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DEICORP PROJECTS PETERSHAM PTY LTD

GEOTECHNICAL INVESTIGATION REPORT

3-7 REGENT STREET, 13-17 REGENT STREET,

& 287-309 TRAFALGAR STREET, PETERSHAM, NSW

Report E22913 GA

24 May 2016

Report Distribution

Geotechnical Investigation Report

3-7 Regent Street, 13-17 Regent Street & 287-309 Trafalgar Street, Petersham, NSW

EI Report No. *E22913 GA*

Date: *24 May 2016*

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1 INTRODUCTION

1.1 BACKGROUND

At the request of DeiCorp Projects Petersham Pty Ltd (Deicorp), Environmental Investigations Australia Pty Ltd (EI) has carried out a Geotechnical Investigation (GI) for the proposed development at 3-7 Regent Street, 13-17 Regent Street & 287-309 Trafalgar Street, Petersham, NSW (the Site).

This GI report has been prepared to provide advice and recommendations to assist the designers in the preparation of initial designs for the proposed development. The investigation has been carried out in accordance with the agreed scope of works outlined in EI's proposal referenced P13544.2, dated 1 December 2015, and DeiCorp's signed "Authorisation to Proceed" form dated February 2016.

EI has also prepared a *Detailed Site Investigation Report* (DSI) for the site (E22913 AA_Rev0, 9 May 2016). This GI report should be read in conjunction with the DSI report.

1.2 PROPOSED DEVELOPMENT

To assist us with the preparation of this GI report, Deicorp has supplied EI with:

- Architectural drawings prepared by Architecture & Building Works for 3-7 Regent Street (**Site 1**) – Project No. PN15010, Drawing Nos. A-0910, A-1000, A-1010, A-1020, A-1030, A-1040, A-1050, A-1060, A-1070, A-1080, A-1090, A-1400, A-2000, issue A, dated 25 November 2015;
- Architectural drawings prepared by Candalepas Associates for 13-17 Regent Street (**Site 2**) – Job No. 5766, Drawing Nos. SK-1000, SK-1101 to SK-1105, SK-1161, SK-1162, SK-1201, SK-1301 to SK-1303, SK-1851, issue P5, dated 20 November 2015;
- Architectural drawings prepared by Nordon Jago Architects for 287-309 Trafalgar Street (**Site 3**) – Job No. DEI00614, Drawing Nos. DN.001 to DN.008, DN.010 to DN.020, and DN.120, latest issue E, dated 25 November 2015;
- Detailed site survey of Site 3 prepared by Daw & Walton Pty Ltd – Job No. 2471-14, dated 9 December 2014; and
- Detailed site survey of Site 1, 2, and 3 prepared by Usher & Company – Plan Reference. 4566-DET, sheets 1-8 of 8, Issue 2, dated 24 October 2012.

Based on the above, we understand that the proposed development will involve the demolition of the existing site structures and redevelopment of the site into three, multi-storey mixed-use commercial and residential apartment buildings. The site is split into three sites and the proposed development at each site is outlined below:

- **Site 1 – 3-7 Regent Street:** A seven-storey residential apartment building over two-level basement carpark. The lowest basement level (B2) is proposed to have a Finish Floor Level (FFL) of Reduced Level (RL) 31.25m Australian Height Datum (AHD). EI has assumed a Bulk Excavation Level (BEL) of RL 30.95m AHD to allow for the construction of the basement slab. To achieve the latter, excavations ranging from depths of about 6.1m at the western end to 12.9m Below Existing Ground Level (BEGL) at the eastern end will be required. Locally deeper excavations may be required for footings, service trenches and lift overrun pits.
- **Site 2 – 13-17 Regent Street:** A six-storey residential apartment building over a stepped two to three-level basement carpark. The lowest basement level (B3) is proposed to have a FFL of RL 30.7m AHD, while the second basement level (B2) is proposed to have a FFL of RL 33.7m AHD. EI has assumed a BEL of RL 30.4m and 33.4m AHD for B3 and B2, respectively, to allow for the construction of the basement slab. To achieve the latter, excavations depths between about 9.6m to 14.6m BEGL will be required for B3, and depths between about 5.6m to 6.6m BEGL will be required for B2. Locally deeper excavations may be required for footings, service trenches and lift overrun pits.
- **Site 3 – 287-309 Trafalgar Street:** An eight-storey mixed-use residential apartment building over four-level basement carpark. The ground floor of this building is to be occupied by Petersham RSL. The lowest

basement level (B4) is proposed to have a FFL of RL 23.1m AHD. EI has assumed a BEL of RL 22.8m AHD to allow for the construction of the basement slab. To achieve the latter, excavations ranging from depths of about 8.4m at the north-western end to 14.7m BEGL at the south-eastern end will be required. Locally deeper excavations may be required for footings, service trenches and lift overrun pits.

1.3 Investigation Objectives

The objective of the GI was to assess site surface and subsurface conditions, and to provide geotechnical advice and recommendations addressing the following:

- Dilapidation Surveys;
- Excavation methodologies and monitoring requirements;
- Rock Excavation;
- Groundwater considerations;
- Excavation support requirements, including geotechnical design parameters for retaining walls and shoring systems;
- Building foundation options, including;
  - Preliminary design parameters.
  - Earthquake loading factor in accordance with AS1170.4:2007.
- Requirements for additional geotechnical works.

