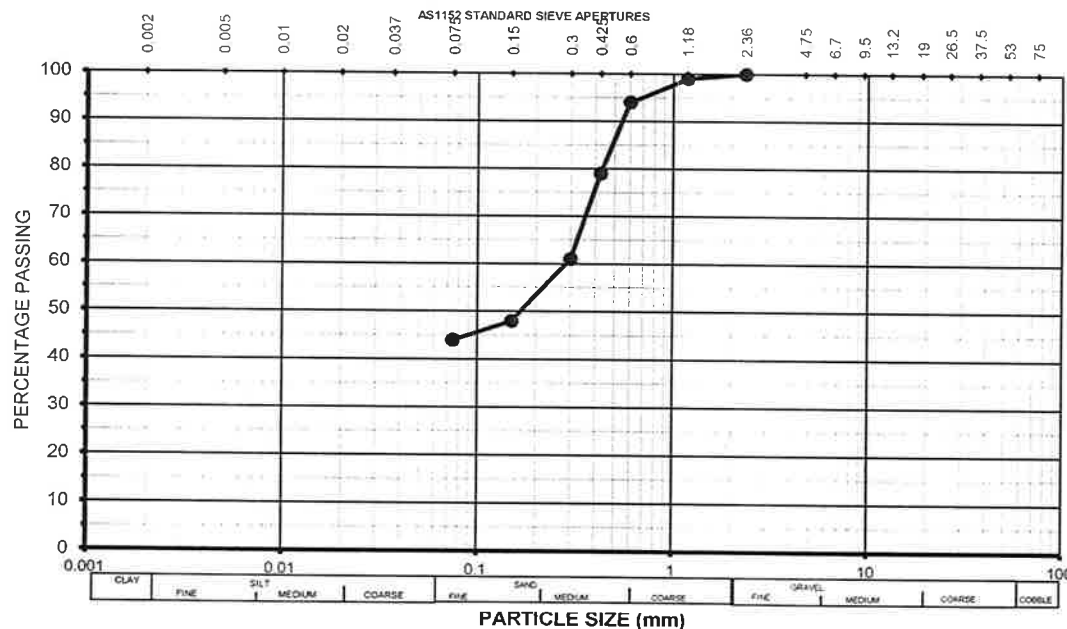
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 2 of 10

Borehole Number: 13  
Depth (m): 8.30-8.75

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

2.36 mm	100
1.18 mm	99
600 µm	94
425 µm	79
300 µm	61
150 µm	48
75 µm	44



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number: 1327

Approved Signatory / Date  
*A. Tatikonda* 26/6/17  
(A. Tatikonda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

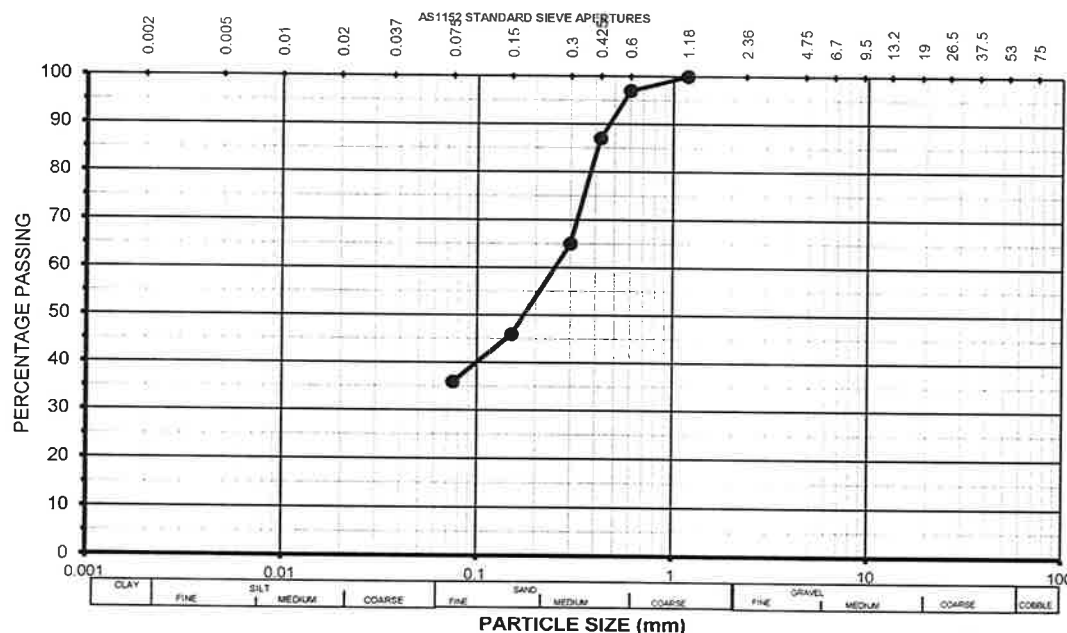
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page:** 3 of 10

Borehole Number: 14  
Depth (m): 5.75-6.20

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

1.18 mm	100
600 µm	97
425 µm	87
300 µm	65
150 µm	46
75 µm	36



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



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Number:1327

Approved Signatory / Date  
*A. Tatikonda* 26/6/17  
(A. Tatikonda)



## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

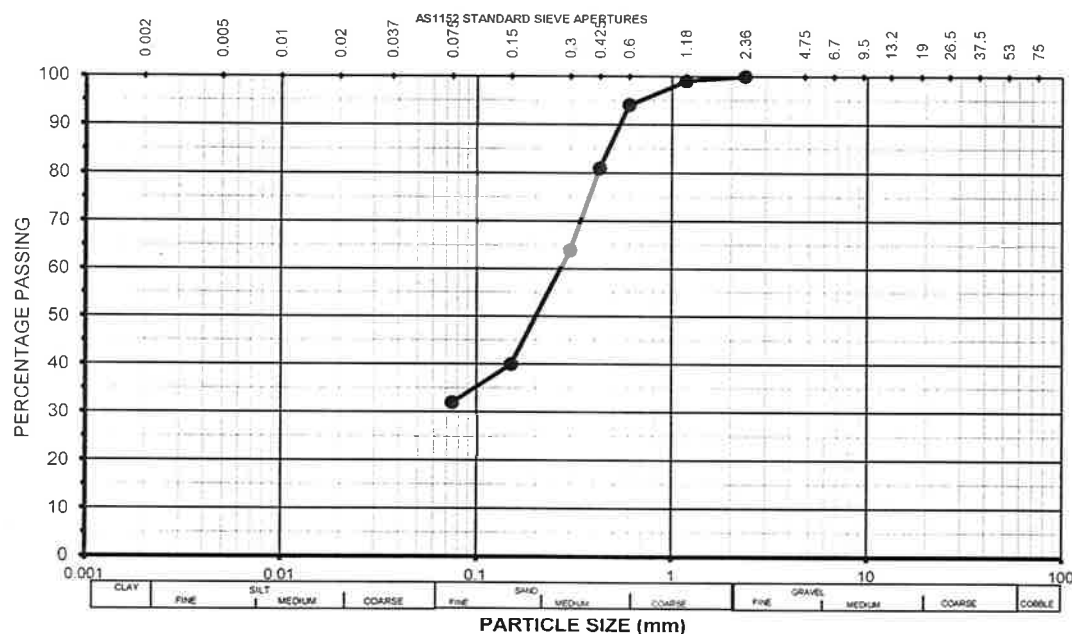
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 4 of 10

Borehole Number: 17  
Depth (m): 4.05-4.50

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

2.36 mm	100
1.18 mm	99
600 µm	94
425 µm	81
300 µm	64
150 µm	40
75 µm	32



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number:1327

Approved Signatory / Date  
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(A. Tatikonda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

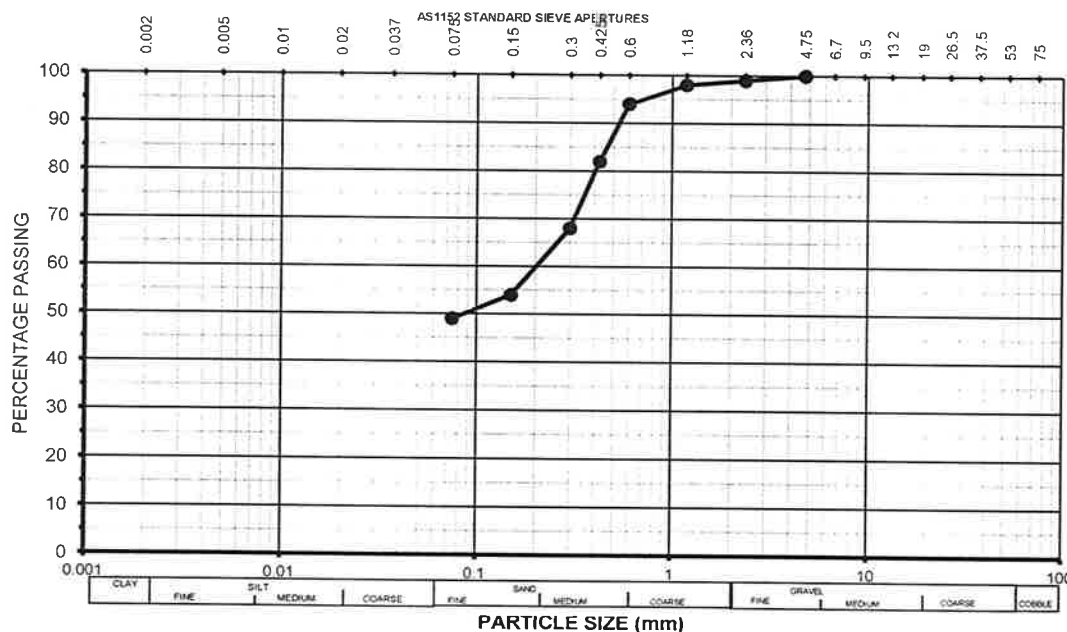
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 5 of 10

Borehole Number: 18  
Depth (m): 8.50-8.95

### **SIEVE ANALYSIS RESULTS**

**SIEVE SIZE % PASSING**

4.75 mm	100
2.36 mm	99
1.18 mm	98
600 µm	94
425 µm	82
300 µm	68
150 µm	54
75 µm	49



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

### **Notes:**

- Please refer to appropriate notes for soil descriptions



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(A. Tatikonda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

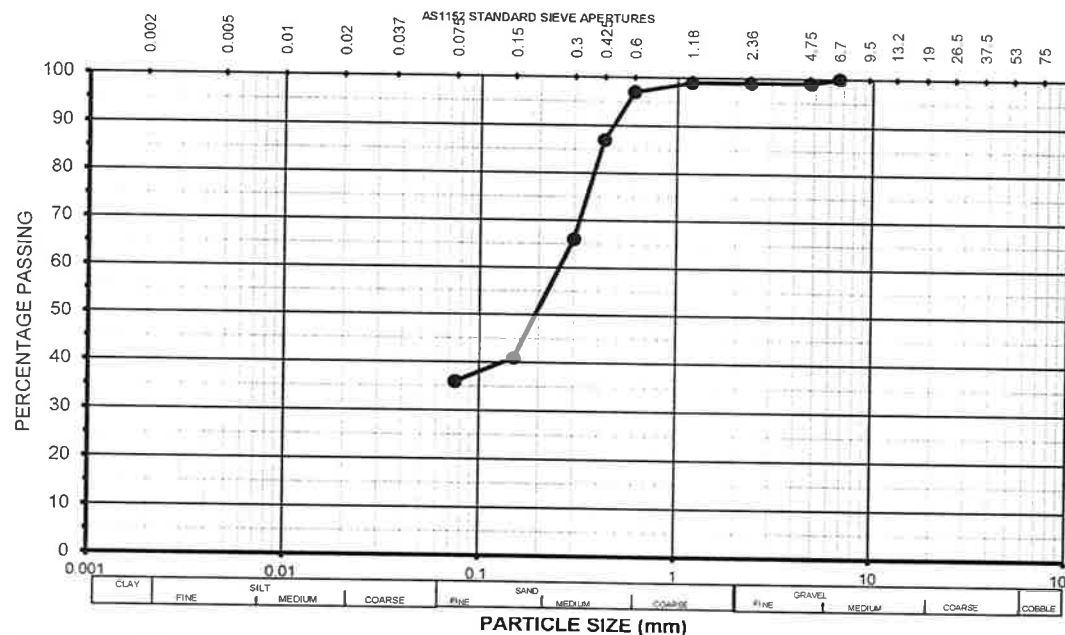
**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 6 of 10

Borehole Number: 20  
Depth (m): 1.20-1.65

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
6.70 mm	100
4.75 mm	99
2.36 mm	99
1.18 mm	99
600 µm	97
425 µm	87
300 µm	66
150 µm	41
75 µm	36



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



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Number: 1327

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*A. Tatikonda* 26/6/17  
(A. Tatikonda)



## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

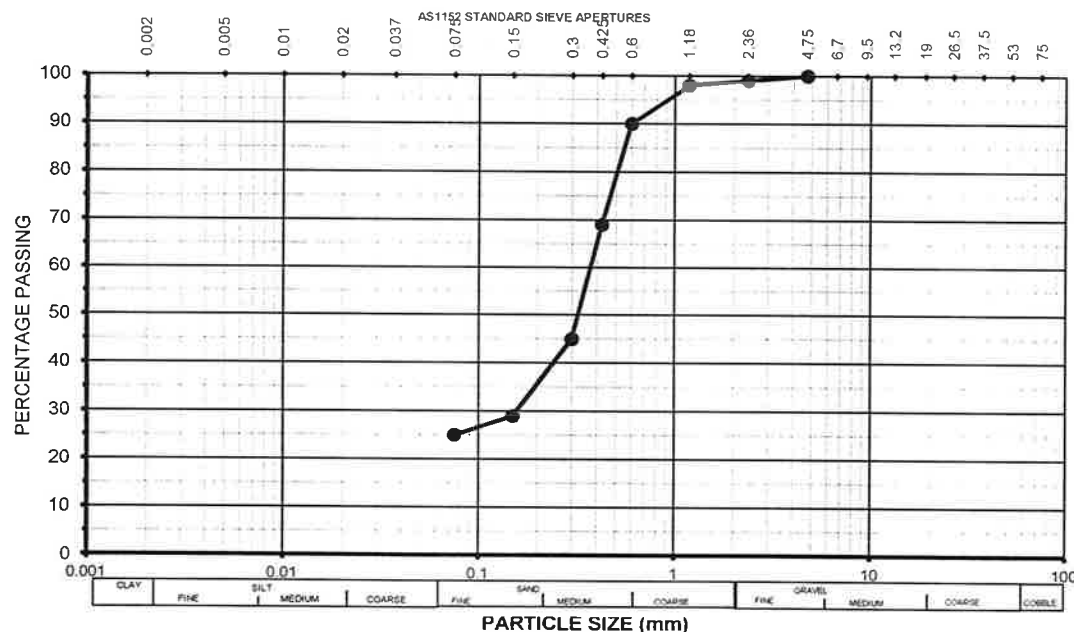
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 7 of 10

Borehole Number: 21  
Depth (m): 5.65-6.10

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

4.75 mm	100
2.36 mm	99
1.18 mm	98
600 µm	90
425 µm	69
300 µm	45
150 µm	29
75 µm	25



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



NATA Accredited Laboratory  
Number:1327

Approved Signatory / Date

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(A. Tatikonda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

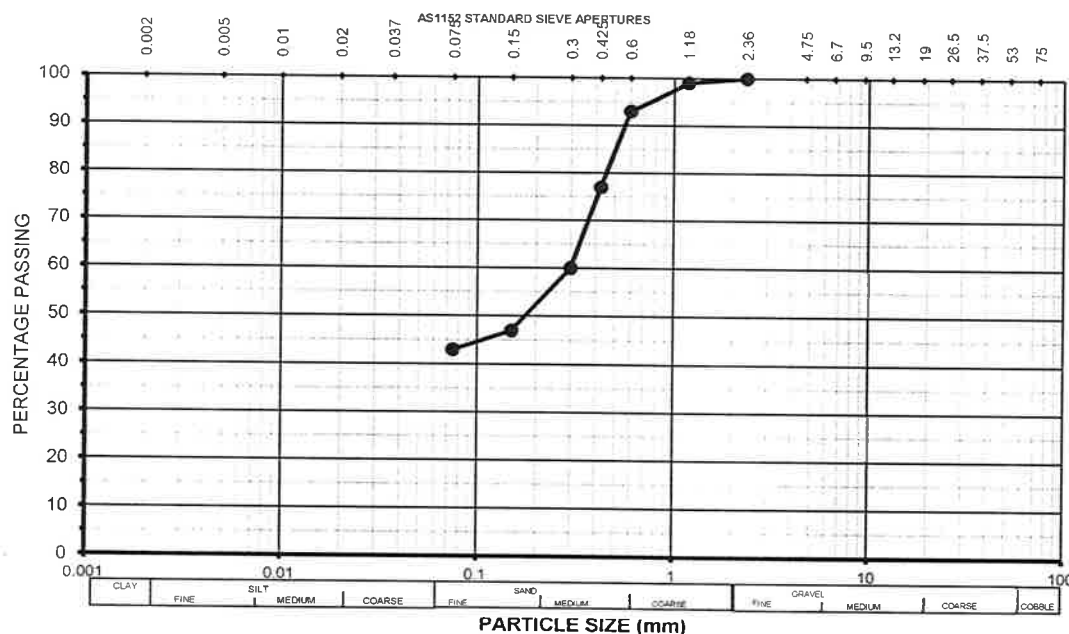
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 8 of 10

Borehole Number: 23  
Depth (m): 5.75-6.20

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

2.36 mm	100
1.18 mm	99
600 µm	93
425 µm	77
300 µm	60
150 µm	47
75 µm	43



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



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Number:1327

Approved Signatory / Date

*A. Tatikenda* 26/6/17

(A. Tatikenda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

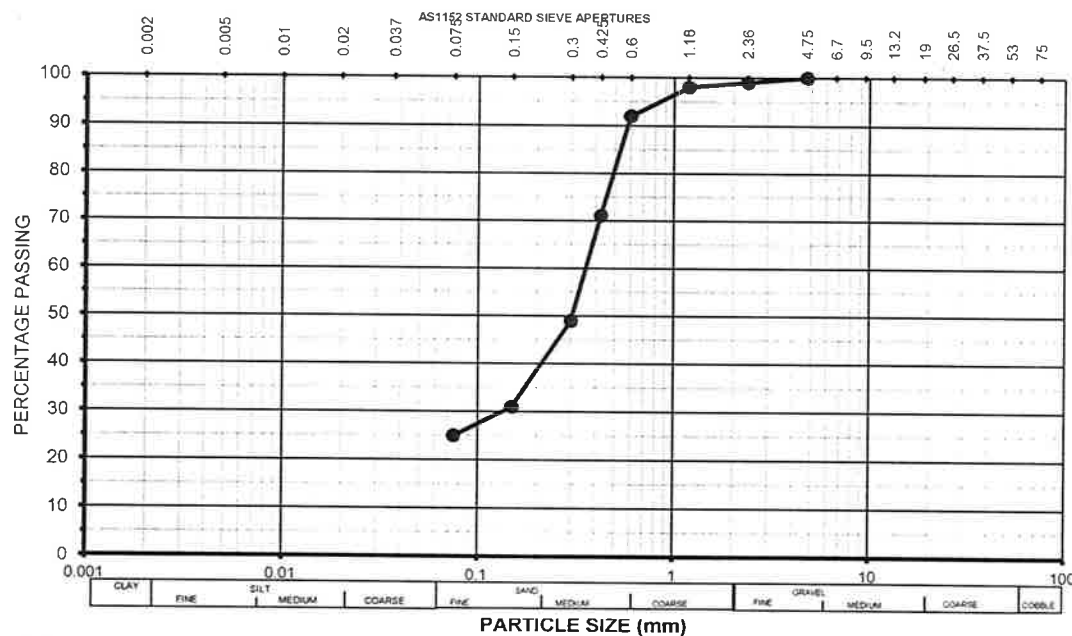
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page:** 9 of 10

**Borehole Number:** 27  
**Depth (m):** 1.50-1.95

### SIEVE ANALYSIS RESULTS

**SIEVE SIZE % PASSING**

4.75 mm	100
2.36 mm	99
1.18 mm	98
600 µm	92
425 µm	71
300 µm	49
150 µm	31
75 µm	25