1.4 Scope of Works

The scope of works for the GI included:

- Preparation of a Work Health and Safety Plan;
- Review of relevant geological maps for the project area;
- Site walkover inspection by a Geotechnical Engineer to assess topographical features and site conditions;
- Scanning of proposed borehole locations for buried conductive services using a licensed service locator with reference to Dial Before You Dig (DBYD) plans;
- Auger drilling of thirteen boreholes as follow:
  - **Site 1:** One borehole, BH8M, was drilled by a track-mounted drill rig using solid flight augers equipped with a 'Tungsten-Carbide' (T-C) bit. BH8M was auger drilled to a depth of about 5.6m BEGL (an RL of about 32.1m AHD)**.**
  - **Site 2:** Four boreholes, BH9M to BH11M, and BH12, were drilled by a track-mounted drill rig using solid flight augers equipped with a 'Tungsten-Carbide' (T-C) bit. BH9M, BH10M, BH11M, and BH12 were auger drilled to depths of about 4.5m (an RL of about 34.8m AHD), 1.5m (an RL of about 41.5m AHD), 4.0m (an RL of about 39.5m AHD), and 6.0m BEGL (an RL of about 34.0m AHD), respectively.
  - **Site 3:** Eight boreholes, BH1M, BH2, BH3, BH4M, BH5, BH6M, BH7, and BH15M, were drilled by a track-mounted drill rig using solid flight augers equipped with a 'Tungsten-Carbide' (T-C) bit. The boreholes were auger drilled to depths ranging from about 4.5m to 9.0m BEGL, or RLs between 24.5m to 33.9m AHD.

  The surface levels as shown on the borehole logs were approximated from spot levels shown on the supplied survey plans. Approximate borehole locations are shown on **Figure 2**.
- Standard Penetration Testing (SPT) was carried out during auger drilling of the boreholes to assess soil strength/relative densities. These were augmented, where possible, by hand penetrometer readings on

cohesive soil samples collected in the SPT split tube sampler. Soil samples were sent to Macquarie Geotechnical Pty Ltd (Macquarie) and SGS Australia Pty Ltd (SGS), which are National Australian Testing Authority (NATA) accredited laboratories, for testing and storage.

- The strength of the shale bedrock in the augered sections of the boreholes was assessed by observation of the auger penetration resistance using a T-C drill bit, examination of the recovered rock cuttings, and rock moisture content tests. It should be noted that rock strengths assessed from augered boreholes are approximate and strength variances can be expected.
- Continuation of eleven boreholes using NMLC diamond coring techniques to depths ranging from 9.6m (an RL of about 28.1m) in BH8M to 17.2m (an RL of about 20.2m) in BH5. Rock cores recovered from the boreholes were boxed, logged, photographed and sent to Macquarie for point load strength index testing and storage. The test results are presented in **Appendix A** and **Appendix B**, and the rock core photographs are presented in **Appendix A**. The termination depths are outlined below:
  - **Site 1:** One borehole, BH8M, was extended to a termination depth of about 9.6m BEGL (an RL of about 28.1m AHD)**.**
  - **Site 2:** Three boreholes, BH9M, BH10M, BH11M, were extended to termination depths of about 13.0m (an RL of about 26.3m AHD), 16.0m (an RL of about 27.0m AHD), and 16.0m BEGL (an RL of about 27.5m AHD), respectively.
  - **Site 3:** Seven boreholes, BH1M, BH2, BH3, BH4M, BH5, BH7, and BH15M, were extended to termination depths between 12.7m to 17.2m BEGL, or RLs between 17.2m to 20.2m AHD.
- Measurements of groundwater seepage/levels, where possible, in the augered sections of the boreholes during and shortly after completion of auger drilling;
- Following the completion of coring, BH1M, BH4M, BH6M, BH8M, BH9M, BH10M, BH11M, and BH15M were converted to monitoring wells, and bailed dry of all the water introduced during the coring process on the day of installation; and
- Preparation of this GI report.

An EI Geotechnical Engineer was present on site to set out the borehole locations, direct the testing and sampling, log the subsurface conditions and record groundwater levels.

1.5 Investigation Constraints

The GI was limited by the intent of the investigation and the presence of the existing structures on site, particularly on Site 1 and Site 3. The discussions and advice presented in this report are intended to assist in the preparation of initial designs for the proposed development. Further geotechnical investigations should be carried out following demolition to confirm the subsurface conditions in these areas.

2 SITE DESCRIPTION

2.1 SITE DESCRIPTION AND IDENTIFICATION

The site identification details and associated information are presented in **Table 2-1** below while the site locality is shown on **Figure 1.**

Table 2-1 Summary of Site Information

Information	Detail
Street Address	3-7 Regent Street, 13-17 Regent Street & 287-309 Trafalgar Street, Petersham, NSW 2049
Lot and Deposited Plan (DP) Identification	Site 1: Lot 1 in DP 629058. Site 2: Lot 2 in DP 830175. Site 3: Lot 10 in DP 1004198, and Lot 1 in DP 1208130.
Local Government Authority	Marrickville Council
Parish	Petersham
County	Cumberland
Current Zoning	R4 – High Density Residential (Marrickville Local Environment Plan, 2011)
Site Description	**Site 1:** Occupied by a three-storey brick and concrete commercial building, operating as "Petersham RSL Club". At the time of the investigation, the building appeared to be in good external condition based on a cursory inspection. The building overlies a single-level basement. The extent of the basement was unknown at the time of writing this report. The north-eastern corner of Site 1 is occupied by a brick-paved council car park. A cement-rendered retaining wall located at the south-western corner of the site retaining about 0.7m of material. The Sydney Water DBYD plans (Sequence No. 51049122, dated 23 February 2016) indicate that a 225mm diameter vitrified clay sewer main runs in a northwest-southeast orientation beneath the northern section of the site. The sewer is shown to have an upstream depth to invert ranging from 1.0m to 1.7m BEGL. **Site 2:** Occupied by an asphaltic-concrete paved council car park. The pavement was observed to be in poor to moderate condition, with potholing and cracking observed. Various garden areas with large trees are located across the car park. Low height timber retaining walls (<0.5m high) bound the site at the northern and western site boundaries. At these sections, the site lies about 0.4m higher than street level. The southern end of the site is bound by a brick retaining wall up to about 1m high, followed by a soil batter falling to the north at an angle of about 15°. At the southern end, the street level is about 2m higher than the site. The Sydney Water DBYD plans referenced above indicate that a 225mm diameter salt glazed ware sewer main runs in a roughly east-west orientation beneath the centre of the site. The sewer is shown to have an upstream depth to invert ranging from 3.4m to 4.1m BEGL. **Site 3:** Three, one to two-storey brick commercial warehouses occupy the western section of the site. The warehouses appeared to be in moderate to poor external conditions based on a cursory inspection, with cracking observed on the external walls. The north eastern and southern portions of the site were occupied by a concrete and asphaltic-concrete paved car park. The asphaltic-concrete sections of the pavement were observed to be in poor to moderate condition, with potholing and cracking observed. The concrete paved carpark included a single-level basement car park. The concrete pavement appeared to be in good condition.
Site Area	The site area is approximately 9,800m^2.

2.2 Local Land Use

The site is situated within an area of mixed residential and commercial use. Current uses on surrounding land are described in **Table 2-2** below.

Table 2-2 Summary of Local Land Use

Direction Relative to Site	Land Use Description		
	Site 1	**Site 2**	**Site 3**
North	Two three-storey brick residential apartment buildings with no basement. On-grade car parking occupies the rear of the property. The closest building has a setback of about 4m from the northern site boundary.	Fisher Street, a two-lane concrete paved street, followed by **Site 1**.	Trafalgar Street, a two-lane asphaltic-concrete and concrete paved street. Beyond Trafalgar Street lies the Sydney Trains T2 and T1 rail corridor, and Petersham Station. The rail corridor has a setback of about 19m from the northern site boundary, and the closest rail line has a setback of about 36m. The rail line has an east-west orientation.
East	A narrow asphaltic-concrete laneway, followed by a four-storey concrete and glass office building (Marrickville Council). At the time of writing this GI report, it is unknown whether this building has a basement. The building has a setback of about 3m.	One to three-storey brick residential and commercial buildings. The closest building lies immediately adjacent to the eastern site boundary. The buildings do not appear to have a basement.	Regent Street, a two-lane asphaltic-concrete street, followed by **Site 1**.
South	Fisher Street, followed by **Site 2** and two to three-storey brick residential buildings. The closest building has a setback of about 18m from the southern site boundary. The buildings do not appear to have a basement.	New Canterbury Road, a two-lane asphaltic-concrete road, followed by the Heritage listed Petersham Water Tower and elevated tank. The water tower has a setback of about 39m from the southern Site Boundary. New Canterbury Road is a Roads and Maritimes Services (RMS) asset.	Two-storey brick residential terraces, a two-storey brick community hall, and a two-storey brick residential apartment building lie southwest of the site. The terraces lie immediately adjacent to the site boundary. Beyond these structures lies Fisher Street, followed by one to three-storey brick and weatherboard residential buildings. These buildings do not appear to have a basement.
West	Regent Street, followed by **Site 3.**	Regent Street, followed by two to three-storey brick residential buildings with no basement. The residential buildings have a setback of about 19m from the western site boundary.	Along Trafalgar Street: Two-storey brick commercial buildings with no basement. The closest building lies immediate adjacent to the western boundary. Along Fisher Street: Two-storey brick residential terraces, a two-storey brick community hall, and a two-storey brick residential apartment building. The terraces lie immediately adjacent to the site boundary.

2.3 REGIONAL SETTING

The site topography, geological and hydrogeological information for the locality is summarised in **Table 2-3** below**.**

Table 2-3 Topographic, Geological and Hydrogeological Information

Attribute	Description
Topography	The Site ground topography generally slopes downwards towards the north-west at an angle of about 5°. **Site 1** falls from an RL of about 43.3m AHD at the south-eastern corner of the site to RL 37.0m AHD at the north-western corner. **Site 2** falls from an RL of about 46.1m AHD at the south-eastern corner of the site to RL 38.5m AHD at the north-western corner. **Site 3** falls from an RL of about 37.5m AHD at the south-eastern corner of the site to RL 31.4m AHD at the north-western corner.
Regional Geology	Information on regional sub-surface conditions, referenced from the Department of Mineral Resources Geological Map Sydney 1:100,000 Geological Series Sheet 9130 (DMR 1991) indicates the site to be underlain by Ashfield Shale. Ashfield Shale consists of laminite and dark grey siltstone. The Geological Map also indicates the presence of a dyke in a northeast-southwest orientation, about 80m northwest of the site, a dyke in a north-south orientation, about 50m west of the site, and a dyke in a northeast-southwest orientation, close to the south-eastern corner of the site. Such features can provide a pathway for ground and surface water flow and therefore result in deep weathering of the rock profile.

3 INVESTIGATION RESULTS

3.1 STRATIGRAPHY

For the development of a site-specific geotechnical model, the observed stratigraphy during the GI has been grouped into 7 geotechnical units. A summary of the subsurface conditions across the site, interpreted from the investigation results, is presented in **Table 3-1** below. The depths and RLs of the top of Unit in each Site are outlined in **Table 3-2** below. More detailed descriptions of subsurface conditions at each borehole location are available on the borehole logs presented in **Appendix A**. The details of the method of soil and rock classification, explanatory notes and abbreviations adopted on the borehole logs are also presented in **Appendix A**.