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



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(A. Tatijonda)

## TABLE B1 PARTICLE SIZE DISTRIBUTION TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

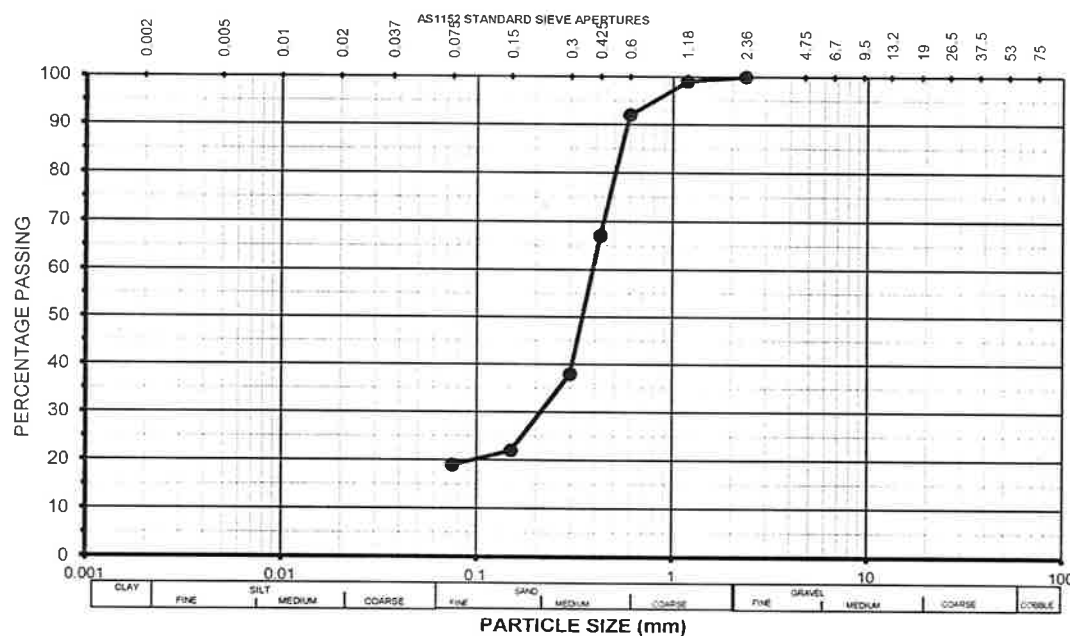
**Ref No:** 29245S  
**Report No:** B1  
**Report Date:** 26/06/2017  
**Page** 10 of 10

Borehole Number: 28  
Depth (m): 6.62-7.07

### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

2.36 mm	100
1.18 mm	99
600 µm	92
425 µm	67
300 µm	38
150 µm	22
75 µm	19



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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(A. Tatikonda)



## TABLE C1 PARTICLE SIZE DISTRIBUTION AND HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 1 of 9

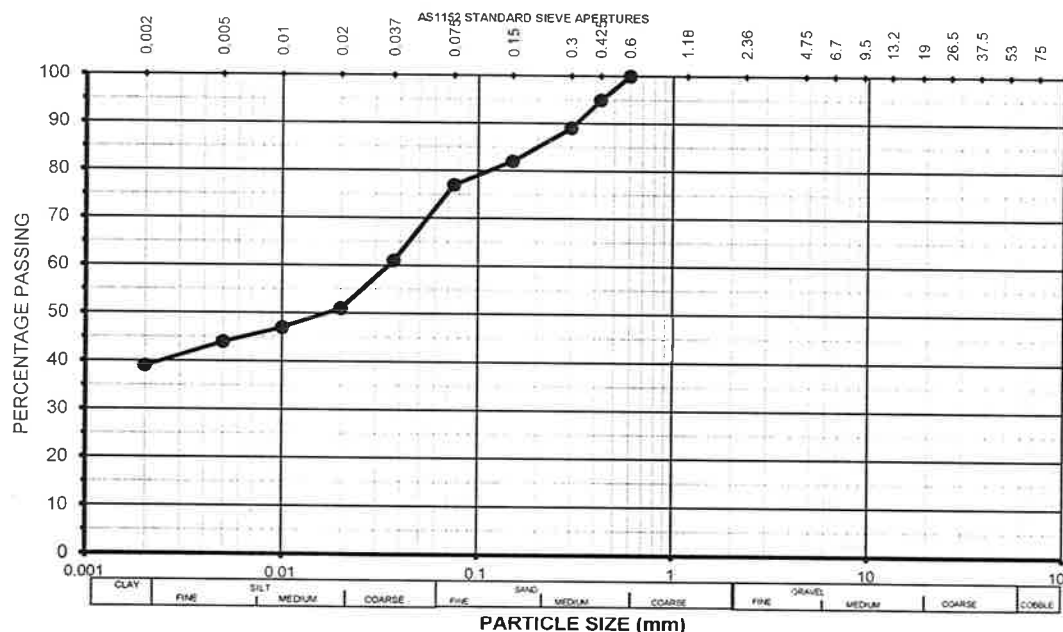
**Borehole Number:** 10  
**Depth (m):** 8.75-9.20

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
600 µm	100
425 µm	95
300 µm	89
150 µm	82
75 µm	77

### HYDROMETER ANALYSIS

37 µm	61
20 µm	51
10 µm	47
5 µm	44
2 µm	39



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### Notes:

- Please refer to appropriate notes for soil descriptions



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Number: 1327

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(A. Tatikonda)

## TABLE C1 PARTICLE SIZE DISTRIBUTION AND HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 2 of 9

Borehole Number: 11  
Depth (m): 4.60-5.10

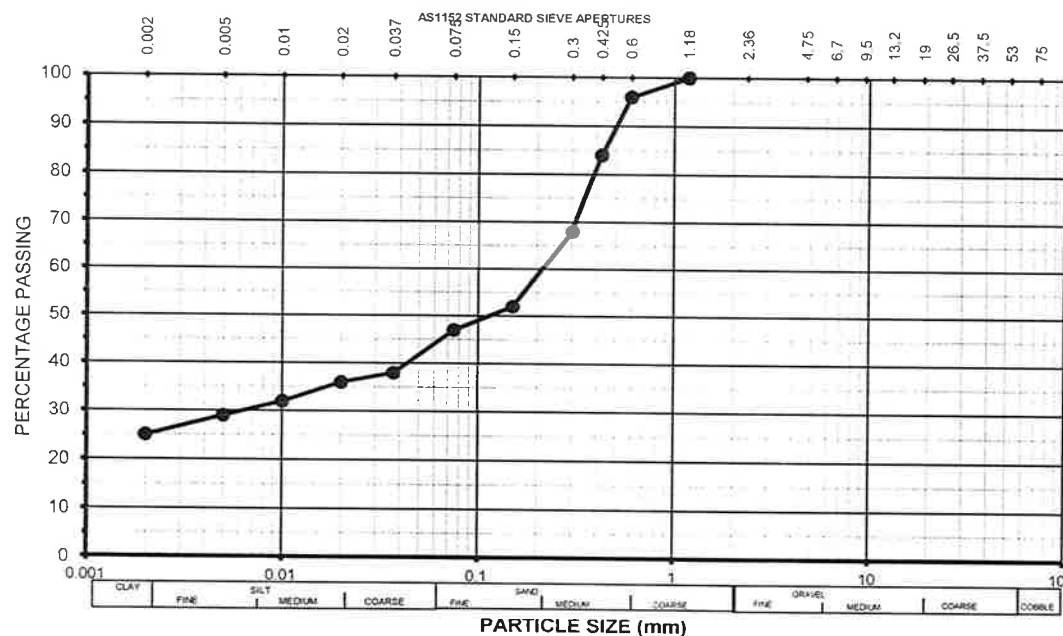
### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

1.18 mm	100
600 µm	96
425 µm	84
300 µm	68
150 µm	52
75 µm	47

### HYDROMETER ANALYSIS

37 µm	38
20 µm	36
10 µm	32
5 µm	29
2 µm	25



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number: 1327

Approved Signatory / Date

*A. Tatikonda* 26/6/17

(A. Tatikonda)

## TABLE C1 PARTICLE SIZE DISTRIBUTION AND HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 3 of 9

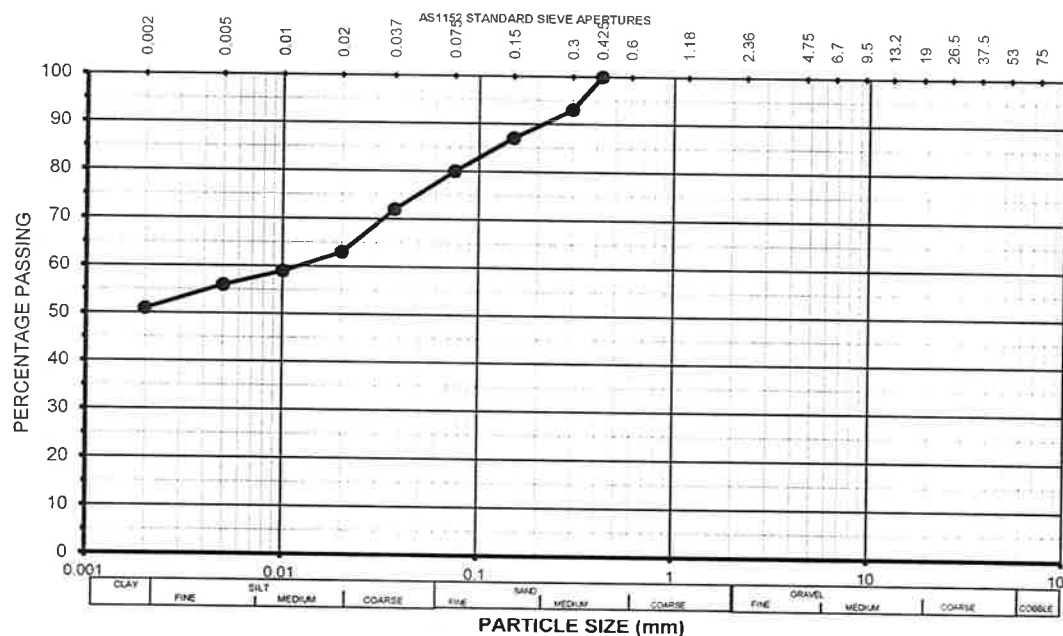
Borehole Number: 12  
Depth (m): 5.75-6.20

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
425 µm	100
300 µm	93
150 µm	87
75 µm	80

### HYDROMETER ANALYSIS

37 µm	72
20 µm	63
10 µm	59
5 µm	56
2 µm	51



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number: 1327

Approved Signatory / Date  
*A. Tatikonda* 26/6/17  
(A. Tatikonda)

## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 4 of 9

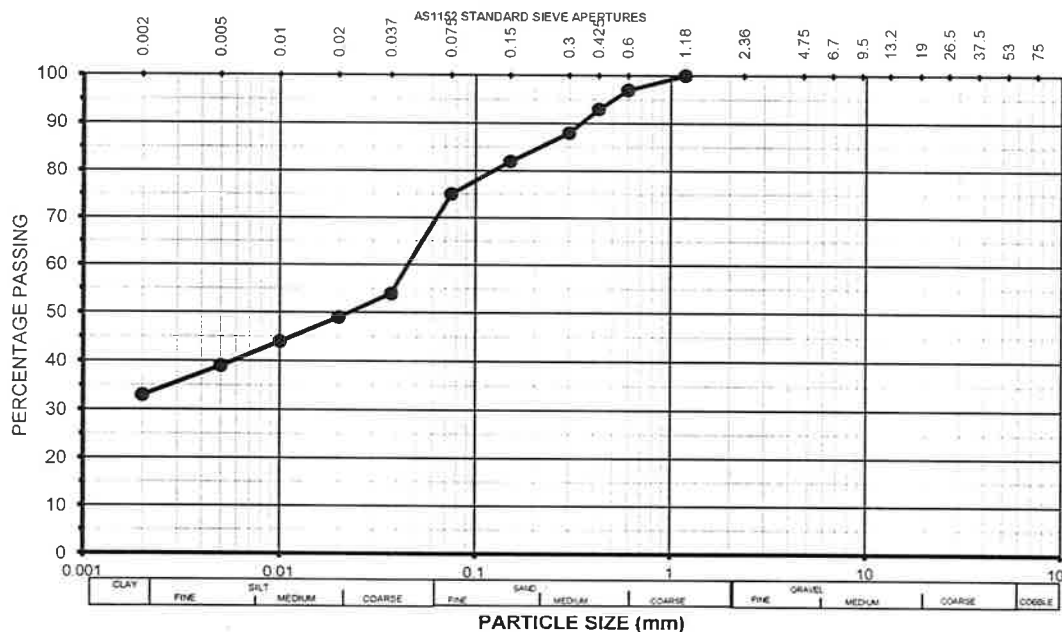
**Borehole Number:** 16  
**Depth (m):** 1.30-1.80

### **SIEVE ANALYSIS RESULTS**

SIEVE SIZE	% PASSING
1.18 mm	100
600 µm	97
425 µm	93
300 µm	88
150 µm	82
75 µm	75

### **HYDROMETER ANALYSIS**

37 µm	54
20 µm	49
10 µm	44
5 µm	39
2 µm	33



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### **• Notes:**

- Please refer to appropriate notes for soil descriptions



NATA Accredited Laboratory  
Number: 1327

Approved Signatory / Date

*A. Tatikonda* 26/6/17  
(A. Tatikonda)

## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 5 of 9

Borehole Number: 18  
Depth (m): 4.00-4.50

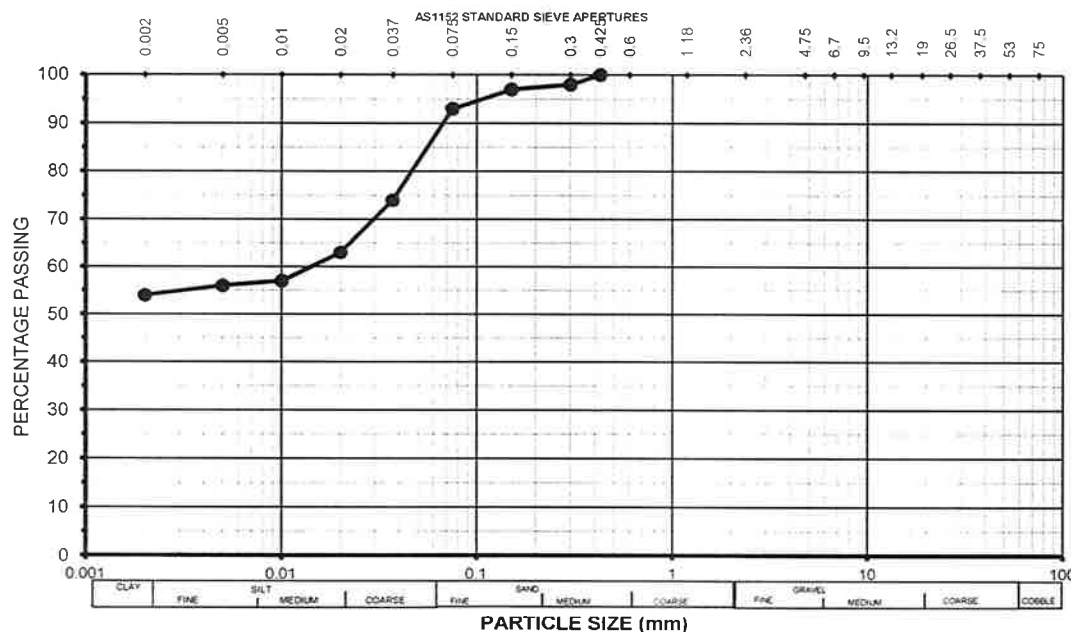
### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

425  $\mu$ m 100  
300  $\mu$ m 98  
150  $\mu$ m 97  
75  $\mu$ m 93

### HYDROMETER ANALYSIS

37  $\mu$ m 74  
20  $\mu$ m 63  
10  $\mu$ m 57  
5  $\mu$ m 56  
2  $\mu$ m 54



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

### • Notes:

- Please refer to appropriate notes for soil descriptions



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Approved Signatory / Date  
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(A. Tatikonda)



## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 6 of 9

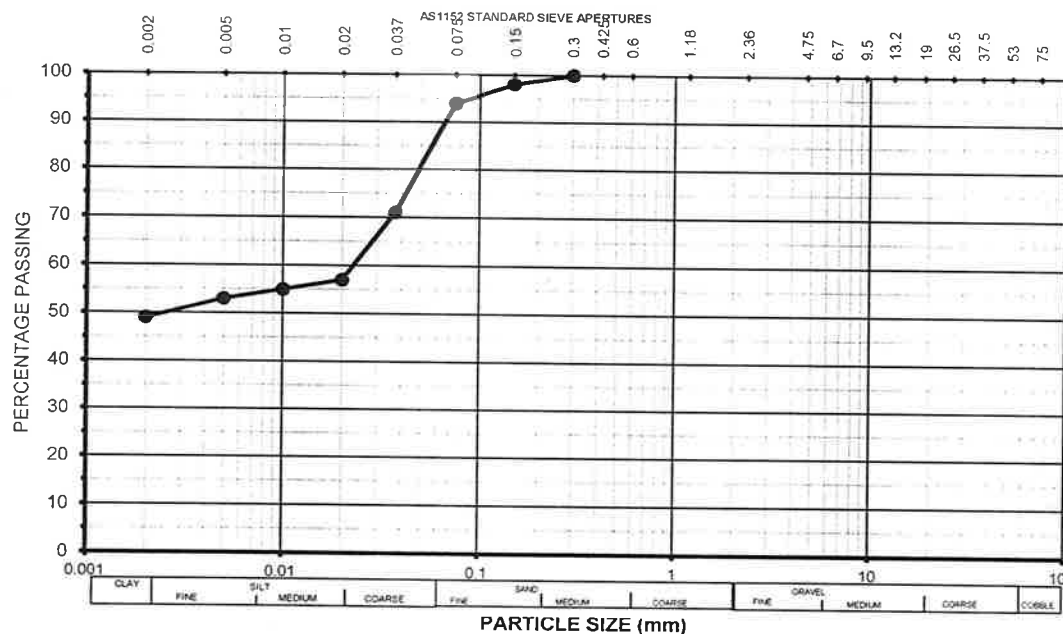
Borehole Number: 19  
Depth (m): 2.90-3.40

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
300 µm	100
150 µm	98
75 µm	94

### HYDROMETER ANALYSIS

37 µm	71
20 µm	57
10 µm	55
5 µm	53
2 µm	49



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number: 1327

Approved Signatory / Date

*A. Tatikonda* 26/6/17  
(A. Tatikonda)

## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 7 of 9

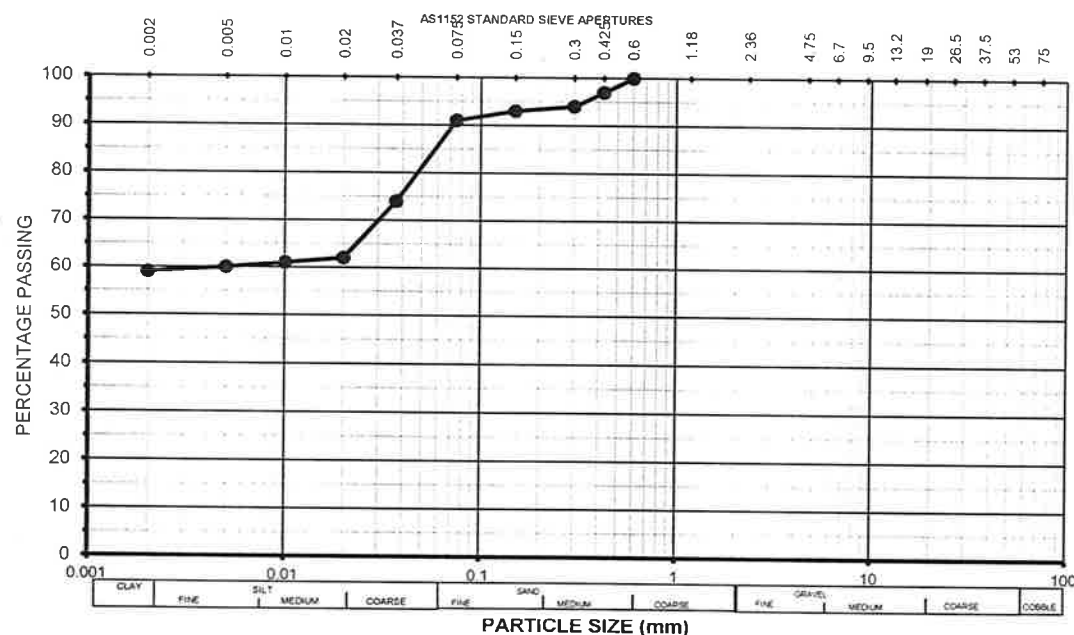
Borehole Number: 21  
Depth (m): 0.00-0.50