Table 3-1 Summary of Subsurface Conditions

Unit	Material [1]	Observed Thickness (m)	Material Description [1]	Comments
1	**Fill**	0.1 to 1.9	CONCRETE/ A-C over FILL	Concrete up to 200mm thick observed in BH1M and BH8M. Asphaltic-Concrete (A-C) up to 50mm thick observed in BH2, BH3, BH4M, BH5, BH6M, BH7, BH9M, BH10M, BH11M, BH12, and BH15M. The concrete or A-C pavement was underlain by gravelly sand, silty clay, silty gravelly clay, and gravelly clayey fill, with varying content of gravel and sand. The fill appeared to be poorly compacted and "uncontrolled". Fill was not encountered in BH8M, BH10M, and BH11M.
2	**Residual Soil**	0.2 to 2.1	Silty CLAY	Generally stiff to hard silty clay of medium to high plasticity. The silty clay grades into weathered shale at depth. SPT N values range from 7 to 19, and hand penetrometer readings, where possible, on the SPT samples ranged from 100kPa to 500kPa. Not encountered in BH10M, BH11M, and BH12
3	**Class V Shale**	3.2 to 11.6	SHALE	Generally extremely low to very low strength, extremely to distinctly weathered shale with bands of highly fractured low to medium strength shale. Defects in Unit 3 included bedding partings, joints, and up to 92% decomposed and crushed seams/zones. Core loss of 100mm to 2500mm thick was observed in some boreholes. Core loss is inferred to be decomposed clay seams or extremely weathered shale. Encountered in all boreholes.
4	**Class IV Shale**	1.5 to 6.7 [2]	SHALE	Generally very low strength, distinctly weathered shale, with bands of highly fractured low to high strength shale. Defects in Unit 4 included bedding partings, joints, and up to 17% decomposed and crushed seams/zones. Encountered in BH2, BH3, BH4M, BH5, BH6M, and BH12.
5	**Class III Shale**	0.9 to 5.9 [3]	SHALE	Low to medium strength, distinctly to slightly weathered shale. Defects in Unit 5 include bedding partings, joints, and up to 6% decomposed and crushed seams. Core loss of 200mm was observed in BH10M. Core loss is inferred to be decomposed clay seams or extremely weathered shale. Encountered in BH7, BH8M, BH9M, BH10M, and BH11M.
6	**Class II Shale**	2.5 to 6.9 [4]	SHALE	Medium to high strength, slightly weathered to fresh shale. Defects in Unit 6 include bedding partings, joints, and 2% decomposed and crushed seams. Encountered in BH2, BH3, BH4M, BH5, BH9M, BH10M, and BH11M.
7	**Class I Shale**	4.2 to 4.3 [5]	SHALE	High strength, fresh shale. Defects in Unit 7 include sub-horizontal bedding partings and joints. Encountered in BH1M and BH15M only.

Notes:
1 For more detailed descriptions of the subsurface conditions, reference should be made to the borehole logs attached to **Appendix A.**
2 Observed up to termination depth in BH6M and BH12
3 Observed up to termination depth in BH7, BH8M, BH9M, BH10M and BH11M
4 Observed up to termination depth in BH2, BH3, BH4M and BH5
5 Observed up to termination depth in BH1M and BH15M

Table 3-2 Approximate Depth and RL to Top of Unit

Unit	Material	Approximate Depth to Top of Unit (m BEGL) [Approximate RL to Top of Unit (m AHD)] [1]												
		Site 1	Site 2				Site 3							
		BH8M	BH9M	BH10M	BH11M	BH12	BH1M	BH2	BH3	BH4M	BH5	BH6M	BH7	BH15M
1	Fill	0 [37.7]	0 [39.3]	0 [43.0]	0 [43.5]	0 [40.5]	0 [33.0]	0 [32.7]	0 [34.5]	0 [35.5]	0 [36.4]	0 [36.7]	0 [36.6]	0 [31.4]
2	Residual Soil	0.2 [37.5]	1.9 [37.4]	-	-	-	0.9 [32.1]	0.8 [31.9]	1.5 [33.0]	1.5 [34.0]	0.5 [35.9]	0.1 [36.6]	2.3 [34.3]	1.5 [29.9]
3	Class V Shale	0.8 [36.9]	2.1 [37.2]	0.1 [41.5]	0.1 [43.4]	1.3 [39.2]	3.0 [30.0]	1.8 [30.9]	3.0 [31.5]	2.2 [33.3]	0.8 [35.6]	2.5 [29.2]	3.4 [33.2]	3.3 [28.1]
4	Class IV Shale	8.7 [29.0]	7.6 [31.7]	7.2 [35.8]	11.6 [31.9]	4.5 [34.5] [2, 3]	8.5 [24.5]	8.3 [24.4]	7.4 [27.1]	5.5 [30.0]	7.5 [28.9]	7.5 [27.7] [2, 3]	11.1 [25.5]	8.4 [23.0]
5	Class III Shale	8.7 [29.0] [2]	7.6 [31.7] [2]	7.2 [35.8]	11.6 [31.9]	-	10.0 [23.0]	12.0 [20.7]	14.1 [20.4]	9.0 [26.5]	-	-	11.1 [25.5] [2]	8.4 [23.0]
6	Class II Shale	-	-	12.0 [31.0] [2]	13.5 [30.0] [2]	-	10.0 [23.0]	12.0 [20.7] [2]	14.1 [20.4] [2]	9.0 [26.5] [2]	-	-	-	8.4 [23.0]
7	Class I Shale	-	-	-	-	-	10.0 [23.0] [2]	-	-	-	-	-	-	8.4 [23.0] [2]

Notes:

1 Approximate depth and level at the time of our investigation. Depths and levels may vary across the site.
2 Observed up to borehole termination depth.
3 Inferred based on augered borehole.
- Not observed in Borehole

3.2 GROUNDWATER OBSERVATIONS

Groundwater seepage was encountered during the auger drilling of BH1M, BH6M, and BH12 at depths of about 4.5m (or RL 28.5m AHD), 6.0m (or RL 30.7m AHD), and 4.5m BEGL (or RL 36.0m AHD). The water induced during the coring process of the boreholes precluded further observations of the groundwater levels. However, following the completion of the fieldwork, seven monitoring wells were installed in BH1M, BH4M, BH6M, BH9M, BH10M, BH11M, and BH15M for further groundwater monitoring, and were bailed dry on the day of installation. Furthermore, the groundwater levels were recorded on 7 to 11 March 2016, 5 April 2016, and 29 April 2016.