### SIEVE ANALYSIS RESULTS

SIEVE SIZE	% PASSING
600 µm	100
425 µm	97
300 µm	94
150 µm	93
75 µm	91

### HYDROMETER ANALYSIS

37 µm	74
20 µm	62
10 µm	61
5 µm	60
2 µm	59



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

### • Notes:

- Please refer to appropriate notes for soil descriptions



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*A. Tatikonda* 26/6/17  
(A. Tatikonda)

## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 8 of 9

Borehole Number: 21  
Depth (m): 1.55-2.05

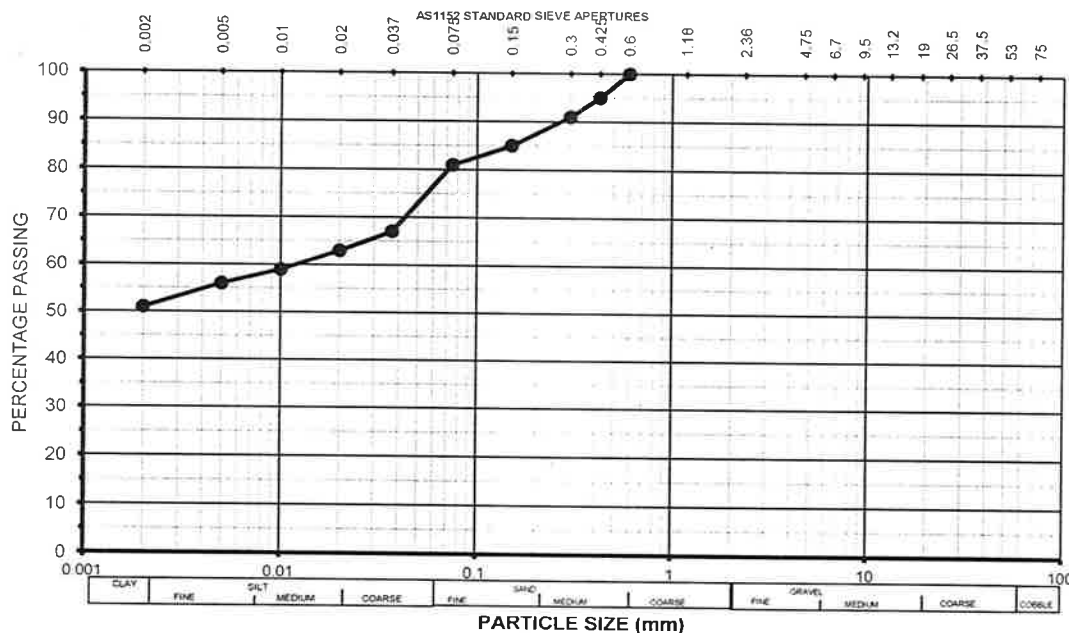
### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

600 µm	100
425 µm	95
300 µm	91
150 µm	85
75 µm	81

### HYDROMETER ANALYSIS

37 µm	67
20 µm	63
10 µm	59
5 µm	56
2 µm	51



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

**• Notes:**

- Please refer to appropriate notes for soil descriptions



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Number: 1327

Approved Signatory / Date  
*[Signature]* 26/6/17  
(A. Tatikonda)

## TABLE C1 HYDROMETER TEST REPORT

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report No:** C1  
**Report Date:** 26/06/2017  
**Page** 9 of 9

Borehole Number: 22  
Depth (m): 0.00-0.50

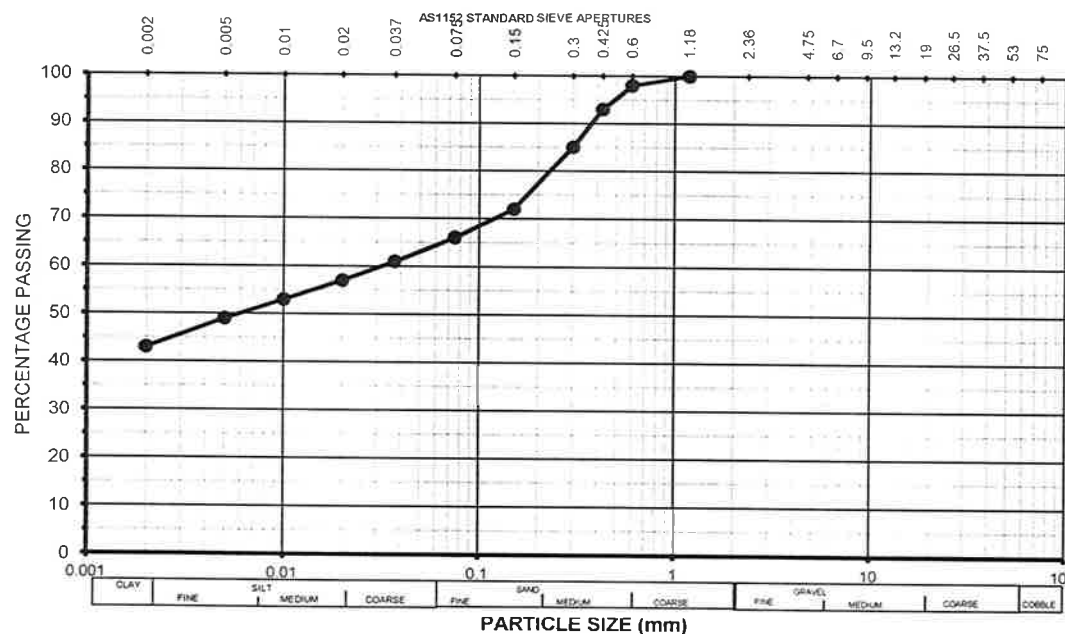
### SIEVE ANALYSIS RESULTS

SIEVE SIZE % PASSING

1.18 mm 100  
600 µm 98  
425 µm 93  
300 µm 85  
150 µm 72  
75 µm 66

### HYDROMETER ANALYSIS

37 µm 61  
20 µm 57  
10 µm 53  
5 µm 49  
2 µm 43



Test Method: AS1289.3.6.1 & 3.6.3 Dry Sieve (washed)

#### • Notes:

- Please refer to appropriate notes for soil descriptions



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Number:1327

Approved Signatory / Date

*A. Tatikonda* 26/6/17  
(A. Tatikonda)

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** D1  
**Report Date:** 19/06/2017  
**Page 1 of 8**

BOREHOLE NUMBER	DEPTH m	$I_s (50)$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)
8	12.74-12.78	0.5	10
	13.33-13.36	0.5	10
	13.67-13.71	1.2	24
	14.13-14.16	0.1	2
	14.47-14.51	0.5	10
	15.00-15.04	1.2	24
9	9.45-9.49	1.0	20
	9.83-9.87	0.5	10
	10.03-10.06	0.5	10
	10.40-10.43	0.3	6
	11.52-11.56	0.2	4
	11.81-11.84	0.6	12
	12.12-12.15	0.6	12
	12.55-12.59	1.0	20
	13.07-13.10	1.3	26
	13.58-13.62	0.3	6
10	11.56-11.61	0.03	1
	11.71-11.75	0.1	2
	12.36-12.40	0.1	2
	12.89-12.93	0.4	8
	13.45-13.49	0.3	6
	14.04-14.08	0.8	16
11	9.46-9.50	0.2	4
	9.79-9.82	0.3	6
	10.32-10.35	0.5	10
	10.84-10.87	0.3	6

**NOTES: See Page 8 of 8**



**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

<b>Client:</b>	JK Geotechnics	<b>Ref No:</b>	29245S
<b>Project:</b>	The Bays Market District	<b>Report:</b>	D1
<b>Location:</b>	Blackwattle Bay, Pyrmont, NSW	<b>Report Date:</b>	19/06/2017

**Page 2 of 8**

BOREHOLE NUMBER	DEPTH m	$I_{s(50)}$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
			(MPa)
11	11.34-11.37	0.6	12
	11.80-11.83	0.8	16
12	15.42-15.46	1.5	30
	15.91-15.94	1.6	32
	16.54-16.57	1.2	24
	17.04-17.07	0.07	1
	17.30-17.33	1.5	30
	17.96-17.99	2.2	44
	18.33-18.37	1.4	28
	18.76-18.81	2.2	44
	19.51-19.54	1.6	32
	20.00-20.04	1.8	36
13	14.14-14.17	1.4	28
	15.05-15.08	2.1	42
	15.63-15.67	0.9	18
	16.00-16.03	1.2	24
	16.56-16.60	1.2	24
	17.04-17.08	1.3	26
	17.58-17.61	0.8	16
14	8.68-8.71	2.7	54
	9.02-9.06	2.4	48
	9.59-9.62	3.2	64
	9.87-9.90	1.5	30
	10.57-10.61	1.4	28
	11.16-11.21	3.2	64
	11.66-11.70	2.6	52

**NOTES: See Page 8 of 8**

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** D1  
**Report Date:** 19/06/2017  
**Page 3 of 8**

BOREHOLE NUMBER	DEPTH m	$I_s (50)$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
			(MPa)
14	12.16-12.20	3.9	78
	12.48-12.52	2.6	52
15	5.52-5.56	1.0	20
	7.02-7.06	0.7	14
	7.53-7.58	3.2	64
	8.72-8.77	2.0	40
	8.93-8.97	2.1	42
	9.23-9.27	1.3	26
	9.68-9.71	2.7	54
	10.53-10.58	2.2	44
	10.71-10.75	0.9	18
	11.30-11.34	1.0	20
	11.64-11.68	3.2	64
	12.21-12.24	1.2	24
	12.65-12.70	2.1	42
	13.18-13.21	2.4	48
	13.60-13.63	4.3	86
	14.19-14.23	1.3	26
16	15.10-15.15	2.5	50
	15.80-15.84	2.4	48
	16.04-16.07	1.1	22
	17.34-17.38	3.5	70
	14.13-14.17	0.2	4
	14.60-14.63	0.5	10
	15.10-15.14	0.6	12
	15.96-16.00	1.1	22

**NOTES: See Page 8 of 8**

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

<b>Client:</b>	JK Geotechnics	<b>Ref No:</b>	29245S
<b>Project:</b>	The Bays Market District	<b>Report:</b>	D1
<b>Location:</b>	Blackwattle Bay, Pyrmont, NSW	<b>Report Date:</b>	19/06/2017

**Page 4 of 8**

BOREHOLE NUMBER	DEPTH m	I <sub>S (50)</sub> MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH (MPa)
16	16.14-16.18	1.0	20
	16.77-16.80	1.2	24
	17.20-17.24	1.0	20
	17.62-17.66	1.8	36
	18.27-18.31	1.2	24
	18.70-18.74	2.0	40
	19.05-19.09	2.2	44
	19.57-19.62	2.3	46
17	7.30-7.33	0.1	2
	7.72-7.75	0.04	1
	8.23-8.27	0.4	8
	8.72-8.75	0.3	6
	9.00-9.04	1.1	22
	9.86-9.90	0.8	16
	10.22-10.26	0.9	18
	10.80-10.84	0.5	10
	11.15-11.18	0.7	14
	11.72-11.76	1.6	32
	12.04-12.08	0.5	10
	14.16-14.20	0.7	14
	14.60-14.63	1.1	22
	15.12-15.16	0.5	10
	15.60-15.64	0.8	16
	16.16-16.20	0.4	8
	16.65-16.69	0.9	18
	17.11-17.15	0.5	10

**NOTES: See Page 8 of 8**

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** D1  
**Report Date:** 19/06/2017  
**Page 5 of 8**

BOREHOLE NUMBER	DEPTH m	$I_s(50)$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
			(MPa)
18	13.76-13.79	0.5	10
	14.05-14.09	0.08	2
	16.40-16.43	2.0	40
	16.82-16.86	1.2	24
	17.30-17.34	1.5	30
	17.76-17.80	2.0	40
	18.30-18.34	2.2	44
	18.88-18.91	2.1	42
	19.13-19.17	2.1	42
	19.43-19.47	2.4	48
19	9.94-9.97	0.5	10
	10.30-10.34	0.6	12
	10.70-10.73	1.0	20
	11.21-11.24	0.9	18
	11.70-11.74	0.9	18
	12.14-12.19	0.7	14
	12.47-12.51	0.8	16
	12.85-12.89	1.3	26
20	13.73-13.77	0.6	12
	14.20-14.23	0.7	14
	14.71-14.75	1.6	32
	15.23-15.27	2.3	46
	15.68-15.71	1.3	26
	16.13-16.16	2.6	52
	16.57-16.61	1.8	36

**NOTES: See Page 8 of 8**

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

<b>Client:</b>	JK Geotechnics	<b>Ref No:</b>	29245S
<b>Project:</b>	The Bays Market District	<b>Report:</b>	D1
<b>Location:</b>	Blackwattle Bay, Pyrmont, NSW	<b>Report Date:</b>	19/06/2017

**Page 6 of 8**

BOREHOLE NUMBER	DEPTH m	$I_{s(50)}$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
			(MPa)
21	12.57-12.61	0.7	14
	13.00-13.04	1.5	30
	13.52-13.56	1.1	22
	14.02-14.06	2.2	44
	14.48-14.52	2.0	40
	14.80-14.84	0.2	4
	15.00-15.04	0.7	14
22	9.42-9.45	0.1	2
	9.93-9.98	0.3	6
	10.22-10.25	0.2	4
	10.70-10.72	0.1	2
	10.73-10.76	0.08	2
	10.86-10.89	1.4	28
	12.14-12.17	0.6	12
	12.56-12.60	1.1	22
	13.18-13.21	1.5	30
	13.64-13.68	1.4	28
	14.08-14.11	0.6	12
	14.61-14.64	1.4	28
23	15.12-15.15	1.0	20
	10.14-10.18	0.5	10
	10.52-10.56	0.6	12
	11.14-11.18	0.8	16
	11.54-11.58	0.7	14
	12.16-12.19	1.2	24

**NOTES: See Page 8 of 8**



**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

<b>Client:</b>	JK Geotechnics	<b>Ref No:</b>	29245S
<b>Project:</b>	The Bays Market District	<b>Report:</b>	D1
<b>Location:</b>	Blackwattle Bay, Pyrmont, NSW	<b>Report Date:</b>	19/06/2017

**Page 7 of 8**

BOREHOLE NUMBER	DEPTH m	$I_{S(50)}$	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
		MPa	(MPa)
23	12.51-12.54	1.0	20
	13.03-13.07	1.4	28
24	5.78-5.82	0.08	2
	6.17-6.20	0.6	12
	6.33-6.37	0.2	4
	6.80-6.84	0.6	12
	7.24-7.27	0.9	18
	7.70-7.74	0.9	18
	8.00-8.04	0.8	16
25	3.21-3.25	0.2	4
	5.61-5.65	0.04	1
	5.91-5.94	0.1	2
	6.06-6.09	0.3	6
	6.52-6.56	0.5	10
	7.17-7.21	0.5	10
	7.89-7.93	0.1	2
	8.20-8.23	0.5	10
	8.64-8.68	0.2	4
	9.10-9.14	0.8	16
	9.53-9.56	1.0	20
26	10.03-10.06	1.1	22
	9.35-9.39	0.4	8
	9.92-9.96	0.2	4
	10.18-10.22	0.5	10
	10.66-10.70	0.9	18

**NOTES: See Page 8 of 8**

**TABLE D1**  
**POINT LOAD STRENGTH INDEX TEST REPORT**

<b>Client:</b>	JK Geotechnics	<b>Ref No:</b>	29245S
<b>Project:</b>	The Bays Market District	<b>Report:</b>	D1
<b>Location:</b>	Blackwattle Bay, Pyrmont, NSW	<b>Report Date:</b>	19/06/2017

**Page 8 of 8**

BOREHOLE NUMBER	DEPTH m	$I_{S(50)}$ MPa	ESTIMATED UNCONFINED COMPRESSIVE STRENGTH
			(MPa)
26	11.14-11.18	0.9	18
	11.54-11.58	0.7	14
	11.89-11.93	1.4	28
	12.08-12.12	1.3	26
	12.24-12.27	0.5	10
	12.38-12.42	0.9	18
27	5.41-5.44	0.7	14
	5.82-5.86	0.8	16
	6.30-6.34	0.8	16
	6.77-6.81	0.6	12
	7.33-7.37	1.1	22
	7.78-7.82	1.0	20
	8.25-8.29	0.9	18
28	8.21-8.24	0.04	1
	8.59-8.63	0.08	2
	10.25-10.29	0.3	6
	10.75-10.79	0.3	6
	11.21-11.24	0.9	18
	11.65-11.68	1.4	28
	12.22-12.25	1.2	24
	12.67-12.70	1.4	28

**NOTES:**

1. In the above table testing was completed in the Axial direction.
2. The above strength tests were completed at the 'as received' moisture content.
3. Test Method: RMS T223.
4. For reporting purposes, the  $I_{S(50)}$  has been rounded to the nearest 0.1MPa, or to one significant figure if less than 0.1MPa
5. The Estimated Unconfined Compressive Strength was calculated from the point load Strength Index by the following approximate relationship and rounded off to the nearest whole number :

$$U.C.S. = 20 I_{S(50)}$$



**SOIL TEST SERVICES**

ABN 43 002 145 173

**TABLE E1**  
**EMERSON CLASS NUMBER TEST REPORT**

**Client:** JK Geotechnics  
**Project:** The Bays Market District  
**Location:** Blackwattle Bay, Pyrmont, NSW

**Ref No:** 29245S  
**Report:** E1  
**Report Date:** 26/06/2017  
**Page 1 of 1**

BOREHOLE NUMBER	DEPTH (m)	Air dried soil crumbs in water	Remoulded soil samples in water	Calcite or Gypsum present/absent	1: 5 Soil/Water Suspension	Emerson Class Number
9	6.60-7.15	Slaking (No Dispersion)	No Dispersion	Present	NA	4
11	1.60-2.05	Slaking (No Dispersion)	No Dispersion	Present	NA	4
14	4.00-4.30	No Slaking (Swelling)	NA	NA	NA	7
18	0.37-0.82	Slaking (Some Dispersion) (Slight)	NA	NA	NA	2
21	0.00-0.50	Slaking (No Dispersion)	No Dispersion	Present	NA	4
23	5.75-6.20	Slaking (Some Dispersion) (Slight)	NA	NA	NA	2
24	1.00-1.45	Slaking (No Dispersion)	No Dispersion	Present	NA	4
24	3.87-4.32	Slaking (Some Dispersion) (Slight)	NA	NA	NA	2
26	1.90-2.35	Slaking (Some Dispersion) (Slight)	NA	NA	NA	2
28	2.00-2.45	Slaking (No Dispersion)	No Dispersion	Present	NA	4

**NOTES:**

- The lowest Emerson Class Number refers to the highest dispersion potential (Range: Class 1 to Class 8)
- Test Method: AS 1289 3.8.1-1997
- All contact water was distilled water, water temperature was 18-19°C & 12°C
- Vigorous Shaking causes Dispersion/Flocculation
- Refer to appropriate notes for soil descriptions
- NA refers to not applicable
- Date of receipt of samples: 1/03/2017 & 8/06/2017



NATA Accredited Laboratory  
Number:1327

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Authorised Signature / Date  
(A. Tatikonda) 26/6/17

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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

## CERTIFICATE OF ANALYSIS

163579

### Client:

**JK Geotechnics**  
PO Box 976  
North Ryde BC  
NSW 1670

**Attention:** O Fraser

### Sample log in details:

Your Reference:	<b>29245S, Pyrmont</b>
No. of samples:	7 soils
Date samples received / completed instructions received	15/03/17 / 15/03/17

### 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.

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

### Report Details:

Date results requested by: / Issue Date:	22/03/17 / 21/03/17
Date of Preliminary Report:	Not Issued

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

### Results Approved By:

David Springer  
General Manager



Envirolab Reference: 163579  
Revision No: R 00

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	163579-1 17	163579-2 20	163579-3 21	163579-4 23	163579-5 26
Depth	-----	5.62-6.07	4.15-4.6	5.65-6.1	1.5-1.95	1.95-2.36
Date Sampled		28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/03/2017	17/03/2017	17/03/2017	17/03/2017	17/03/2017
Date analysed	-	17/03/2017	17/03/2017	17/03/2017	17/03/2017	17/03/2017
pH 1:5 soil:water	pH Units	8.1	7.3	5.2	4.8	8.5
Electrical Conductivity 1:5 soil:water	µS/cm	1,600	2,200	1,400	3,400	1,900
Chloride, Cl 1:5 soil:water	mg/kg	2,500	3,100	2,200	5,900	3,100
Sulphate, SO4 1:5 soil:water	mg/kg	330	310	320	1,000	110

Misc Inorg - Soil Our Reference: Your Reference	UNITS ----- -	163579-6 28	163579-7 BH21
Depth	-----	2.0-2.45	1.1-1.5
Date Sampled		28/02/2017	28/02/2017
Type of sample		Soil	Soil
Date prepared	-	17/03/2017	17/03/2017
Date analysed	-	17/03/2017	17/03/2017
pH 1:5 soil:water	pH Units	8.6	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	5,800	3,300
Chloride, Cl 1:5 soil:water	mg/kg	10,000	5,800
Sulphate, SO4 1:5 soil:water	mg/kg	1,900	590

MethodID	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 Analyser.