Groundwater levels measured during fieldwork and groundwater monitoring visits are presented in **Table 3-2** below.

Table 3-3 Summary of Groundwater Levels

Monitoring Well / Borehole ID	Date of Observation	Approximate Depth to Groundwater (m BEGL)	Approximate RL of Groundwater (m AHD) [1]	Assumed Bulk Excavation Level (m AHD)
BH8M	29-4-16	1.6	36.1	**Site 1** 30.95
BH9M	10-3-16	2.1	37.2	**Site 2** 30.7
	11-3-16	3.4	35.9	
	5-4-16	3.4	35.9	
	29-4-16	3.0	36.3	
BH10M	10-3-16	2.0	41.0	
	29-4-16	2.8	40.2	
BH11M	10-3-16	1.8	41.7	
	11-3-16	3.3	40.2	
	5-4-16	4.2	39.3	
	29-4-16	3.7	39.8	
BH1M	7-3-16	1.8	31.2	**Site 3** 22.8
	8-3-16	1.9	31.1	
	9-3-16	1.9	31.1	
	10-3-16	1.5	31.5	
	11-3-16	1.5	31.5	
	5-4-16	2.0	31.0	
	29-4-16	1.5	31.5	
BH4M	8-3-16	3.8	31.7	
	9-3-16	3.5	32.0	
	10-3-16	3.3	32.2	
	11-3-16	3.5	32.0	
	5-4-16	3.9	31.6	
	29-4-16	3.5	32.0	
BH6M	11-3-16	3.2	33.5	
	29-4-16	2.7	34.0	
BH15M	9-3-16	2.0	29.4	
	10-3-16	1.9	29.5	
	11-3-16	2.0	29.4	
	5-4-16	2.3	29.1	
	29-4-16	1.8	29.6	

Notes:
1 Approximated from spot levels shown on the supplied survey plans.

3.3 TEST RESULTS

Six soil samples and four groundwater samples were selected for laboratory testing to assess the following:

- Atterberg Limits and Linear Shrinkage;
- Soil and Rock Moisture Content;
- Soil and groundwater aggressivity (pH, Chloride and Sulfate content and electrical conductivity).

A summary of soil and groundwater test results is provided in **Table 3-4** below.

119 selected rock core samples were tested by Macquarie to estimate the Point Load Strength Index (Is_{50}) values to assist with rock strength assessment. The results of the testing are summarised on the attached borehole logs.

Laboratory test certificates are presented in **Appendix B**.

The Atterberg Limits results on Unit 2 indicated these clays to be of high plasticity and have a high potential for shrink /swell movements with changes in moisture content (Class H1).

The point load strength index test results correlated reasonably well with our field assessments of rock strength. The approximate Unconfined Compressive Strength (UCS) of the rock core, estimated from correlations with the point load strength index test results, varied from <1 MPa to 88 MPa.

The investigation indicated low permeability soils were present above the groundwater table. In accordance with Tables 6.4.2(C) and 6.5.2(C) of AS 2159:2009 'Piling – Design and Installation', the results of the pH, chloride and sulfate content and electrical conductivity of the soil, provided the following exposure classifications:

Unit 1 – Fill:

- 'Non-aggressive' for buried concrete structural elements; and
- 'Non-aggressive' for buried steel structural elements.

Unit 2 – Residual Soil:

- 'Mild' for buried concrete structural elements; and
- 'Non-aggressive' for buried steel structural elements.

Unit 3 – Class V Shale:

- 'Mild' to 'Non-aggressive' for buried concrete structural elements; and
- 'Non-aggressive' for buried steel structural elements.

Groundwater:

- 'Mild' to 'Non-aggressive' for buried concrete structural elements; and
- 'Mild' to 'Moderate' for buried steel structural elements.

In accordance with Table 4.8.1 of AS3600-2009 'Concrete Structures' Unit 1, 2, and 3 material would be classified as exposure classification 'A1', 'A2', and 'A1' to 'A2', respectively, for concrete in sulfate soils.

Table 3-4 Summary of Laboratory Test Results

Test/ Sample ID		BH3_ 1.5-1.95	BH8M_ 0.8-0.95	BH9M_ 1.4-1.5	BH10M_ 0.9-1.0	BH7_ 0.5-0.9	BH15M_ 3.0-3.3	BH8M	BH10M	BH15M
Unit		2	3	1	3	1	2	-	-	-
Material Description [1]		Silty Clay	SHALE	FILL	SHALE	FILL	Silty CLAY	GROUND WATER	GROUND WATER	GROUND WATER
Atterberg Limits	Liquid Limit (%)	63	-	-	-	-	-	-	-	-
	Plastic Limit (%)	28	-	-	-	-	-	-	-	-
	Plasticity Index (%)	35	-	-	-	-	-	-	-	-
Linear Shrinkage (%)		14.0	-	-	-	-	-	-	-	-
Aggressivity	pH	-	4.7	5.8	8.0	7.3	5.1	6.1	5.3	6.5
	Electrical Conductivity (µS/cm)	-	49	500	110	270	360	610	1200	1000
	Sulfate SO_4 (mg/kg)	-	67	360	64	300	110	140	270	190
	Chloride Cl (mg/kg)	-	3.7	19	11	63	16	49	140	110
Moisture Content (%)		25.5	9.1	16	6.7	17	24	-	-	-

Notes:
1. More detailed descriptions of the subsurface conditions at each borehole location are available on the borehole logs presented in **Appendix A**.