**Client Reference: 29245S, Pymont**

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Misc Inorg - Soil						Base    Duplicate    %RPD		
Date prepared	-			17/03/2017	[NT]	[NT]	LCS-1	17/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-1	17/03/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	102%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	LCS-1	95%
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	LCS-1	96%
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	LCS-1	104%
QUALITYCONTROL	UNITS	Dup. Sm#		Duplicate		Spike Sm#	Spike % Recovery	
Misc Inorg - Soil				Base + Duplicate + %RPD				
Date prepared	-	[NT]		[NT]		163579-1	17/03/2017	
Date analysed	-	[NT]		[NT]		163579-1	17/03/2017	
pH 1:5 soil:water	pH Units	[NT]		[NT]		[NR]	[NR]	
Electrical Conductivity 1:5 soil:water	µS/cm	[NT]		[NT]		[NR]	[NR]	
Chloride, Cl 1:5 soil:water	mg/kg	[NT]		[NT]		163579-1	#	
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]		[NT]		163579-1	102%	



**Report Comments:**

Chloride:

# Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier:

Not applicable for this job

Asbestos ID was authorised by Approved Signatory:

Not applicable for this job

INS: Insufficient sample for this test

PQL: Practical Quantitation Limit

NT: Not tested

NR: Test not required

RPD: Relative Percent Difference

NA: Test not required

<: Less than

>: Greater than

LCS: Laboratory Control Sample

### **Quality Control Definitions**

**Blank:** This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

**Duplicate:** This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

**Matrix Spike:** A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

**LCS (Laboratory Control Sample):** This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

**Surrogate Spike:** Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

### **Laboratory Acceptance Criteria**

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: <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.



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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

## CERTIFICATE OF ANALYSIS

**169546**

### Client:

**JK Geotechnics**  
PO Box 976  
North Ryde BC  
NSW 1670

**Attention:** M Serra

### Sample log in details:

Your Reference:	<b><u>29245S, Pyrmont</u></b>
No. of samples:	3 Soils
Date samples received / completed instructions received	20/06/17 / 20/06/17

### 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.

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

### Report Details:

Date results requested by: / Issue Date:	27/06/17 / 26/06/17
Date of Preliminary Report:	Not Issued

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**Tests not covered by NATA are denoted with \*.**

### Results Approved By:

David Springer  
General Manager



Envirolab Reference: 169546  
Revision No: R 00

Misc Inorg - Soil				
Our Reference:	UNITS	169546-1	169546-2	169546-3
Your Reference	-----	BH8	BH9	BH14
	-			
Depth	-----	6.15-6.60	0-0.3	2.3-2.75
Type of sample		Soil	Soil	Soil
Date prepared	-	23/06/2017	23/06/2017	23/06/2017
Date analysed	-	23/06/2017	23/06/2017	23/06/2017
pH 1:5 soil:water	pH Units	6.0	8.0	7.9
Chloride, Cl 1:5 soil:water	mg/kg	1,900	2,900	11,000
Sulphate, SO4 1:5 soil:water	mg/kg	310	1,700	5,700
Resistivity in soil*	ohm cm	670	340	110

MethodID	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-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 Analyser.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity.

**Client Reference: 29245S, Pymont**

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Misc Inorg - Soil						Base II Duplicate II %RPD		
Date prepared	-			23/06/2017	[NT]	[NT]	LCS-1	23/06/2017
Date analysed	-			23/06/2017	[NT]	[NT]	LCS-1	23/06/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	102%
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	LCS-1	98%
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	LCS-1	111%
Resistivity in soil*	ohm cm	1	Inorg-002	<1.0	[NT]	[NT]	[NR]	[NR]

**Report Comments:**

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test

NR: Test not required

<: Less than

PQL: Practical Quantitation Limit

RPD: Relative Percent Difference

>: Greater than

NT: Not tested

NA: Test not required

LCS: Laboratory Control Sample

### **Quality Control Definitions**

**Blank:** This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

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**Surrogate Spike:** Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

### **Laboratory Acceptance Criteria**

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

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

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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.



1 / 3

# BOREHOLE LOG



**Borehole No.**  
**8**  
**2 / 3**

EASTING: 332532  
NORTHING: 6250240

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.50 m  
**Date:** 29/5/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-12			CH	SILTY CLAY: high plasticity, grey.	MC>PL	St - Vst		
					N = 19 10,12,7		8		SC	CLAYEY SAND: fine to coarse grained, grey.	W	MD		
						-13	9							
					N = 28 6,14,14		-14							
						-15	10							
					N=SPT 11/ 100mm REFUSAL		11							NO RECOVERY IN SPT BANDED RESISTANCE ON CASING ADVANCER
						-16	12			SANDSTONE: fine to coarse grained, light grey.	(DW)	(M)		RESISTANCE ON CASING ADVANCER
						-17	13			REFER TO CORED BOREHOLE LOG				
						-18								

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**Borehole No.**

**8**

**3 / 3**

EASTING: 332532  
NORTHING: 6250240

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -4.50 m  
**Date:** 29/5/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 12.47m					
		-17			SANDSTONE: fine to coarse grained, light grey, bedded at 0-10°.	SW	M			(12.58m) XWS, 0°, 1 mm.t
		13								
		-18			as above, but light grey mottled red and yellow brown, with quartz inclusions.		M - H			
		14					L			(13.88m) XWS, 0°, 20 mm.t (14.02m) XWS, 0°, 20 mm.t (14.20m) XWS, 0°, 10 mm.t (14.33m) XWS, 0°, 10 mm.t (14.38m) XWS, 0°, 5 mm.t
		-19			as above, but light grey.	FR	M - H			
		15								
		-20			END OF BOREHOLE AT 15.50 m					(15.38m) XWS, 0°, 3 mm.t
		16								
		-21								
		17								
		-22								
		18								
		-23								

JOB NO: 292455

BH8

START CORING AT: 12.47m

12

13

14

15

EOBH AT 15.50m



**Borehole No.**  
**9**  
**1 / 3**

EASTING: 332545  
NORTHING: 6250192

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -2.08 m  
**Date:** 2/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										FILL: Silty sand, fine to medium grained, dark grey/black, with shell fragments, trace of fine grained river gravel.	W			SLIGHT ORGANIC ODOUR
					N=0 0,0,0	-3	1							SPT SUNK 450mm UNDER WEIGHT OF HAMMER ALONE NO RECOVERY IN SPT
						-4	2							
					N=0 0,0,0	-5	3		CH	SILTY CLAY: high plasticity, dark grey/black, trace of fine to medium grained sand.	MC>PL	VS	<20 <20	SPT SUNK 450mm UNDER WEIGHT OF HAMMER ALONE
														SLIGHT HYDROCARBON ODOUR
					N = 3 0,0,3	-6	4		CL	as above, but medium plasticity, light grey.		St	120 120 140	SPT SUNK 300mm UNDER WEIGHT OF HAMMER ALONE
						-7	5							NO RECOVERY IN U50
					N = 6 3,2,4	-8	6		CH	as above, but with fine to medium grained sand.	MC~PL	VSt	220 240 250	NO RECOVERY IN U50
						-9				SILTY CLAY: high plasticity, light grey mottled red and yellow brown.			210 210 250	





**Borehole No.**  
**9**  
**2 / 3**

EASTING: 332545  
NORTHING: 6250192

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -2.08 m  
**Date:** 2/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
									CH	SILTY CLAY: high plasticity, light grey mottled red and yellow brown. (continued)	MC~PL	VSt		
					N = 6 4,4,2	-10	8		SC	CLAYEY SAND: fine to coarse grained, light grey.	W	L		
						-11	9			SANDSTONE: fine to coarse grained, light grey.	SW	(M)		RESISTANCE ON CASING ADVANCER
						-12	10			REFER TO CORED BOREHOLE LOG				
						-13	11							
						-14	12							
						-15	13							
						-16								



**Borehole No.**  
**9**  
**3 / 3**

EASTING: 332545  
NORTHING: 6250192

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -2.08 m  
**Date:** 2/6/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 9.38m					
			-12	10	SANDSTONE: fine to coarse grained, light grey, with dark grey laminae, bedded at 5-10°, with quartz inclusions.	FR	M			(10.16m) XWS, 5°, 60 mm.t (10.31m) XWS, 5°, 10 mm.t (10.40m) XWS, 10°, 50 mm.t (10.46m) XWS, 5°, 15 mm.t
			-13	11	CORE LOSS 0.96m					
			-14	12	SANDSTONE: fine to coarse grained, light grey, with dark grey laminae, bedded at 5-10°.	FR	M			(12.06m) XWS, 5°, 5 mm.t
			-15	13	as above, but light grey mottled red and yellow brown.					(13.28m) XWS, 0°, 3 mm.t (13.36m) XWS, 0°, 5 mm.t (13.51m) XWS, 0°, 25 mm.t
			-16	14	END OF BOREHOLE AT 13.79 m					
			-17	15						
			-18							

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JOB NO: 292455

BH9

START CORING AT: 9.38m

9

10

CORE LOSS: 0.96m

11

12

13

EOBH AT 13.7m



1 / 3

# BOREHOLE LOG

[illegible]



**Borehole No.**  
**10**  
**2 / 3**

EASTING: 332631  
NORTHING: 6250245

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -3.65 m  
**Date:** 1/6/17 TO 2/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 8 2,3,5	-11			CH	SILTY CLAY: high plasticity, light grey mottled red and yellow brown. (continued) as above, but grey.	MC>PL	VSt		
					N = 14 4,6,8	-12							320 350 330	
					N = 14 4,7,7	-13								
						-14								NO RECOVERY IN SPT
						-15				SANDSTONE: fine to medium grained, yellow brown and light grey.	DW	(L - M)		RESISTANCE OF CASING ADVANCER
						-16				REFER TO CORED BOREHOLE LOG				
						-17								



**Borehole No.**  
**10**  
**3 / 3**

EASTING: 332631  
NORTHING: 6250245

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -3.65 m  
**Date:** 1/6/17 TO 2/6/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>s</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-15			START CORING AT 11.37m					
			12		SANDSTONE: fine to medium grained, yellow brown mottled red brown and light grey, bedded at 0-10°.	DW	VL			(11.47m) Be, 0°, P, R, IS
							L			
		-16								
			13				M			(12.73m) XWS, 0°, 5 mm.t
		-17			as above, but light grey mottled red and yellow brown.		VL			(13.57m) XWS, 0°, 130 mm.t
			14				M			
		-18			as above, but yellow brown mottled light grey.	SW				
					END OF BOREHOLE AT 14.44 m					
			15							
		-19								
			16							
		-20								
			17							
		-21								

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JK Geotechnics

JOB NO: 292455

BH10

START CORING AT: 11.37m

11

12

13

14

FINISH AT 11.44m



**Borehole No.**  
**11**  
**1 / 3**

EASTING: 332581  
NORTHING: 6250274

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.02 m  
**Date:** 31/5/17 TO 1/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey.				NO RECOVERY IN U50
					N = 9 3,4,5	-8	1							
						-9	2			SILTY CLAY: high plasticity, light grey mottled red and yellow brown.	MC>PL	VSt - H	380 420 450	NO RECOVERY IN U50
						-10	3							
					N = 8 3,3,5	-11	4						360 420 450	
						-12	5		SC	CLAYEY SAND: fine to medium grained, light grey.	W		410 450 440	
						-13	6		CL-CH	SANDY CLAY: medium to high plasticity, grey, with bands of clayey sand.	MC~PL	St	150 160	
					N = 11 3,4,7									





**Borehole No.**  
**11**  
**2 / 3**

EASTING: 332581  
NORTHING: 6250274

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.02 m  
**Date:** 31/5/17 TO 1/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 32 8,13,19	-15	8		CL-CH	SANDY CLAY: medium to high plasticity, grey, with bands of clayey sand. (continued)	MC-PL	St		NO RECOVERY IN U50
						-16	9		SP	SAND: medium to coarse grained, light grey, with silt and clay.	W	D		
						-16	9			SANDSTONE: fine to coarse grained, light grey and yellow brown.	XW - DW	(EL - M)		BANDED RESISTANCE ON CASING ADVANCER
						-17	10			REFER TO CORED BOREHOLE LOG				
						-18	11							
						-19	12							
						-20	13							



**Borehole No.**  
**11**  
**3 / 3**

EASTING: 332581  
NORTHING: 6250274

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -7.02 m  
**Date:** 31/5/17 TO 1/6/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-16	9		START CORING AT 9.14m					
		-17	10		SANDSTONE: fine to coarse grained, light grey and yellow brown mottled red brown, bedded at 0-10°, with quartz inclusions.	SW	L - M			
		-18	11		SANDSTONE: fine to coarse grained, light grey, with dark grey laminae, bedded at 0-5°.	FR	M			(10.90m) XWS, 0°, 5 mm.t (11.07m) J, 80°, P, R, IS (11.26m) XWS, 0°, 10 mm.t
		-19	12		END OF BOREHOLE AT 12.13 m					
		-20	13							
		-21	14							

JOB NO: 292455

BH11

START CORING AT: 9.14m

9

10

11

12

FINISH AT 12.13m





**Borehole No.**  
**12**  
**1 / 4**

EASTING: 332658  
NORTHING: 6250307

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.39 m  
**Date:** 30/5/17 TO 31/5/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
							-7		CH	SILTY CLAY: high plasticity, dark grey.	MC>PL	(VS)		NO RECOVERY IN U50
					N=0 0,0,0		-8					(VS)		SPT SUNK 450mm UNDER WEIGHT OF HAMMER
							-9							NO RECOVERY IN SPT
							-10			SILTY CLAY: high plasticity, grey mottled red and yellow brown.				
					N = 7 2,3,4		-11					VSt	310 250 240	
							-12							
					N = 15 5,6,9		-13			as above, but with fine to medium grained sand.			250 270 320	



**Borehole No.**  
**12**  
**2 / 4**

EASTING: 332658  
NORTHING: 6250307

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.39 m  
**Date:** 30/5/17 TO 31/5/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 7 2,3,4				CH	as above, but with fine to medium grained sand. (continued)	MC>PL	VSt	240 250 270	
						-14	8		CH / SC	INTERBEDDED SANDY CLAY: high plasticity, dark grey, fine to coarse grained sand and CLAYEY SAND: fine to coarse grained, dark grey.	MC>PL / W	(St / MD)		
					N = 18 2,5,13		9					St / MD	150 120	
						-16	10							
					N=0 0,0,0		-17		CH	SILTY CLAY: high plasticity, dark grey.	MC>PL	S	90 70 90	SPT SUNK 450mm UNDER WEIGHT OF HAMMER
						-18	11							
						-19	12		SP	SAND: medium to coarse grained, light grey and grey, trace of possible boulders.	W	(L - MD)		BANDED RESISTANCE ON CASING ADVANCER
					N = 19 2,8,11		-20					MD		



**Borehole No.**  
**12**  
**3 / 4**

EASTING: 332658  
NORTHING: 6250307

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.39 m  
**Date:** 30/5/17 TO 31/5/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering (XW - DW)	Strength/ Rel Density (EL - M)	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-21				SANDSTONE: fine to coarse grained, light grey, brown and red brown.	(XW - DW)	(EL - M)		BANDED RESISTANCE ON CASING ADVANCER
							15			REFER TO CORED BOREHOLE LOG				
						-22								
						16								
						-23								
						17								
						-24								
						18								
						-25								
						19								
						-26								
						20								
						-27								

**Borehole No.**

**12**

**4 / 4**

EASTING: 332658  
NORTHING: 6250307

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -6.39 m  
**Date:** 30/5/17 TO 31/5/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-21			START CORING AT 14.65m					
			15		CORE LOSS 0.40m					
					SANDSTONE: fine to coarse grained, light grey and yellow brown, with quartz inclusions.	DW	M - H			(15.05m) J, 75°, Un, R (15.12m) XWS, 0°, 15 mm.t
			-22		as above, but light grey, with dark grey laminae, bedded at 0-5°.	SW				
			16							(16.19m) J, 80°, P, R
			-23							(16.77m) J, 80°, Un, R
			17							(16.98m) XWS, 0°, 60 mm.t (17.14m) XWS, 0°, 30 mm.t
			-24			FR	H			(17.42m) XWS, 0°, 10 mm.t
			18							
			-25							(18.80m) XWS, 0°, 2 mm.t
			19							
			-26							
			20							
		-27			END OF BOREHOLE AT 20.54 m					

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JOB NO: 29245S

BH 12

START CORING AT: 14.55m

14

CORE LOSS: 0.4m

15

16

17

18

19

20

EOBH AT 20.54m



1 / 3

# BOREHOLE LOG

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
						-8		CH	SILTY CLAY: high plasticity, dark grey, trace of fine to medium grained sand.	MC>PL	(VS)		SLIGHT HYDROCARBON ODOUR	
				N = 6 2,2,4		-9			as above, but grey mottled red brown and yellow.		(St - VSt)		NO RECOVERY IN SPT	
				N = 6 3,3,3		-10							NO RECOVERY IN SPT	
						-11					VSt	220 250		
				N = 6 2,2,4		-12			as above, but grey.			250 270 330		
				N = 6 2,2,4		-13			SILTY CLAY: high plasticity, grey, with sandy clay bands.			250 300 310		
						-14								



**Borehole No.**  
**13**  
**2 / 3**

EASTING: 332635  
NORTHING: 6250360

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.29 m  
**Date:** 30/5/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS								
						CH	SILTY CLAY: high plasticity, grey, with sandy clay bands. <i>(continued)</i>	MC>PL	VSt	220 250 240	
				-15	8						
						SC	CLAYEY SAND: fine to coarse grained, grey.	W	MD		
				-16	9						
				-17	10						
				-18	11	CH	SANDY CLAY: high plasticity, grey, with clayey sand bands.	MC>PL	VSt	250 220	
				-19	12						
						SC	CLAYEY SAND: medium to coarse grained, grey and yellow brown, with bands of XW sandstone.	W			
				-20	13						
				-21							

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**Borehole No.**  
**13**  
**3 / 3**

EASTING: 332635  
NORTHING: 6250360

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S      **Core Size:** NMLC      **R.L. Surface:** -7.29 m  
**Date:** 30/5/17      **Inclination:** VERTICAL      **Datum:** AHD  
**Plant Type:** JK305      **Bearing:** N/A      **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-21			START CORING AT 13.96m					
			14		SANDSTONE: fine to medium grained, light grey and yellow brown.	SW	H			(14.14m) Be, 0°, P, R (14.27m) J, 0°, P, R
					CORE LOSS 0.10m					
		-22			SANDSTONE: fine to medium grained, light grey and yellow brown.	DW	M			(14.59m) XWS, 0°, 5 mm.t (14.66m) XWS, 0°, 40 mm.t (14.72m) J, 80°, P, R (14.80m) XWS, 0°, 80 mm.t (14.88m) J, 80°, P, R
			15		SANDSTONE: fine to coarse grained, light grey, with quartz inclusions.	FR	M - H			
		-23								(15.38m) XWS, 0°, 30 mm.t (15.60m) J, 80°, P, HEALED
			16							
		-24								
			17							
		-25								
			18		END OF BOREHOLE AT 18.00 m					
		-26								
			19							
		-27								