4 RECOMMENDATIONS

4.1 GEOTECHNICAL ISSUES

Based on the results of the investigation, we consider the following to be the main geotechnical issues for the proposed development:

- Basement excavation methodology;
- Rock excavation;
- Groundwater within the depth of the basement excavation;
- Excavation retention to limit lateral deflections and ground loss as a result of excavations, resulting in damage to nearby structures;
- Existing basement structures in **Site 1** and **Site 3**;
- Foundation design for building loads;
- Access constraints precluded investigation within the majority of **Site 1** and the western corner of **Site 3**. Further investigations to confirm the subsurface conditions in **Site 1** and the western corner of **Site 3**is recommended;
- Proximity to Sydney Trains Corridor which is located north of **Site 3**; and
- Proximity to New Canterbury Road, an RMS asset road which is located south of **Site 2.**

4.2 DILAPIDATION SURVEYS

Prior to excavation and construction, we recommend that detailed dilapidation surveys be carried out on all structures and infrastructures surrounding the site that falls within the zone of influence of the excavation. The zone of influence of the excavation is defined by a distance back from the excavation perimeter of twice the total depth of the excavation. The reports would provide a record of existing conditions prior to commencement of the work. A copy of each report should be provided to the adjoining property owner who should be asked to confirm that it represents a fair assessment of existing conditions. The reports should be carefully reviewed prior to demolition and construction.

4.3 EXCAVATION METHODOLOGY

4.3.1 Excavation Assessment

Prior to any excavation commencing, we recommend that reference be made to the WorkCover Excavation Work Code of Practice – July 2015.

Furthermore, any buried services which run below the site will require diversion prior to the commencement of excavation or alternatively be temporarily supported during excavation, subject to permission or other instructions from the relevant service authorities.

Based on the results of the investigation, the proposed basement excavations for Sites 1, 2, and 3 will therefore extend through the units summarised in **Table 4-1** below. A retention system must be installed prior to excavation commencing.

Table 4-1 Summary of Units Expected to be Encountered During Excavation

Site	Assumed BEL RL (m AHD)	Expected Units
1	30.95	1, 2, and 3
2	B2: 33.4 B3: 30.4	B2: 1, 2, 3, 4, and 5 B3: 1, 2, 3, 4, 5, and 6
3	22.8	All Units

Units 1, 2, 3, and 4 could be excavated using buckets of large earthmoving Hydraulic Excavators, particularly if fitted with 'Tiger Teeth', with some light to moderate ripping.

Excavation of Unit 5, 6 and 7 is expected to present hard or heavy ripping, or "hard rock" excavation conditions. Ripping of Unit 5 would require a high capacity and heavy bulldozer of at least D9 or similar, and Unit 6 and 7 will require a dozer of at least D10 or similar for effective production. Excavation productivity within Unit 5, 6 and 7 will be slow and possibly higher than normal 'wear and tear' of excavation attachments can be expected, and this should be allowed for.

Alternatively, hydraulic rock breakers, rock saws and/ or rotary grinders could be used, though productivity would be lower and equipment wear increases, and this should be allowed for. Such equipment would also be required for detailed excavation, such as footings or service trenches, and for trimming of faces. Final trimming of faces may also be completed using a grinder attachment rather than a rock breaker in order to assist in limiting vibrations. The use of rotary grinders generally generates dust and this may be supressed by spraying with water.

Excavation using rock hammers should commence away from the adjoining structures and the transmitted vibrations monitored to assess how close the hammer can operate to the adjoining structures while maintaining transmitted vibrations within acceptable limits. Alternatively, vibration monitors may be set up on the adjoining buildings to monitor vibrations at all times during rock excavation. Such monitors should be attached to base of external walls of existing building and/ or infrastructure in closest proximity to the excavation and have flashing lights to warn the operator when acceptable limits have been reached. Reference should be made to **Appendix C** for acceptable limits of transmitted vibrations.

Where the transmitted vibrations are excessive, alternate excavation equipment would need to be used, such as a small rock hammer, ripping hooks, rotary grinders or rock saws. If an alternate rock hammer is to be used, the transmitted vibrations from that hammer should be measured to determine how close each individual hammer can operate to the adjoining buildings. To assist in reducing vibrations and over-break of the shale, we recommend that initial saw cuts through the bedrock may be provided using rock saw attachments fitted to the excavator. However, the effectiveness of such approach must be confirmed by the results of vibration monitoring

Groundwater seepage monitoring should be carried out during bulk excavation prior to finalising the design of a pump out facility. Outlets into the stormwater system will require Council approval.

4.3.2 Vibration Considerations

Utmost care must be taken when using excavators with hydraulic impact hammer attachments for any rock excavation, as there will likely be direct transmission of ground vibrations to nearby structures and infrastructures. Guideline levels of vibration velocity for evaluating the effects of vibration in structures are given in the attached Vibration Limits in **Appendix C**. We recommend that the acceptable limit for transmitted vibration be set at quite a low peak particle velocity of 5mm/s for frequencies of less than 10Hz at foundation level. To fall within these limits, we recommend that the size of rock hammers initially used during the trial not exceed medium sized rock hammer, say 900kg. If it is found that transmitted vibrations are unacceptable, then it would be necessary to change to a smaller excavator with a smaller rock hammer, or to a rotary grinder, rock saws, or jackhammers.