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JOB NO: 292455

BH 13

START CORING AT: 13.96m

14

C.L: 0.1m

15

16

17

END OF BH 13 AT 18.00m

1 / 3

# BOREHOLE LOG

**Logged/Checked By:** M.S./O.F.

K\_LIB\_CURRENT - V8.00.GLB Log J & K AUGERHOLE - MASTER 29245S PYRMONT.GPJ <<DrawingFile>> 07/07/2017 14:56 Produced by gINT Professional, Developed by Datgel



**Borehole No.**  
**14**  
**2 / 3**

EASTING: 332731  
NORTHING: 6250333

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -2.32 m  
**Date:** 5/6/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-10				SANDSTONE: fine to coarse grained, light grey.	(SW)	(M)		RESISTANCE ON CASING ADVANCER
							8			REFER TO CORED BOREHOLE LOG				
						-11								
							9							
						-12								
							10							
						-13								
							11							
						-14								
							12							
						-15								
							13							
						-16								





**Borehole No.**  
**14**  
**3 / 3**

EASTING: 332731  
NORTHING: 6250333

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -2.32 m  
**Date:** 5/6/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-10			START CORING AT 7.73m					
			8		CORE LOSS 0.50m					
		-11			SANDSTONE: fine to coarse grained, light grey, with dark grey laminae, bedded at 0°.	SW	H			(8.23m) J, 80°
			9		as above, but light grey mottled red and yellow brown.					(8.47m) J, 80°, P, R (8.63m) J, 80°, P, R (8.80m) J, 90°, P, R (9.10m) Be, 0°, P, R (9.13m) Be, 0°, P, R (9.16m) J, 90°, P, R (9.24m) XWS, 5°, 15 mm.t
		-12								
			10							(10.02m) J, 85°, P, R (10.17m) J, 80°, Un, R (10.27m) J, 90°, P, R (10.38m) J, 85°, P, R (10.45m) XWS, 60°, 20 mm.t
		-13								
			11		SANDSTONE: fine to medium grained, light grey mottled red and yellow brown, bedded at 5-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H - VH			(10.83m) J, 60°, P, R (10.87m) J, 85°, P, R (11.11m) XWS, 0°, 2 mm.t (11.24m) J, 85°, P, R (11.33m) J, 70°, P, R (11.38m) J, 80°, P, HEALED (11.56m) XWS, 20°, 20 mm.t (11.60m) J, 80°, P, R (11.71m) J, 85°, P, R (11.75m) XWS, 0°, 15 mm.t (11.80m) J, 70°, P, R (12.04m) J, 80°, P, R
		-14								
			12							
		-15								(12.62m) J, 90°, P, R (12.63m) J, 85°, P, R (12.66m) J, 80°, P, R (12.81m) XWS, 0°, 20 mm.t
			13							(13.06m) Be, 30°, P, R (13.14m) J, 90°, P, R (13.22m) J, 80°, Un, R
		-16			END OF BOREHOLE AT 13.40 m					

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JOB NO: 292455

BH14

START CORING AT: 7.73m

7

CORE LOSS: 0.5m

8

9

10

11

12

13

FINISH AT 13.40m





**Borehole No.**  
**15**  
**1 / 3**

EASTING: 332748  
NORTHING: 6250362

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -3.79 m  
**Date:** 14/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-4				FILL: Silty clay, high plasticity, black and dark grey, trace of fine to medium grained sand and coal fragments.	MC>PL	(VS)		NO RECOVERY IN U50
					N=0 0,0,0		1							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-5								
					N=0 0,0,0		2							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-6								
						-7								
					N=0 0,0,0		3							SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-8								
						-9								
					N = 13 5,5,8		4							
						-10								
							5		SC	CLAYEY SAND: fine to medium grained, light grey, trace of fine to coarse grained gravel and shell fragments.	W	MD		
							6			REFER TO CORED BOREHOLE LOG				

**Borehole No.**  
**15**  
**2 / 3**

EASTING: 332748  
NORTHING: 6250362

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -3.79 m  
**Date:** 14/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-9			START CORING AT 5.49m					
					SANDSTONE: fine to medium grained, light grey, yellow and red brown.	DW	M			(5.51m) Be, 0°, P, R (5.53m) J, 75°, Un, R
					CORE LOSS 1.34m					
			6							
			-10							
			7		SANDSTONE: fine to medium grained, light grey mottled yellow brown, with frequent healed and altered joints up to 90°.	DW	H - VH			(7.02m) FRAGMENTED ZONE, 0°, 560 mm.t
			-11		CORE LOSS 0.20m					
			8		SANDSTONE: fine to medium grained, light grey mottled yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H			(7.78m) FRAGMENTED ZONE, 0°, 770 mm.t
			-12							
			9							(8.55m) J, 90°, P, R (8.69m) Be, 0°, P, R (8.72m) J, 75°, P, R (8.88m) J, 45°, P, R (9.05m) J, 60°, P, R (9.10m) J, 90°, P, R (9.26m) XWS, 0°, 50 mm.t (9.31m) J, 90°, Un, R (9.58m) J, 80°, P, R (9.76m) Be, 30°, P, R (9.82m) J, 40°, P, R (9.99m) XWS, 0°, 25 mm.t, P (10.02m) J, 90°, Un, R (10.35m) XWS, 15°, 15 mm.t, P (10.41m) J, 80°, P, R (10.43m) J, 50°, P, R (10.55m) J, 50°, P, R (10.75m) J, 65°, P, R (10.90m) J, 70°, P, R
			-13							
			10							
			-14							
			11		CORE LOSS 0.30m					
			-15		SANDSTONE: fine to medium grained, light grey mottled red and yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H - VH			(11.35m) J, 75°, P, R (11.45m) J, 30°, P, R (11.54m) J, 60°, P, R (11.74m) J, 50°, P, R (11.83m) J, 55°, P, R (11.87m) J, 75°, P, R

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**Borehole No.**  
**15**  
**3 / 3**

EASTING: 332748  
NORTHING: 6250362

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -3.79 m  
**Date:** 14/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-16			SANDSTONE: fine to medium grained, light grey mottled red and yellow brown, bedded at 10-30°, with frequent healed and altered joints up to 90°, occasional vesicles.	DW	H - VH			(11.97m) J, 40°, Un, R (12.02m) J, 30°, P, R (12.03m) J, 60°, P, R (12.11m) J, 50°, P, R (12.20m) Be, 20°, P, R (12.23m) Be, 20°, P, R (12.30m) Be, 20°, P, R (12.30m) Be, 20°, P, R (12.47m) J, 55°, P, R (12.52m) J, 75°, P, R (12.53m) J, 75°, P, R (12.60m) J, 85°, P, R (12.79m) J, 80°, P, R
		-17			as above, but light grey and yellow brown.					(13.31m) J, 90°, P, R (13.44m) J, 90°, Un, R  (13.66m) XWS, 20°, 3 mm.t (13.72m) J, 60°, P, R (13.84m) J, 60°, P, R (13.90m) J, 50°, P, R  (14.05m) XWS, 0°, 5 mm.t (14.07m) J, 60°, P, R (14.26m) J, 70°, P, R (14.32m) J, 70°, P, R  (14.50m) J, 50°, P, R  (14.68m) J, 90°, P, R (14.70m) J, 50°, P, R (14.80m) J, 50°, P, R (14.93m) J, 50°, P, R (15.01m) J, 50°, P, R  (15.17m) J, 75°, Un, R (15.31m) J, 65°, P, R (15.39m) J, 85°, Un, R  (15.60m) J, 80°, P, R
		-18			SANDSTONE: fine grained, light yellow brown, with indistinct bedding at 10-30°.					
		-19								
		-20			DOLERITE: fine grained, green grey.	FR	H			(16.30m) J, 75°, Un, R (16.36m) J, 50°, P, R (16.45m) J, 60°, P, R (16.54m) J, 60°, P, R
					CORE LOSS 0.44m					
		-21			DOLERITE: fine grained, green grey.	FR	H - VH			(17.00m) CS, 0° (17.12m) J, 75°, P, R (17.24m) J, 70°, P, R (17.28m) J, 70°, P, R  (17.44m) J, 50°, P, R (17.49m) FRAGMENTED ZONE, 0°, 460 mm.t
					as above, but grey.					
		-22			END OF BOREHOLE AT 17.90 m					



JOB No: 29245S

BM15

START CORING AT: 5.49m

5

CORE

6

LOSS: 1.34m

7

CORE LOSS: 0.20m

8

9

10

11

CORE LOSS: 0.3m

12

13

14

15

16

CORE LOSS: 0.44m

17

FINISH AT 17.90m



**Borehole No.**  
**16**  
1 / 4

EASTING: 332508  
NORTHING: 6250253

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.12 m  
**Date:** 6/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 8 3,3,5	-6	1		CL	SILTY CLAY: medium plasticity, light grey, trace of fine grained sand.	MC>PL	St	180 190 190	
						-7	2							
					N = 9 4,4,5	-8	3		CH	SANDY CLAY: high plasticity, light grey, fine to medium grained sand.	MC>PL	VSt	220 220 240	
						-9	4			SILTY CLAY: high plasticity, grey mottled red and yellow brown.			240 250 250	
					N = 11 5,5,6	-10	5							
						-11	6			as above, but grey.			240 250 220	
					N = 7 3,3,4	-12								

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**Borehole No.**  
**16**  
**2 / 4**

EASTING: 332508  
NORTHING: 6250253

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.12 m  
**Date:** 6/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 26 9,16,10				CH	SANDY CLAY: high plasticity, grey.	MC>PL	St	140 150 140	
							-13	8	SC	CLAYEY SAND: fine to medium grained, grey, with sandy clay bands.	W	MD		
					N = 22 9,11,11					as above, but grey mottled yellow brown.				
							-14	9				L		
					N = 7 5,3,4									
							-15	10						
							-16	11						
					N = 9 2,5,4									
							-17	12						
					N = 42 7,21,21							D		
							-18	13						
							-19			SANDSTONE: fine to medium grained, light grey.	DW	(M)		RESISTANCE ON CASING ADVANCER





**Borehole No.**  
**16**  
**3 / 4**

EASTING: 332508  
NORTHING: 6250253

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.12 m  
**Date:** 6/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
										SANDSTONE: fine to medium grained, light grey.	DW	(M)		
										REFER TO CORED BOREHOLE LOG				
							-20	15						
							-21	16						
							-22	17						
							-23	18						
							-24	19						
							-25	20						
							-26							

**Borehole No.**  
**16**  
**4 / 4**

EASTING: 332508  
NORTHING: 6250253

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -5.12 m  
**Date:** 6/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.  START CORING AT 14.13m	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$ EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.  Specific General
									500 300 100 50 30 10	
			-20		SANDSTONE: fine to medium grained, light grey.	SW	L			
			15		as above, but with dark grey lenses bedded at 0-5°.		M			<ul style="list-style-type: none"> <li>(14.33m) Be, 0°, P, R, IS</li> <li>(14.41m) J, 40°, P, R</li> <li>(14.48m) Be, 0°, P, R, IS</li> <li>(14.52m) Be, 0°, P, R, IS</li> <li>(14.59m) Be, 0°, P, R, IS</li> <li>(14.71m) Be, 0°, P, R</li> <li>(14.79m) Be, 0°, P, R</li> <li>(14.86m) J, 45°, P, R</li> </ul>
			-21				H			<ul style="list-style-type: none"> <li>(15.07m) J, 60°, P, R</li> <li>(15.40m) J, 90°, Un, R</li> <li>(15.78m) Be, 0°, P, R</li> <li>(16.30m) J, 85°, Un, R</li> <li>(16.60m) HEALED J, 75°, P, R</li> </ul>
			-22							<ul style="list-style-type: none"> <li>(17.17m) XWS, 0°, 5 mm.t</li> <li>(17.30m) J, 30°, P, R</li> </ul>
			-23							<ul style="list-style-type: none"> <li>(17.87m) J, 20°, P, R</li> <li>(18.00m) Cr, 0°, 20 mm.t</li> </ul>
			-24		as above, but with dark grey laminae, bedded at 0-10°.					<ul style="list-style-type: none"> <li>(19.14m) J, 65°, P, R</li> <li>(19.29m) J, 45°, S</li> <li>(19.40m) XWS, 0°, 10 mm.t</li> </ul>
			-25		as above, but light grey mottled dark grey.					
			20		END OF BOREHOLE AT 19.81 m					
			-26							

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JOB NO: 29245S

BH16

START CORING AT: 14.13m

14

15

16

17

18

19

END OF BOREHOLE AT 19.81m.



**Borehole No.**  
**17**  
1 / 4

EASTING: 332484  
NORTHING: 6250286

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.11 m  
**Date:** 7/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N=0 0,0,0	-5	1		CH	SILTY CLAY: high plasticity, dark grey and black, interbedded with fine to medium grained, yellow brown clayey sand.	MC>PL	VS		ORGANIC ODOUR  SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-6	2		CL	SANDY CLAY: medium plasticity, light grey mottled yellow brown.		VSt	220 240 260	
					N = 16 4,5,11	-7	3		SC	CLAYEY SAND: fine to medium grained, light grey mottled yellow brown.	W	L		
					N = 3 2,1,2	-8	4		CH	SANDY CLAY: high plasticity, light grey mottled red and yellow, trace of fine grained river gravel and shells.	MC>PL	St	140 150 150	
					N = 4 2,1,3	-9	5							
						-10	6							
						-11				SANDSTONE: fine to medium grained, light grey.	XW	(EL)		RESISTANCE OF CASING ADVANCER

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**Borehole No.**  
**17**  
**2 / 4**

EASTING: 332484  
NORTHING: 6250286

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.11 m  
**Date:** 7/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N=SPT 15/ 150mm REFUSAL					SANDSTONE: fine to medium grained, light grey.	XW	EL		
										REFER TO CORED BOREHOLE LOG				
							-12	8						
							-13	9						
							-14	10						
							-15	11						
							-16	12						
							-17	13						
							-18							

**Borehole No.**  
**17**  
**3 / 4**

EASTING: 332484  
NORTHING: 6250286

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -4.11 m  
**Date:** 7/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>p</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
					START CORING AT 7.21m					
					SANDSTONE: fine to medium grained, light grey.	DW	L			
					CORE LOSS 0.15m	DW	VL			(7.52m) J, 60°, P, R (7.57m) Be, 0°, P, R
			-12	8	SANDSTONE: fine to medium grained, light grey.		M			(7.81m) Be, 0°, P, R (7.85m) J, 90°, Un, R (7.90m) J, 35°, P, R
					as above, but yellow brown, red brown and light grey.					(8.40m) Be, 15°, P, R
			-13	9						(8.77m) Be, 10°, P, R (8.91m) J, 40°, P, R (9.04m) J, 60°, P, R
					CORE LOSS 0.76m					
			-14	10	SANDSTONE: fine to medium grained, yellow brown, red brown and light grey.	DW	M			(9.90m) Be, 15°, P, R (10.20m) Be, 10°, P, R (10.33m) J, 35°, P, R, IS (10.52m) J, 5°, P, R, IS (10.61m) J, 50°, P, R (10.71m) J, 25°, P, R, IS (10.77m) J, 70°, P, R, IS (10.85m) Be, 10°, P, R, IS (10.90m) J, 45°, P, R, IS
			-15	11						(11.30m) J, 90°, Un, R, IS (11.65m) Be, 10°, Un, R, IS
			-16	12						(12.13m) CS, 0°, 30 mm t
					CORE LOSS 0.84m					
			-17	13	SILTY CLAY: high plasticity, dark grey, with XW shale bands.	RS	EL			(13.00m) HP, 420, 470, >600
			-18		SHALE: grey.	XW	EL			

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**Borehole No.**  
**17**  
**4 / 4**

EASTING: 332484  
NORTHING: 6250286

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S      **Core Size:** NMLC      **R.L. Surface:** -4.11 m  
**Date:** 7/2/17      **Inclination:** VERTICAL      **Datum:** AHD  
**Plant Type:** JK305      **Bearing:** N/A      **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific      General
			-19		SANDSTONE: fine to medium grained, yellow brown, red brown and light grey.	DW	M			(14.16m) XWS, 0°, 10 mm.t
			15		as above, but yellow brown, red brown and light grey.					(14.43m) J, 70°, P, R
			-20							(15.05m) J, 55°, P, R
			16							(15.51m) J, 40°, P, R
			-21							(15.80m) J, 25°, P, R
			17							(15.97m) J, 80°, Un, R
										(16.08m) XWS, 0°, 5 mm.t
										(16.39m) Be, 0°, P, R, IS
										(16.75m) J, 70°, P, R
										(16.86m) J, 45°, P, R, IS
										(17.07m) Be, 0°, P, R, IS
										(17.21m) J, 90°, P, R
			-22		END OF BOREHOLE AT 17.27 m					
			18							
			-23							
			19							
			-24							
			20							
			-25							

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JOB NO: 292455

BH17

START CORING AT: 7.21m

7

C.L: 0.15m

8

9

CORE LOSS: 0.76m

10

11

12

CORE LOSS: 0.84m

13

14

15

16

17

FINISH AT 17.27m



**Borehole No.**  
**18**  
**1 / 3**

EASTING: 332552  
NORTHING: 6250324

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.86 m  
**Date:** 8/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-8				-				
					N = 9 3,4,5				CH	SILTY CLAY: high plasticity, light grey mottled red and yellow brown, trace of fine grained sand.	MC>PL	VSt	210 220 240	
							1							
						-9								
							2							
					N = 6 2,2,4	-10				SILTY CLAY: high plasticity, grey mottled red and yellow brown.			220 210 250 270 280	
							3							
						-11								
					N = 8 2,4,4					as above, but trace of fine to medium grained sand.			270 270 280	
						-12								
							5							
						-13								
					N = 7 3,3,4					as above, but with bands of sandy clay.			310 320 290	
						-14								
							6							

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EASTING: 332552  
NORTHING: 6250324

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S      **Method:** CASING ADVANCER      **R.L. Surface:** -7.86 m  
**Date:** 8/2/17      **Datum:** AHD  
**Plant Type:** JK305      **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
					N = 10 3,4,6	-15		CH	SANDY CLAY: high plasticity, grey, fine to medium grained sand.	MC>PL	St - VSt	180 200 210		
							8							
					N = 8 3,3,5	-17	9	SC	CLAYEY SAND: fine to medium grained, light grey mottled yellow brown.	W	L			
					N = 15 3,3,12	-18	10	CH	INTERBEDDED: SANDY CLAY: high plasticity, grey. CLAYEY SAND: fine to medium grained, light grey.	MC>PL / W	St / L	180 190 180		
							11							
					N = 7 3,3,4	-20	12					150 160 180		
						-21	13							
										REFER TO CORED BOREHOLE LOG				



**Borehole No.**  
**18**  
**3 / 3**

EASTING: 332552  
NORTHING: 6250324

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -7.86 m  
**Date:** 8/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
		-21			START CORING AT 13.59m					
		-22	14		SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-10°.	SW	M			(13.70m) J, 30°, P, R (13.83m) J, 35°, P, R (13.95m) XWS, 0°, 50 mm.t (14.11m) XWS, 0°, 15 mm.t
		-23	15		CORE LOSS 1.85m		VL			
		-24	16		SANDSTONE: fine to coarse grained, light grey and brown, with dark grey laminae, bedded at 0-20°.	XW	EL			(16.25m) J, 45°, P, R (16.30m) J, 45°, P, R (16.37m) J, 50°, P, R (16.46m) XWS, 0°, 20 mm.t
		-25	17		as above, but light grey, with dark grey laminae.	SW	H			(16.69m) J, 30°, P, R (16.72m) J, 40°, P, R (16.78m) J, 45°, P, R (16.85m) J, 30°, P, R (16.93m) J, 65°, P, R (16.95m) J, 80°, Un, R (17.16m) J, 85°, Un, R
		-26	18							(17.60m) HEALED J, 80°, Un
		-27	19		as above, but fine grained.					(18.37m) Be, 5°, P, R (18.55m) Be, 5°, P, R
					as above, but fine to medium grained.					(19.03m) J, 60°, P, R (19.20m) J, 60°, P, R (19.39m) XWS, 5°, 5 mm.t
					END OF BOREHOLE AT 19.61 m					

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JOB NO: 292455

BH18

START CORING AT: 13.59m

13

14

CORE LOSS: 1.85m

15

16

17

18

19

FINISH AT 19.61m



**Borehole No.**  
**19**  
**1 / 3**

EASTING: 332517  
NORTHING: 6250358

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.50 m  
**Date:** 8/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS											
					N = 8 2,3,5		1		CH	SILTY CLAY: high plasticity, light grey mottled yellow brown.	MC>PL	VSt	210 240 210	
					N = 8 3,3,5		2						340 320 360	
					N = 5 2,2,3		3			as above, but grey mottled red and yellow brown.			240 250 280	
					N = 7 2,3,4		4			as above, but grey, trace of fine grained sand.			240 260 260	



**Borehole No.**  
**19**  
**2 / 3**

EASTING: 332517  
NORTHING: 6250358

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.50 m  
**Date:** 8/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	as above, but grey, trace of fine grained sand. (continued)	MC>PL	VSt		
					N = 40 14,22,18	-15			SC	CLAYEY SAND: fine to medium grained, light grey.	W	D		
							8							
						-16						MD		
							9							
					N = 11 8,6,5	-17								
										SANDSTONE: fine to medium grained, light grey.	DW	(M)		RESISTANCE ON CASING ADVANCER
							10			REFER TO CORED BOREHOLE LOG				
						-18								
							11							
						-19								
							12							
						-20								
							13							
						-21								



**Borehole No.**  
**19**  
**3 / 3**

EASTING: 332517  
NORTHING: 6250358

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -7.50 m  
**Date:** 8/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>s</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-17			START CORING AT 9.86m					
			10		SANDSTONE: fine to coarse grained, brown, bedded at 0-10°, with fine to medium grained quartz inclusions.	SW	M			(9.92m) J, 45°, P, R (10.07m) Be, 0°, P, R
			-18		as above, but yellow and red brown.					(10.66m) Be, 10°, P, R
			11							(11.19m) Be, 10°, P, R (11.30m) J, 25°, P, R
			-19							
			12							
			-20							
			13		END OF BOREHOLE AT 12.98 m		H			(12.63m) XWS, 0°, 3 mm.t (12.69m) J, 80°, Un, R
			-21							
			14							
			-22							
			15							
			-23							

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JOB NO: 292455

BH19

START CORING AT: 9.86m

9

10

11

12

FINISH AT 12.96m



**Borehole No.**  
**20**  
**1 / 3**

EASTING: 332575  
NORTHING: 6250385

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.93 m  
**Date:** 9/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-8			CH	SILTY CLAY: high plasticity, dark grey.	MC>PL	(S)		ORGANIC ODOUR
									SC	CLAYEY SAND: fine to medium grained, grey.	W	VL		
					N=0 0,0,0		1							
						-10	2							
					N=0 0,0,0									SPT SUNK 450mm UNDER WEIGHT OF HAMMER ALONE
						-11	3							
						-12	4		CH	SILTY CLAY: high plasticity, grey mottled red and yellow brown, trace of fine to medium grained sand.	MC>PL	VSt	350 370 360	
					N = 9 3,3,6									
						-13	5							
					N = 8 3,3,5					as above, but grey.			260 270 280	
						-14	6							
					N = 7 3,3,4								240 250 260	





**Borehole No.**  
**20**  
**2 / 3**

EASTING: 332575  
NORTHING: 6250385

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -7.93 m  
**Date:** 9/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-15			CH	SILTY CLAY: high plasticity, grey mottled yellow brown, trace of fine to medium grained sand.	MC>PL	VSt		
						-16	8			SILTY CLAY: high plasticity, dark grey, with fine to medium grained sand.		St	150 160 150	
					N = 3 0,0,3									
						-17	9							
						-18	10			as above, but without fine to medium grained sand.			120 110 140	
					N = 5 0,2,3									
						-19	11			as above, but dark grey mottled yellow brown, trace of fine to medium grained sand.			140 120 120	
					N = 6 3,3,3									
						-20	12			SANDY CLAY: high plasticity, yellow brown and grey.				
						-21	13							
										REFER TO CORED BOREHOLE LOG				



**Borehole No.**  
**20**  
**3 / 3**

EASTING: 332575  
NORTHING: 6250385

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -7.93 m  
**Date:** 9/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>s</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
		-21			START CORING AT 13.59m			EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-22	14		SANDSTONE: fine to coarse grained, light grey and yellow brown, with dark grey laminae and fine to medium grained quartz inclusions, bedded at 5-20°.	FR	M			(14.44m) Be, 5°, P, R
		-23	15		as above, but with dark grey mudstone lenses and bedded at 0-5°.		H			(14.68m) Be, 0°, P, R (14.95m) Be, 0°, P, R (15.03m) J, 30°, P, R (15.58m) Be, 0°, Un, R
		-24	16							(16.36m) Be, 0°, Un, R
		-25	17		END OF BOREHOLE AT 16.68 m					
		-26	18							
		-27	19							

JK Geotechnics

JOB NO: 292455

BH20

START CORING AT: 13.59m

13

14

15

16

FINISH AT 16.68m



**Borehole No.**  
**21**  
**1 / 3**

EASTING: 332665  
NORTHING: 6250385

# BOREHOLE LOG

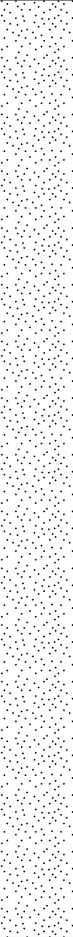
**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.14 m  
**Date:** 13/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey, with fine to medium grained sand. SILTY CLAY: high plasticity, dark brown and dark grey.	MC>PL	(VS) (S - F)		ORGANIC ODOUR
					N=0 0,0,0		-7	1					50 60 60	SPT SUNK 450mm UNDER WEIGHT OF HAMMER ALONE
							-8	2		as above, but light grey mottled yellow brown.		VSt		
					N = 7 3,3,4		-9	3					220 320 340	
					N = 7 7,4,3		-10	4						
							-11	5						NO SAMPLE IN SPT
					N = 13 4,5,8		-12	6	SP	SAND: fine to medium grained, grey, with clay and silt fines and sandy clay/clayey sand bands.	W	MD		
							-13							

**2 / 3**

# BOREHOLE LOG

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	US0	DB	DS										
					N = 15 3,6,9	-14	8		SP	SAND: fine to medium grained, grey, with clay and silt fines and sandy clay/clayey sand bands.	W	MD		
				N = 14 6,10,4	-15	9								
				N = 13 7,6,7	-17	11								
					-18									
						-19	13			REFER TO CORED BOREHOLE LOG				
						-20								



**Borehole No.**  
**21**  
**3 / 3**

EASTING: 332665  
NORTHING: 6250385

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S      **Core Size:** NMLC      **R.L. Surface:** -6.14 m  
**Date:** 13/2/17      **Inclination:** VERTICAL      **Datum:** AHD  
**Plant Type:** JK305      **Bearing:** N/A      **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific      General
		-18			START CORING AT 11.96m					
			12		CORE LOSS 0.55m					
		-19	13		SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-20°.	SW	M			(13.00m) J, 80°, Un, R, IS
							H			(13.26m) Be, 0°, P, R
		-20	14		as above, but light grey, with dark grey mudstone lenses.	FR				(13.57m) Be, 10°, P, R
										(13.75m) J, 50°, P, R
		-21	15				M			(14.66m) Be, 0°, P, R
										(14.85m) XWS, 0°, 5 mm.t
					END OF BOREHOLE AT 15.04 m					
		-22	16							
		-23	17							
		-24								



JK Geotechnics



JOB NO: 292455

BH21

START CORING AT: 11.96m

12

CORE LOSS: 0.55m

13

14

15

FINISH AT 15.04m



**Borehole No.**  
**22**  
**1 / 3**

EASTING: 332636  
NORTHING: 6250427

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.42 m  
**Date:** 10/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS								
						CH	SILTY CLAY: high plasticity, dark grey.	MC>PL	(VS)		ORGANIC ODOUR
						CL-CH	SANDY CLAY: medium to high plasticity, light grey mottled red and yellow brown.		(F - St)		
				-7							
				1							
				-8		SC	CLAYEY SAND: fine to medium grained, yellow brown and light grey mottled red brown.	W	L		
				2							
				-9							
				3							
				-10		CH	as above, but light grey. SILTY CLAY: high plasticity, dark grey, trace of fine to medium grained sand.	MC>PL	VSt - H	360 390 420	
				4							
				-11							
				5					F - St		NO RECOVERY IN SPT
				-12							
				6							
				-13			as above, but grey.			90 100 110	SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE



**Borehole No.**  
**22**  
**2 / 3**

EASTING: 332636  
NORTHING: 6250427

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -6.42 m  
**Date:** 10/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
							-14		CH	SILTY CLAY: high plasticity, grey.	MC>PL	F - St		
					N = 16 9,9,7		8		SC	CLAYEY SAND: fine to medium grained, light grey.	W	MD		
							-15							
							9							
					N=SPT 6/ 100mm REFUSAL		-16			SANDSTONE: fine to medium grained, light grey.	XW	EL		
							10			REFER TO CORED BOREHOLE LOG				
							-17							
							11							
							-18							
							12							
							-19							
							13							
							-20							

**Borehole No.**  
**22**  
**3 / 3**

EASTING: 332636  
NORTHING: 6250427

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -6.42 m  
**Date:** 10/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 9.40m					
		-16	10		SANDSTONE: fine to coarse grained, red brown and light grey mottled yellow brown, bedded at 0-20°.	DW	M			
		-17								(10.55m) XWS, 5°, 40 mm.t (10.67m) XWS, 20°, 20 mm.t
			11		CORE LOSS 0.56m					
		-18			SHALE: grey, interbedded with fine to medium grained, light grey sandstone.	XW	EL			
		12			SANDSTONE: fine grained, light grey mottled red brown, with grey shale lenses.	DW	M			(11.75m) J, 90°, Un, R (11.80m) XWS, 4°, 70 mm.t (12.04m) J, 45°, P, R (12.07m) XWS, 0°, 80 mm.t (12.16m) Be, 5°, P, R (12.31m) CS, 0°, 30 mm.t (12.41m) XWS, 0°, 30 mm.t (12.47m) XWS, 5°, 30 mm.t
		-19	13		SANDSTONE: fine to coarse grained, light grey and yellow brown, bedded at 0-15°.	SW	H			
		-20								
		-21	14		as above, but light grey, with dark grey laminae.	FR	M			(13.89m) Be, 15°, Un, R (14.13m) J, 75°, P, R (14.21m) J, 80°, Un, R (14.30m) J, 65°, Un, R (14.47m) J, 65°, P, R (14.52m) CS, 5°, 3 mm.t
		-22	15							(15.05m) XWS, 5°, 3 mm.t
					END OF BOREHOLE AT 15.23 m					

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JOB NO: 292455

BH22

START CORING AT: 9.40m

9

10

CORE

11

LOSS: 0.56m

12

13

14

15

FINISH AT 15.23m



**Borehole No.**  
**23**  
**1 / 3**

EASTING: 332671  
NORTHING: 6250417

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.94 m  
**Date:** 13/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ES	U50	DB	DS								
				-6		SC	CLAYEY SAND: fine to medium grained, grey and dark grey.	W			
				-7		CL-CH	SILTY CLAY: medium to high plasticity, dark grey, trace of fine to medium grained sand and organic.	MC>PL	(S - F)		ORGANIC ODOUR
				-8					F - St	90 100 110	SPT SANK UNDER WEIGHT OF HAMMER ALONE
				-9							
				-10		SC	CLAYEY SAND: fine to medium grained, grey.	W	L		
				-11							
				-12		CH	SANDY CLAY: high plasticity, grey.	MC>PL	F - St	90 110 150	NO RECOVERY IN SPT





**Borehole No.**  
**23**  
**2 / 3**

EASTING: 332671  
NORTHING: 6250417

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.94 m  
**Date:** 13/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
					N = 23 9,13,10	-13			SC	CLAYEY SAND: fine to medium grained, grey.	W	MD		NO RECOVERY IN SPT
							8							
					N = 10 15,5,5	-14				as above, but light grey, yellow and red brown.				
							9							
					N = 28 9,14,14	-15				SANDSTONE: fine to medium grained, light grey, yellow brown and brown.	XW	EL		
						-16	10			REFER TO CORED BOREHOLE LOG				
							11							
							12							
							13							



**Borehole No.**  
**23**  
**3 / 3**

EASTING: 332671  
NORTHING: 6250417

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -5.94 m  
**Date:** 13/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>s</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
		-15						EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-16	10		START CORING AT 10.01m					
		-17	11		SANDSTONE: fine to medium grained, brown and light grey.	SW	M			
		-18	12		as above, but light brown.		H			
		-19	13		as above, but light grey, with dark grey lenses.					
		-20	14		END OF BOREHOLE AT 13.11 m					
		-21	15							

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JOB NO: 29245S

BH23

START CORING AT: 10.01m

10

11

12

13

FINISH AT 13.11m



**Borehole No.**  
**24**  
**1 / 2**

EASTING: 332677  
NORTHING: 6250483

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.04 m  
**Date:** 15/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey and black, trace of fine to medium grained sand.	MC>PL	VS		ORGANIC ODOUR
					N = 2 2,1,1	-6	1		SC	CLAYEY SAND: fine to medium grained, light grey mottled dark grey and yellow brown.	W	VL		
						-7	2							
					N = 5 2,2,3	-8	3					L		
						-9	4		CH	SANDY CLAY: high plasticity, light grey and yellow brown, trace of fine to medium grained quartz gravel.	MC>PL	St - VSt	170 210 240	RESIDUAL
						-10	5			SANDSTONE: fine to medium grained, red brown.	XW	(EL)		RESISTANCE OF CASING ADVANCER
						-11	6			REFER TO CORED BOREHOLE LOG				
						-12								



**Borehole No.**  
**24**  
**2 / 2**

EASTING: 332677  
NORTHING: 6250483

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -5.04 m  
**Date:** 15/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-10	5		START CORING AT 5.00m					
					CORE LOSS 0.71m					
		-11	6		SANDSTONE: fine to medium grained, dark red brown.	DW	L			<ul style="list-style-type: none"> <li>(5.94m) XWS, 0°, 5 mm.t</li> <li>(6.06m) Be, 0°, P, R</li> <li>(6.16m) CS, 0°, 3 mm.t</li> <li>(6.29m) Be, 0°, P, R</li> </ul>
					as above, but light grey, red and yellow brown, bedded at 0-40°.	SW	M			<ul style="list-style-type: none"> <li>(6.64m) XWS, 20 mm.t</li> </ul>
		-12	7		as above, but light brown, with minor dark grey lenses.					
		-13	8		END OF BOREHOLE AT 8.06 m					
		-14	9							
		-15	10							
		-16								

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JOB NO: 292455

BH24

START CORING AT: 5.00m

5 CORE LOSS: 0.71m

6

7

8

FINISH AT 8.06m





**Borehole No.**  
**25**  
**1 / 3**

EASTING: 332641  
NORTHING: 6250575

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -2.73 m  
**Date:** 15/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									SC	CLAYEY SAND: fine to medium grained, dark grey, trace of shell fragments.	W	(VL)		ORGANIC/SULFUR ODOUR
							1							
							4							
					N=0 0,0,0									
							2			CLAYEY SAND: fine to medium grained, light grey mottled yellow brown.				
							5							
							3			SANDSTONE: fine to medium grained.	DW	(L)		RESISTANCE ON CASING ADVANCER
							6			REFER TO CORED BOREHOLE LOG				
							4							
							7							
							5							
							8							
							6							
							9							

2 / 3

EASTING: 332641  
NORTHING: 6250575

# CORED BOREHOLE LOG

<b>Job No.:</b> 29245S	<b>Core Size:</b> NMLC	<b>R.L. Surface:</b> -2.73 m
<b>Date:</b> 15/2/17	<b>Inclination:</b> VERTICAL	<b>Datum:</b> AHD
<b>Plant Type:</b> JK305	<b>Bearing:</b> N/A	<b>Logged/Checked By:</b> M.S./O.F./P.S.

[illegible]



**Borehole No.**  
**25**  
**3 / 3**

EASTING: 332641  
NORTHING: 6250575

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -2.73 m  
**Date:** 15/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-12			SANDSTONE: fine to medium grained, light grey, with dark grey laminae at about 15°, bands of yellow and red brown staining.	SW	M			
			10		as above, but light grey with dark grey lenses.		H			(9.64m) XWS, 20°, 5 mm.t
		-13			END OF BOREHOLE AT 10.31 m					
			11							
		-14								
			12							
		-15								
			13							
		-16								
			14							
		-17								
			15							
		-18								

JK Geotechnics

JOB NO: 292455

BH 25

START CORING AT: 3.01m

3

4

CORE LOSS: 2.04m

5

6

7

8

9

10

FINISH AT 10.31m

1 / 3

# BOREHOLE LOG

<b>Client:</b> URBANGROWTH NSW															
<b>Project:</b> THE BAYS MARKET DISTRICT															
<b>Location:</b> BLACKWATTLE BAY, PYRMONT, NSW															
<b>Job No.:</b> 29245S								<b>Method:</b> CASING ADVANCER				<b>R.L. Surface:</b> -4.57 m			
<b>Date:</b> 16/2/17								<b>Datum:</b> AHD							
<b>Plant Type:</b> JK305								<b>Logged/Checked By:</b> M.S./O.F./P.S.							
Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks	
	ES	U50	DB	DS											
					N = 2 4,1,1	-5	1		CL	SILTY SANDY CLAY: high plasticity, dark grey, black and grey, trace of ash.	MC>PL	(VS)		ORGANIC/SULFUR ODOUR	
					N = 5 2,2,3	-6	2		CH	SANDY CLAY: high plasticity, light grey mottled red ad yellow brown, with bands of clayey sand.		VSt	260 320 340		
					N = 3 2,1,2	-7	3		SC	CLAYEY SAND: fine to medium grained, light grey mottled red and yellow brown.	W	L			
					N = 4 1,2,2	-8	4								
					N = 8 1,2,6	-9	5								
						-10	6								
						-11									





**Borehole No.**  
**26**  
**2 / 3**

EASTING: 332499  
NORTHING: 6250667

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.57 m  
**Date:** 16/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-12			SC	CLAYEY SAND: fine to medium grained, light grey mottled red and yellow brown. (continued)	W	L		
					N = 10 4,5,5		8			as above, but light brown and red brown.		MD		
						-13								
							9							
					N=SPT 3/ 80mm REFUSAL	-14				REFER TO CORED BOREHOLE LOG				
							10							
						-15								
							11							
						-16								
							12							
						-17								
							13							
						-18								





**Borehole No.**  
**26**  
**3 / 3**

EASTING: 332499  
NORTHING: 6250667

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -4.57 m  
**Date:** 16/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-13	9		START CORING AT 9.20m					
		-14			SANDSTONE: fine to medium grained, yellow brown mottled red brown and light grey. CORE LOSS 0.37m	DW	M			(9.30m) Be, 5°, P, R (9.49m) CS, 5°, 30 mm.t
		-15	10		SANDSTONE: fine to medium grained, yellow brown, with fine to medium grained quartz inclusions. as above, but light grey, with dark grey shale lenses.	DW SW	L M			(9.95m) J, 90°, P, R (10.12m) XWS, 5°, 5 mm.t (10.13m) J, 90°, Un, R
		-16	11							
		-17	12		Shale band 0.12mt.		H			(12.20m) CS, 0°, 5 mm.t (12.30m) XWS, 0°, 30 mm.t
		-17			END OF BOREHOLE AT 12.50 m		M			
		-18	13							
		-19	14							

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JOB NO: 292455

BH26

START CORING AT: 9.20m

9

CORE LOSS: 0.37m

10

11

12

FINISH AT: 12.50m



**Borehole No.**  
**27**  
**1 / 2**

EASTING: 332415  
NORTHING: 6250682

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -5.35 m  
**Date:** 16/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
									CH	SILTY CLAY: high plasticity, dark grey, with fine grained sand, trace of shell fragments.	MC>PL	(VS)		
							-6	1						
					N = 2 0,0,2		-7	2	SC	CLAYEY SAND: fine to medium grained, yellow brown mottled brown.	W	VL		
							-8	3						
					N = 11 3,5,6		-9	4		as above, but light grey mottled red and yellow brown, trace of shell fragments.		MD		
							-10	5						
					N = 10 3,4,6		-11	6		REFER TO CORED BOREHOLE LOG				
							-12							



**Borehole No.**  
**27**  
**2 / 2**

EASTING: 332415  
NORTHING: 6250682

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -5.35 m  
**Date:** 16/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX I <sub>s</sub> (50)	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
					START CORING AT 5.38m					
		-11	6		SANDSTONE: fine to medium grained, brown, red brown and light brown, bedded at 0-30°.	SW	M			(6.10m) Be, 20°, P, R
		-12	7				M - H			(7.29m) J, 35°, Un, R
		-13	8							
		-14	9		END OF BOREHOLE AT 8.48 m					
		-15	10							
		-16	11							
		-17								

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JOB NO: 292455

BH27

START CORING AT: 5.38m

5

6

7

8

FINISH AT 8.48m



**Borehole No.**  
**28**  
**1 / 3**

EASTING: 332311  
NORTHING: 6250870

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.92 m  
**Date:** 17/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES				Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS										
						-5				FILL: Gravel, fine to coarse grained coal, dark grey, trace of sand and shell fragments.	W			
					N = 1 1,1,0		1							
						-6								
						-7	2		CL-CH	SILTY CLAY: medium to high plasticity, dark grey, trace of shell fragments.	MC>PL	VS	10 20 30	SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
					N=0 0,0,0									
						-8	3							
					N=0 0,0,0				CH	as above, but grey, trace of fine to medium grained sand.		VS - S	20 40 30	SPT SANK 450mm UNDER WEIGHT OF HAMMER ALONE
						-9	4							
					N = 5 2,2,3									
						-10	5		SC	as above, but with fine to medium grained sand. CLAYEY SAND: fine to medium grained, grey brown and yellow brown.	W	L		
						-11	6							
					N = 6 2,2,4					as above, but brown.				