If rock hammers are to be used, we recommend that the initial excavation in rock should preferably be commenced away from likely critical areas and vibration monitoring be carried out. The monitoring program should be confirmed when details of the contractor's excavation methods and sequence are known.

Vibrations induced by excavations can be reduced by alternative methods such as the following:

- Commence the rock excavation away from potentially sensitive areas;
- Keep rock hammer orientation towards the face and enlarge excavation by breaking small wedges off faces;
- Operate hammers in short bursts only;
- Use smaller equipment (resulting in low productivity); and
- Use line sawing, especially along boundaries, to assist in breaking and trimming.

Furthermore, we recommend that only excavation contractors with appropriate insurances and experience on similar projects be used. The contractor should also be provided with a copy of this report to make his own judgement on the most appropriate excavation equipment.

4.3.3 Excavation Monitoring

Consideration should be made to the impact of the proposed development upon neighbouring structures, roadways and services, particularly the Sydney Trains and RMS assets to the north and south, respectively. Basement excavation retention systems should be designed so as to limit lateral deflections.

Contractors should also consider the following limits associated with carrying out excavation and construction activities:

- Limit lateral deflection of temporary or permanent retaining structures;
- Limit vertical settlements of ground surface at common property boundaries and services easement.
- Limit Peak Particle Velocities (PPV) from vibrations, caused by construction equipment or excavation, experienced by any nearby structures and services.

Monitoring of deflections of retaining structures and surface settlements should be carried out by a registered surveyor at agreed points along the excavation boundaries and along existing building foundations/ services/ pavements and other structures located within or near the zone of influence of the excavation. Owners of existing services adjacent to the site should be consulted to assess appropriate deflection limits for their infrastructure. Measurements should be taken:

- Prior to commencement of excavations;
- Immediately after installation of any temporary or permanent retaining structures;
- Immediately after the excavation has reached a depth of 1.5 m, and each 1.5 m depth increment thereafter;
- Immediately after the excavation has reached bulk excavation level; and
- Immediately after backfilling behind retaining structures.

4.4 Groundwater Considerations

Groundwater within the wells was measured at the levels summarised in **Table 4-2** below.

Table 4-2 Summary of Groundwater Levels

Site	Range of Groundwater RLs Measured m AHD)	Assumed BEL RL (m AHD)
1	36.1	30.95
2	35.9 to 41.7	B2: 33.4 B3: 30.4
3	29.1 to 34.0	22.8

The groundwater levels in the wells installed at the three sites were measured to be well above the proposed bulk excavation levels.

Experience shows that due to the expected low permeability of the residual clayey soil and shale bedrock profile, groundwater inflows into the excavation should not have an adverse impact on the proposed development or on the neighbouring sites. However, we expect that some groundwater inflows into the excavation along the soil/rock interface and through any defects within the shale bedrock (such as jointing, and bending planes, etc.) particularly following a period of heavy rain. The initial flows into the excavation may be locally high, but would be expected to decrease considerably with time as the bedding seams/joints are drained. We recommend that monitoring of seepage be implemented during the excavation works to confirm the capacity of the drainage system.

We expect that any seepage that does occur will be able to be controlled by a conventional sump and pump system. We recommend that a sump-and-pump system be used both during construction and for permanent groundwater control below the basement floor slab.

In the long term, drainage should be provided behind all basement retaining walls, around the perimeter of the basement and below the basement slab. The completed excavation should be inspected by the hydraulic engineer to confirm that adequate drainage has been allowed for. Drainage should be connected to the sump-and-pump system and discharging into the stormwater system. The permanent groundwater control system should take into account any possible soluble substances in the groundwater which may dictate whether or not groundwater can be pumped into the stormwater system.

The design of drainage and pump systems should take the above issues into account along with careful ongoing inspections and maintenance programs. EI recommends further detailed groundwater monitoring with pump out tests be carried out within the installed monitoring wells for monitoring of groundwater levels and estimation of seepage volumes.

4.5 Excavation Retention

4.5.1 Support Systems

From a geotechnical perspective, it is critical to maintain the stability of the adjacent structures and infrastructures during demolition and excavation works. Excavations and retention systems will need to take into consideration the stability of adjoining structures so as not to have any adverse effects on the buildings and structures adjoining the excavation.

The proposed basement footprint of **Sites 1, 2, and 3** are proposed to extend close to the site boundaries. Based on this and the encountered subsurface conditions, temporary batter slopes of the soil and weathered rock profile will not be feasible and are not recommended for this site. Unsupported vertical cuts are not recommended for this site as these carry the risk of potential slump failure especially after a period of wet weather. Slumping of the material may result in injury to personnel and/or damage to nearby structures/infrastructures and equipment.

A suitable full-depth retention system, such as anchored or propped soldier pile walls, with concrete infill panels, installed to below bulk excavation levels is recommended and will be required for the support of the entire excavation. Anchors and/or props and shotcrete must be installed progressively as excavation proceeds. The use of a more closely spaced shoring system (such as semi-contiguous or contiguous) is preferred adjacent to neighbouring buildings/infrastructures, so as to reduce the lateral movements and the risk of potential damage. The piles must be installed to below BEL and socketed into Unit 5 shale or better with a nominal socket of 1.0m. The retention system must be installed prior to excavation commencement.

The proposed development consists of three separate buildings with two to four-level basements. Anchors may not be suitable for additional lateral restraint due to the close proximity of the proposed adjoining basements, and therefore internal props or bracing may be required.