**Borehole No.**  
**28**  
**2 / 3**

EASTING: 332311  
NORTHING: 6250870

# BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Method:** CASING ADVANCER **R.L. Surface:** -4.92 m  
**Date:** 17/2/17 **Datum:** AHD  
**Plant Type:** JK305 **Logged/Checked By:** M.S./O.F./P.S.

Groundwater Record	SAMPLES			Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	ES	U50	DB	DS									
					-12			SC	CLAYEY SAND: fine to medium grained, brown.	W	L		
					-13	8			REFER TO CORED BOREHOLE LOG				
					-14	9							
					-15	10							
					-16	11							
					-17	12							
					-18	13							

N=SPT  
9/ 60mm  
REFUSAL



**Borehole No.**  
**28**  
**3 / 3**

EASTING: 332311  
NORTHING: 6250870

# CORED BOREHOLE LOG

**Client:** URBANGROWTH NSW  
**Project:** THE BAYS MARKET DISTRICT  
**Location:** BLACKWATTLE BAY, PYRMONT, NSW

**Job No.:** 29245S **Core Size:** NMLC **R.L. Surface:** -4.92 m  
**Date:** 17/2/17 **Inclination:** VERTICAL **Datum:** AHD  
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** M.S./O.F./P.S.

Water Loss/Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_p(50)$	DEFECT DETAILS	
									DEFECT SPACING (mm)	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating.
								EL-0.03 VL-0.1 L-0.3 M-1 H-3 VH-10 EH	500 300 100 50 30 10	Specific General
		-12								
			8		START CORING AT 8.01m					
		-13			SANDSTONE: fine to medium grained, yellow brown and light brown.	DW	VL			(8.01m) J, 60°, P, R (8.06m) J, 60°, P, R (8.12m) J, 50°, P, R (8.16m) J, 50°, P, R
					as above, but light grey, red and yellow brown.					(8.57m) J, 45°, Un, R (8.58m) J, 70°, P, R (8.67m) J, 60°, P, R
		-14	9		CORE LOSS 0.78m					
					SANDSTONE: fine to medium grained, brown.	XW	EL			
		-15	10		as above, but light grey red brown, bedded at 0-40°.	SW	M			(10.20m) J, 50°, P, R
		-16	11							(10.93m) Be, 0°, P, R
		-17	12		as above, but light grey, with dark laminae and lenses, bedded at 0-20°.	FR	H			
		-18	13		END OF BOREHOLE AT 13.02 m					

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JOB NO: 292455

BH28

START CORING AT: 8.01m

8

9 CORE LOSS: 0.78m

10

11

12

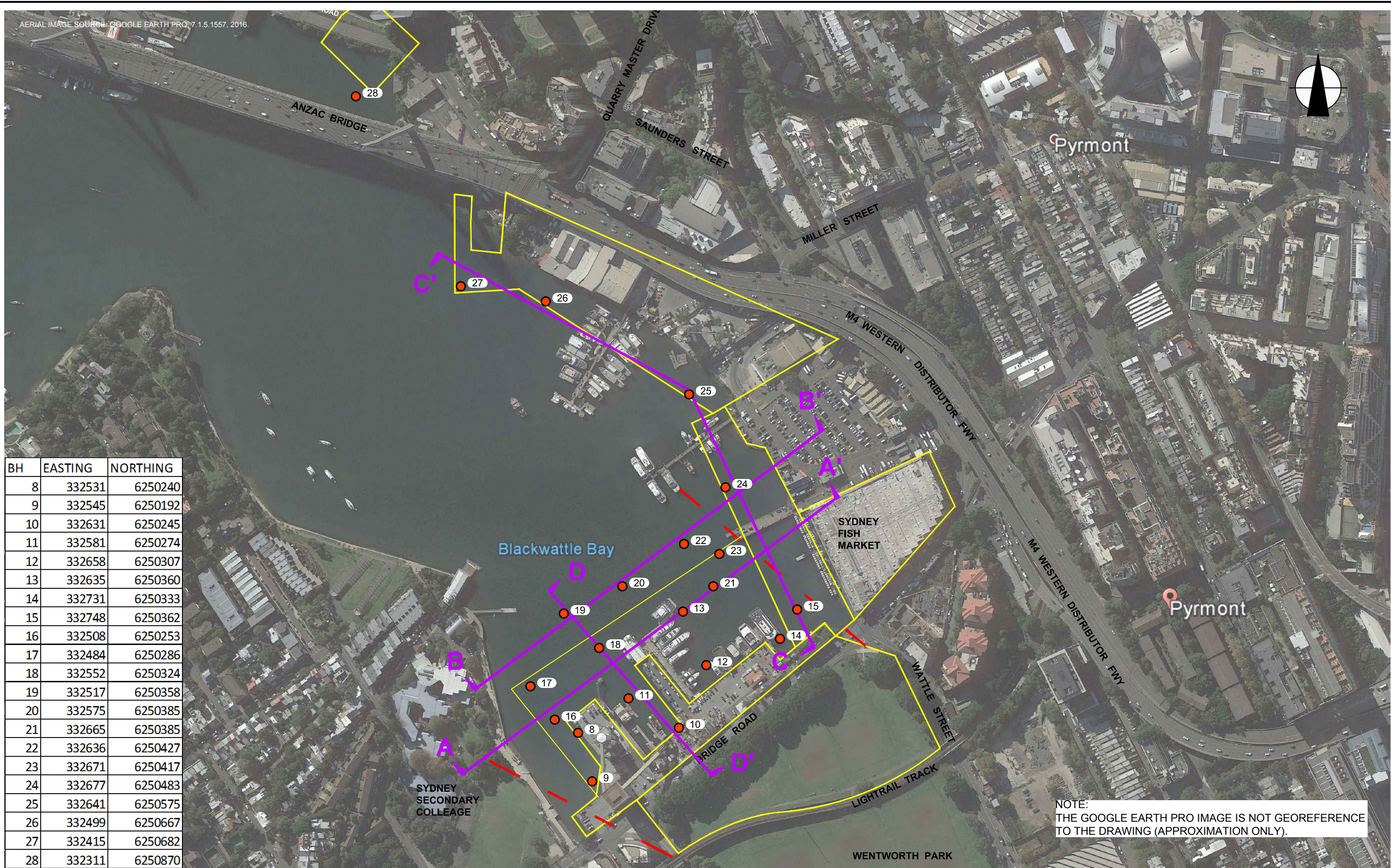
13 FINISH AT 13.02m







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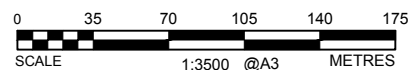


BH	EASTING	NORTHING
8	332531	6250240
9	332545	6250192
10	332631	6250245
11	332581	6250274
12	332658	6250307
13	332635	6250360
14	332731	6250333
15	332748	6250362
16	332508	6250253
17	332484	6250286
18	332552	6250324
19	332517	6250358
20	332575	6250385
21	332665	6250385
22	332636	6250427
23	332671	6250417
24	332677	6250483
25	332641	6250575
26	332499	6250667
27	332415	6250682
28	332311	6250870

LEGEND

— — — — — INFERRED DYKE

- OFFSHORE BOREHOLES (PREVIOUS INVESTIGATION FEBRUARY 2017)
- OFFSHORE BOREHOLES (8-14 CURRENT INVESTIGATION)



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

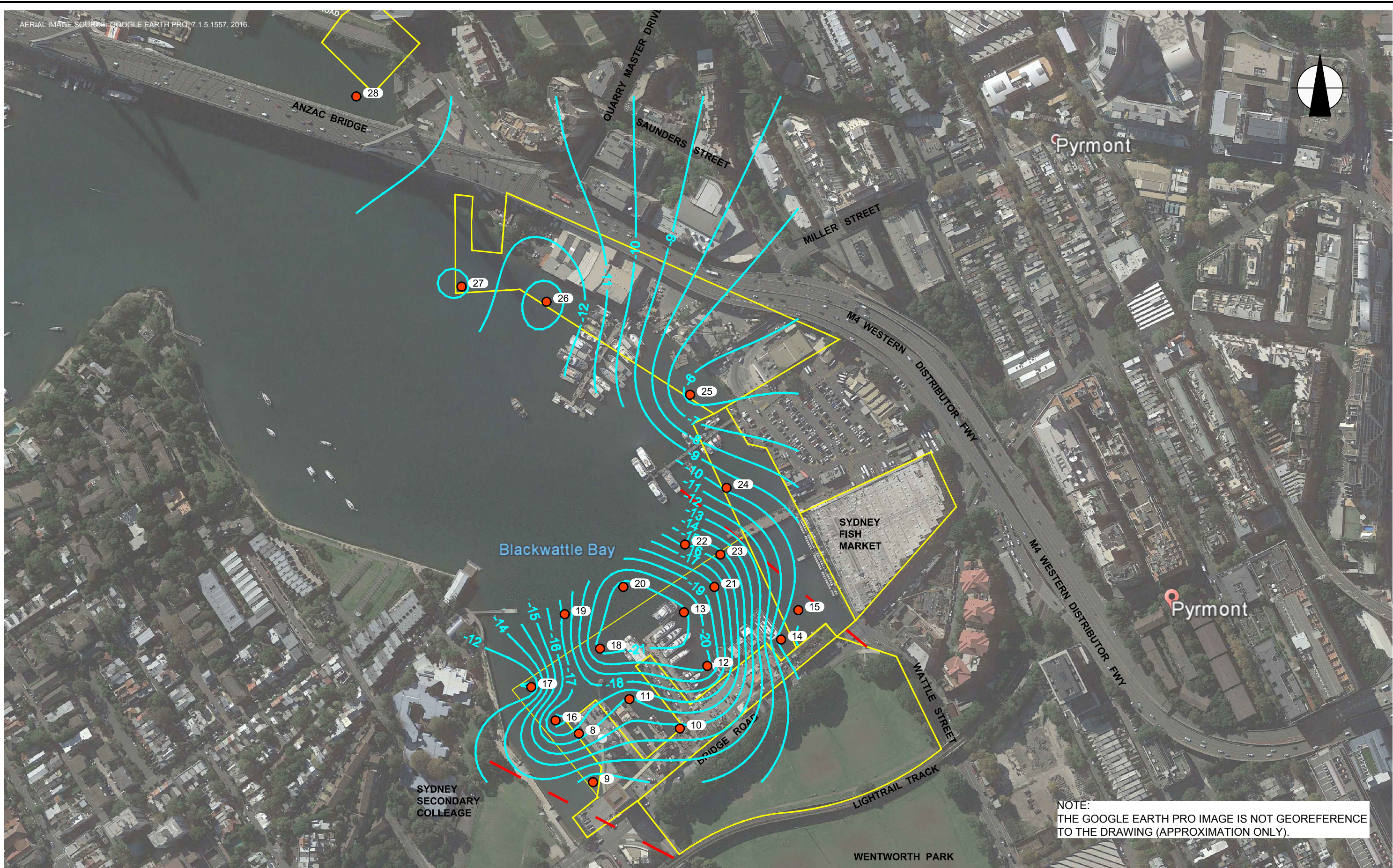
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THE GOOGLE EARTH PRO IMAGE IS NOT GEOREFERENCE  
TO THE DRAWING (APPROXIMATION ONLY).

Title: <b>BOREHOLE LOCATION PLAN</b>	
Location: THE BAYS MARKET DISTRICT SYDNEY, NSW	
Report No: 29245Srev1	Figure No: <b>2</b>
<b>JK Geotechnics</b>	





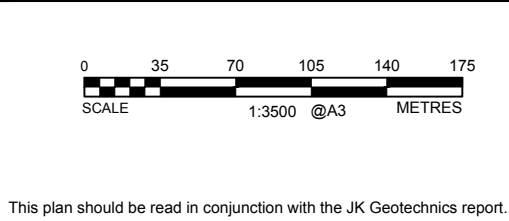
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NOTE:  
THE GOOGLE EARTH PRO IMAGE IS NOT GEOREFERENCE  
TO THE DRAWING (APPROXIMATION ONLY).

LEGEND

- INFERRED DYKE
- 15— CONTOUR BEDROCK RL (mAHD)
- OFFSHORE BOREHOLES (PREVIOUS INVESTIGATION FEBRUARY 2017)
- OFFSHORE BOREHOLES (8-14 CURRENT INVESTIGATION)

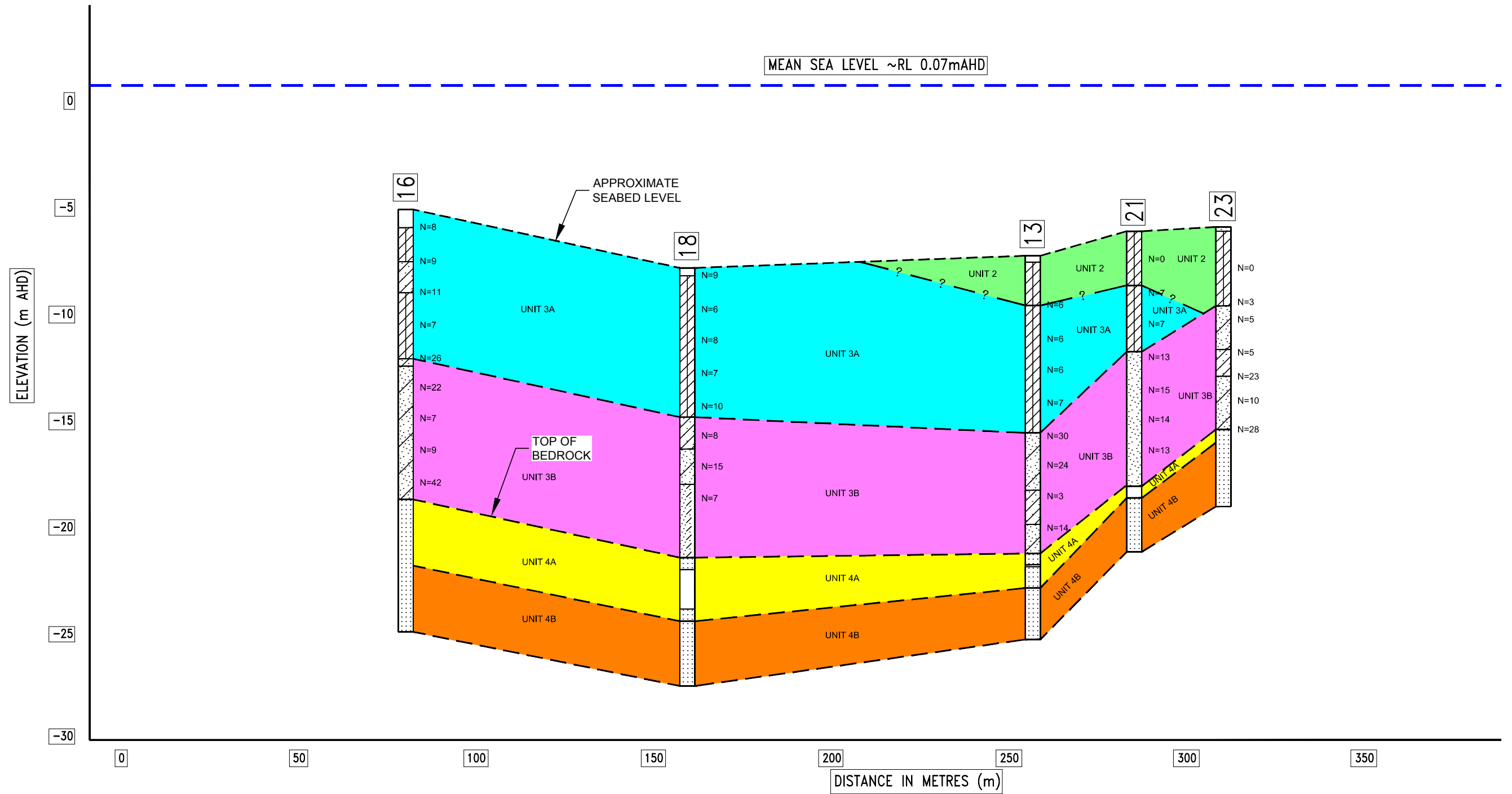


Title: <b>ROCK CONTOUR PLAN</b>	
Location: THE BAYS MARKET DISTRICT SYDNEY, NSW	
Report No: 29245Srev1	Figure No: 3
<b>JK Geotechnics</b>	

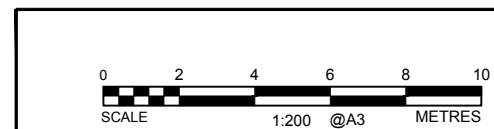
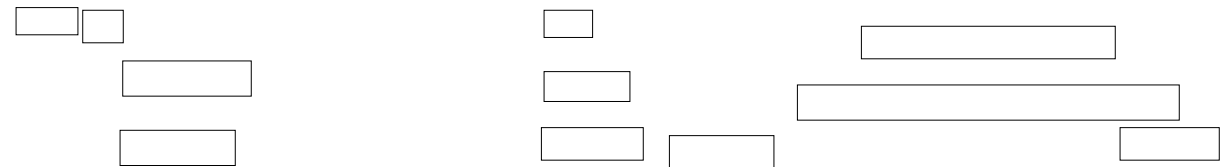




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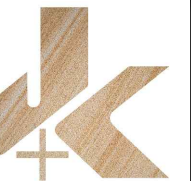


	BLANK
	CLAYEY SAND
	CORE LOSS
	SAND
	SANDY CLAY
	SILTY CLAY
	SANDSTONE
	UNIT 2 SOFT ALLUVIALS
	UNIT 3A CLAYS: St-H STRENGTH
	UNIT 3B SANDY CLAYS/CLAYEY SANDS
	UNIT 4A UPPER POORER BEDROCK, CLASS IV AND V
	UNIT 4B UPPER QUALITY SANDSTONE BEDROCK, CLASS III OR BETTER

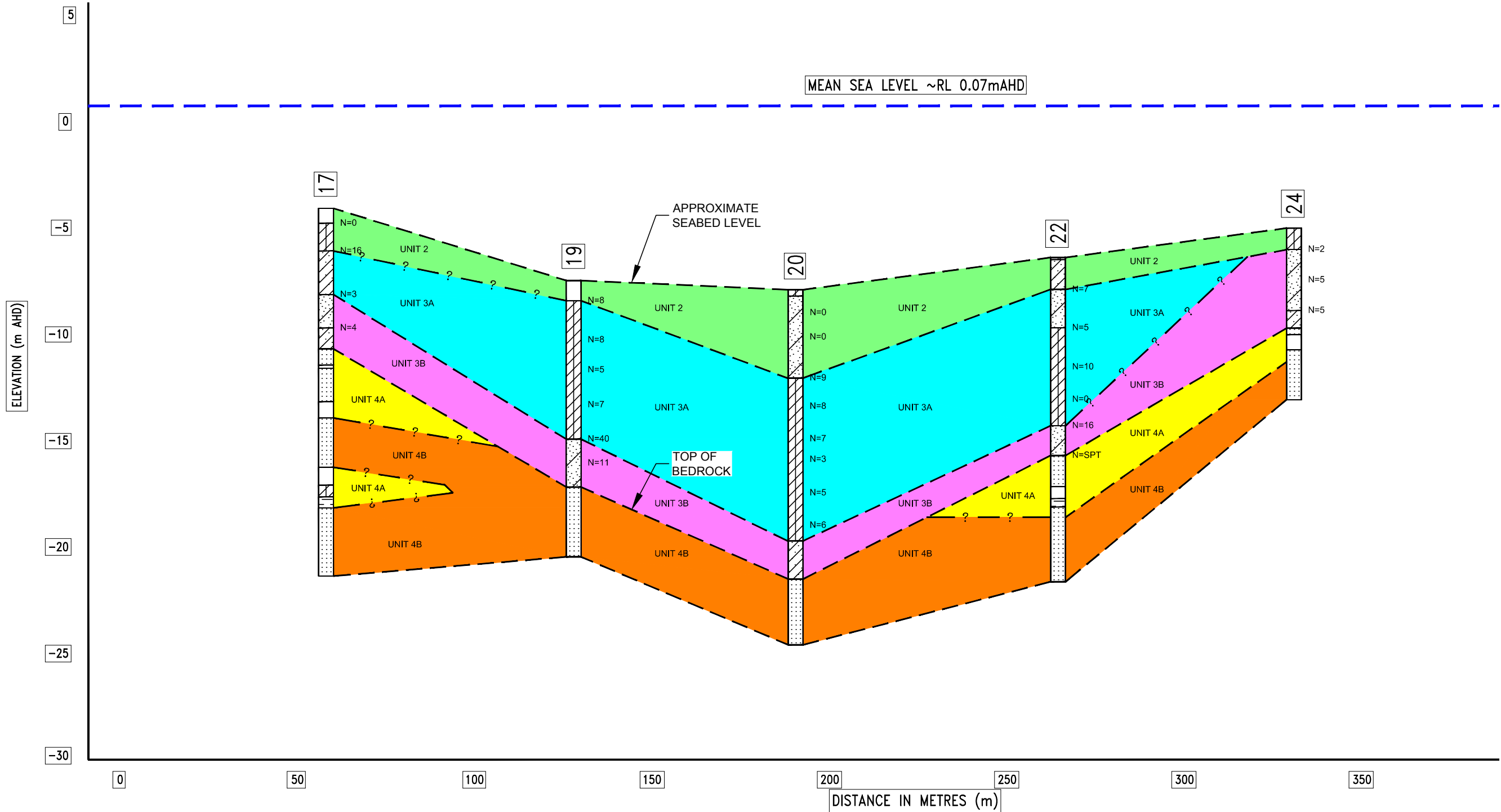


This plan should be read in conjunction with the JK Geotechnics report.

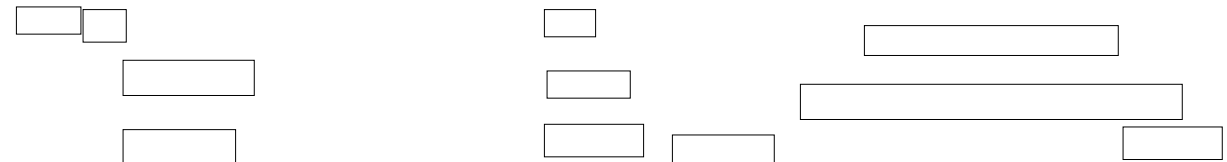
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Location: THE BAYS MARKET DISTRICT SYDNEY, NSW	
Report No: 29245Srev1	Figure No: 4
<b>JK Geotechnics</b>	



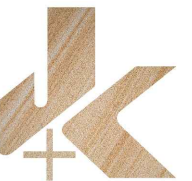
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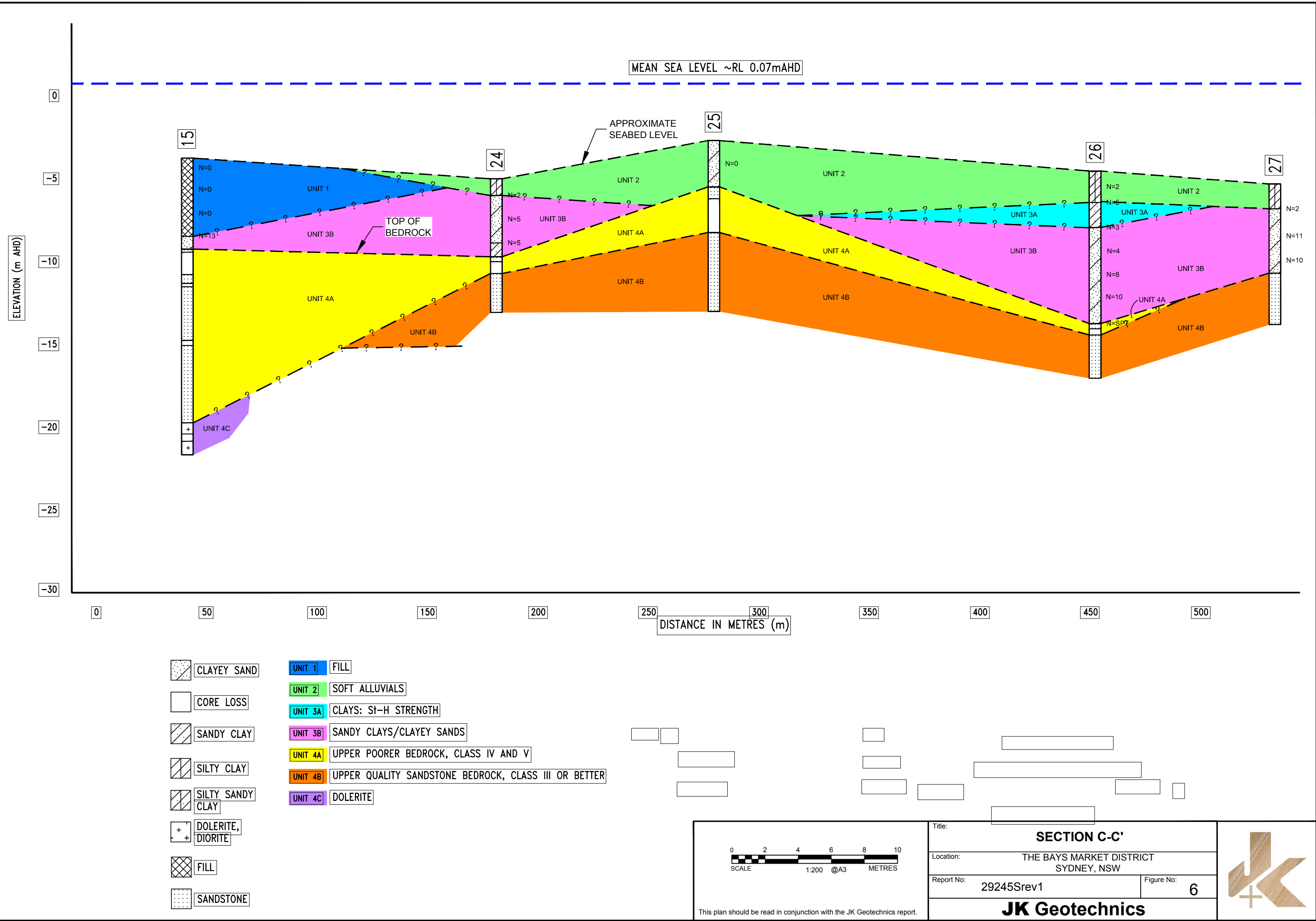
	BLANK		UNIT 2	SOFT ALLUVIALS
	CLAYEY SAND		UNIT 3A	CLAYS: St-H STRENGTH
	CORE LOSS		UNIT 3B	SANDY CLAYS/CLAYEY SANDS
	SANDY CLAY		UNIT 4A	UPPER POORER BEDROCK, CLASS IV AND V
	SILTY CLAY		UNIT 4B	UPPER QUALITY SANDSTONE BEDROCK, CLASS III OR BETTER
	SANDSTONE			
	SHALE			



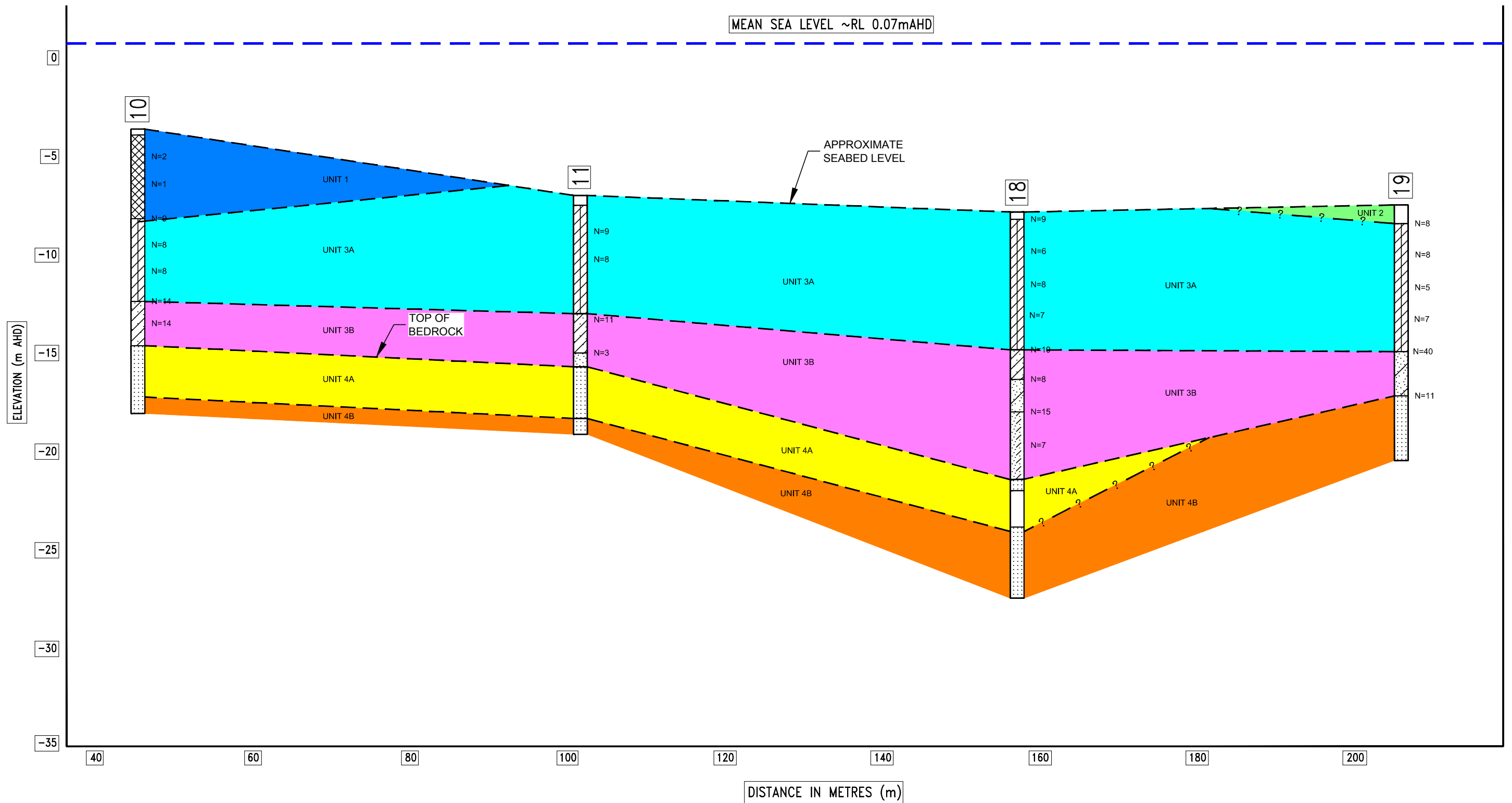
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Location: THE BAYS MARKET DISTRICT SYDNEY, NSW	
Report No: 29245Srev1	Figure No: 5
<b>JK Geotechnics</b>	



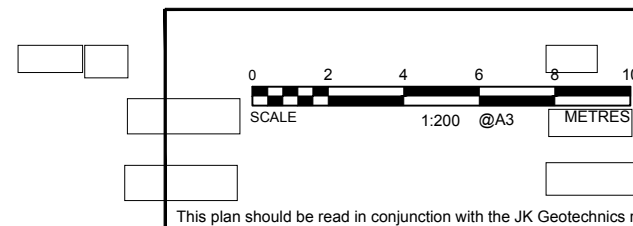
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PLOT DATE: 13/07/2017 10:25:07 AM DWG FILE: S:\6 GEOTECHNICAL\6F GEOTECHNICAL JOBS\29245\29245SP PYRMONT\29245S\CAD\29245REV1.DWG



	BLANK		SANDY CLAY		UNIT 1	FILL
	CLAYEY SAND		SILTY CLAY		UNIT 2	SOFT ALLUVIALS
	CORE LOSS		FILL		UNIT 3A	CLAYS: St-H STRENGTH
	SAND		SANDSTONE		UNIT 3B	SANDY CLAYS/CLAYEY SANDS
					UNIT 4A	UPPER POORER BEDROCK, CLASS IV AND V
					UNIT 4B	UPPER QUALITY SANDSTONE BEDROCK, CLASS III OR BETTER



Title:	SECTION D-D'
Location:	THE BAYS MARKET DISTRICT SYDNEY, NSW
Report No:	29245Srev1
Figure No:	7







## REPORT EXPLANATION NOTES

### INTRODUCTION

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

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

### DESCRIPTION AND CLASSIFICATION METHODS

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

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

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

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

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

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

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

### SAMPLING

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

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

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

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

### INVESTIGATION METHODS

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



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

**Hand Auger Drilling:** A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

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

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

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

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

**Continuous Core Drilling:** A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

**Standard Penetration Tests:** Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

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

The test results are reported in the following form:

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

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

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

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

### Static Cone Penetrometer Testing and Interpretation:

Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using a Cone Penetrometer Test (CPT). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm or 44mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm or 165mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

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

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

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

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

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

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

**Portable Dynamic Cone Penetrometers:** Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The 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.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

### LOGS

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

The attached explanatory notes define the terms and symbols used in preparation of the logs.

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

### GROUNDWATER

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

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

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





## FILL

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

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

## LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

## ENGINEERING REPORTS

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

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

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

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

## SITE ANOMALIES

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

## REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

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

## REVIEW OF DESIGN

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

## SITE INSPECTION

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

Requirements could range from:

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



## GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL		ROCK		DEFECTS AND INCLUSIONS	
	FILL		CONGLOMERATE		CLAY SEAM
	TOPSOIL		SANDSTONE		SHEARED OR CRUSHED SEAM
	CLAY (CL, CH)		SHALE		BRECCIATED OR SHATTERED SEAM/ZONE
	SILT (ML, MH)		SILTSTONE, MUDSTONE, CLAYSTONE		IRONSTONE GRAVEL
	SAND (SP, SW)		LIMESTONE		ORGANIC MATERIAL
	GRAVEL (GP, GW)		PHYLLITE, SCHIST		
	SANDY CLAY (CL, CH)		TUFF		
	SILTY CLAY (CL, CH)		GRANITE, GABBRO		
	CLAYEY SAND (SC)		DOLERITE, DIORITE		
	SILTY SAND (SM)		BASALT, ANDESITE		
	GRAVELLY CLAY (CL, CH)		QUARTZITE		
	CLAYEY GRAVEL (GC)				
	SANDY SILT (ML)				
	PEAT AND ORGANIC SOILS				
				<b>OTHER MATERIALS</b>	
					CONCRETE
					BITUMINOUS CONCRETE, COAL
					COLLUVIUM

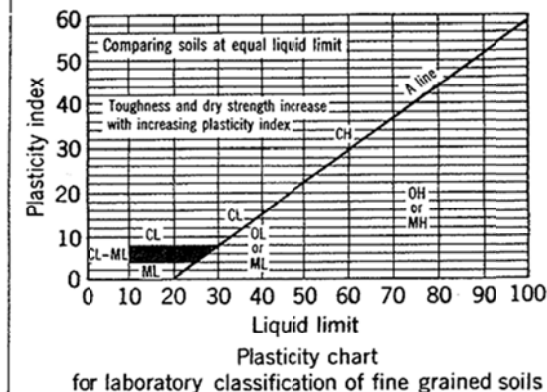




Field Identification Procedures (Excluding particles larger than 75 $\mu\text{m}$ and basing fractions on estimated weights)				Group Symbols	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria		
Coarse-grained soils More than half of material is larger than 75 $\mu\text{m}$ sieve size <sup>b</sup> (The 75 $\mu\text{m}$ sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses  For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics  Example: Silty sand, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3  Not meeting all gradation requirements for GW  Atterberg limits below "A" line, or PI less than 4  Atterberg limits above "A" line, with PI greater than 7		
			Predominantly one size or a range of sizes with some intermediate sizes missing	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines				
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see ML below)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures				
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Plastic fines (for identification procedures, see CL below)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures			$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3  Not meeting all gradation requirements for SW  Atterberg limits below "A" line or PI less than 5  Atterberg limits below "A" line with PI greater than 7	
			Wide range in grain sizes and substantial amounts of all intermediate particle sizes	SW	Well graded sands, gravelly sands, little or no fines				
		Sands with fines (appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing	SP	Poorly graded sands, gravelly sands, little or no fines				
Nonplastic fines (for identification procedures, see ML below)	SM		Silty sands, poorly graded sand-silt mixtures						
Plastic fines (for identification procedures, see CL below)	SC	Clayey sands, poorly graded sand-clay mixtures							
Identification Procedures on Fraction Smaller than 380 $\mu\text{m}$ Sieve Size									
Fine-grained soils More than half of material is smaller than 75 $\mu\text{m}$ sieve size (The 75 $\mu\text{m}$ sieve size is about the smallest particle visible to naked eye)	Sils and clays liquid limit less than 50	Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)		Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses  For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions  Example: Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)			
			None to slight	Quick to slow	None			ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
			Medium to high	None to very slow	Medium			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Slight to medium	Slow	Slight	OL			Organic silts and organic silt-clays of low plasticity	
			Slight to medium	Slow to none	Slight to medium			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			High to very high	None	High			CH	Inorganic clays of high plasticity, fat clays
	Sils and clays liquid limit greater than 50	Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity			
Highly Organic Soils				Pt	Peat and other highly organic soils				

Determine percentages of gravel and sand from grain size curve  
Depending on percentage of fines (fraction smaller than 75  $\mu$ m sieve size) coarse grained soils are classified as follows:  
Less than 5% GW, GP, SW, SP  
More than 5% GM, GC, SM, SC  
Borderline cases requiring use of dual symbols





Use grain size curve in identifying the fractions as given under field identification



- Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).  
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.



## LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown.
		Extent of borehole collapse shortly after drilling.
		Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N <sub>c</sub> = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)  (Cohesionless Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
	D	DRY – Runs freely through fingers.
	M	MOIST – Does not run freely but no free water visible on soil surface.
	W	WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – Unconfined compressive strength less than 25kPa
	S	SOFT – Unconfined compressive strength 25-50kPa
	F	FIRM – Unconfined compressive strength 50-100kPa
	St	STIFF – Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF – Unconfined compressive strength 200-400kPa
	H	HARD – Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)	VL	<b>Density Index (I<sub>p</sub>) Range (%)</b> Very Loose <15
	L	Loose 15-35
	MD	Medium Dense 35-65
	D	Dense 65-85
	VD	Very Dense >85
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
		<b>SPT 'N' Value Range (Blows/300mm)</b> 0-4 4-10 10-30 30-50 >50
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
		Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.



## LOG SYMBOLS continued

### ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

### ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low: -----	EL -----	0.03	Easily remoulded by hand to a material with soil properties.
Very Low: -----	VL -----	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low: -----	L -----	0.3	A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength: -----	M -----	1	A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High: -----	H -----	3	A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High: -----	VH -----	10	A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

### ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	