If the walls of the existing basements (Site 1 and 3) are to be retained, underpinning and/or additional lateral support (such as bracing) or strengthening may be required and these should be designed by the structural engineer.

Bored piers may be used for all three sites. However, relatively large capacity piling rigs (e.g. Soilmec SR-40 or larger) will be required for drilling through the shale bedrock. We recommend further advice be sought from piling contractors who should be provided with a copy of this report. Working platforms may also be required.

4.5.2 Retaining Walls Design Parameters

The following parameters may be used for static design of temporary and permanent retaining walls at the subject site:

- For progressively anchored or propped walls where minor movements can be tolerated (provided there are no buried movement sensitive services), we recommend the use of a trapezoidal earth pressure distribution of 6H kPa for soil and shale bedrock, where H is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system;
- For progressively anchored or propped walls which support areas which are highly sensitive to movement (such as areas where movement sensitive structures or infrastructures or buried services are located in close

proximity), we recommend the use of a trapezoidal earth pressure distribution of 9H kPa for soil and shale bedrock, where 'H' is the retained height in meters. These pressures should be assumed to be uniform over the central 50% of the support system;

- Full hydrostatic pressures must be taken into consideration in the design of retaining walls unless measures are taken to provide complete and permanent drainage behind the walls. Strip drains protected with a non-woven geotextile fabric should be used behind the shotcrete infill panels for soldier pile walls or inserted between gaps in contiguous piles. Alternatively, for the contiguous pile walls, weepholes comprising 20mm diameter PVC pipes grouted into holes or gaps between adjacent piles at 1.2m centres (horizontal and vertical), may be used. The embedded end of the pipes must, however, be wrapped with a non-woven geotextile fabric (such as Bidim A34) to act as a filter against subsoil erosion;
- All surcharge loading affecting the walls (including from construction equipment, construction loads, adjacent high level footings, etc.) should be adopted in the retaining wall design as an additional surcharge using an 'at rest' earth pressure coefficient, k_o, of 0.59;
- For piles embedded into Unit 5 or better, the allowable lateral toe resistance value outlined in **Table 4-3** below may be adopted;
- If temporary anchors extend beyond the site boundaries, then permission from the neighbouring developments would need to be obtained prior to installation. Also, the presence of neighbouring basements (if any) or services and their levels must be confirmed prior to finalising anchor design;
- Anchors should have their bond length within Unit 5 or better. For the design of anchors bonded into Unit 4 or better, the allowable bond stress values outlined in **Table 4-3** below may be used, subject to the following conditions:

    1. Anchor bond lengths of at least 3m behind the 'active' zone of the excavation (taken as a 45 degree zone above the base of the excavation) is provided;
    2. Overall stability, including anchor group interaction, is satisfied;
    3. All anchors should be proof loaded to at least 1.3 times the design working load before locked off at working load. Such proof loading is to be witnessed by and engineer independent of the anchoring contractor. We recommend that only experienced contractors be considered for anchor installation with appropriate insurances;
    4. Permanent anchors must have appropriate corrosion provisions for longevity.

Table 4-3 Geotechnical Design Parameters

Material [1]		Unit 1 Fill	Unit 2 Residual Soil	Unit 3 Class V Shale	Unit 4 Class IV Shale	Unit 5 Class III Shale	Unit 6 Class II Shale	Unit 7 Class I Shale
RL of Top of Unit (m AHD) [2]		See Table 3-2						
Bulk Unit Weight (kN/m³)		18	18	22	23	24	24	24
Earth Pressure Coefficients	At rest, K_o [3]	0.59	0.58	0.53	0.50	0.36	0.29	0.29
	Active, K_a [3]	0.42	0.41	0.36	0.33	0.22	0.17	0.17
	Passive, K_p [3]		-	2.77	3.00	4.60	5.83	5.83
Allowable Bearing Pressure (kPa) [5]		-	-	700	1000	1500	3500	8000 [6]
Allowable Shaft Adhesion (kPa) [4, 5]	in Compression	-	-	70	100	150	350	800 [6]
	in Uplift	-	-	35	50	75	175	400 [6]
Toe Resistance (kPa)		-	-	-	-	200	350	400 [6]
Bond Stress (kPa)		-	-	-	-	200	300	350 [6]
Earthquake Site Risk Classification		• AS 1170.4:2007 indicates an earthquake subsoil class of Class C_e.(Shallow Soil) • AS 1170.4:2007 indicates that the hazard factor (z) for Sydney is 0.08.						

Notes:

1 More detailed descriptions of subsurface conditions are available on the borehole logs presented in **Appendix A.**

2 Approximate levels to top of unit at the time of our investigation. Levels may vary across the site.

3 Earth pressures are provided on the assumption that the ground behind the retaining walls is horizontal.

4 Allowable Shaft Adhesion values given assume there is intimate contact between the pile and foundation material and should achieve a clean socket roughness category R2 or better. Design engineer to check both 'piston pull-out' and 'cone liftout' mechanics in accordance with AS4678-2002 Earth Retaining Structures.

5 To adopt these parameters we have assumed that:
- Piles have a nominal socket of at least two pile diameters or 1 m, whichever is greater, into the relevant founding material;
- There is intimate contact between the pile and foundation material (a clean socket roughness category of R2 or better);
- Potential soil and groundwater aggressivity will be considered in the design of piles;
- The pile should be drilled in the presence of a suitably qualified Geotechnical Engineer prior to pile construction to verify that ground conditions meet design assumptions. Pile excavations should be pumped dry of water prior to pouring concrete, or alternatively a tremie method should be used;
- The bases of all pile excavations are cleaned of loose and softened material and water is pumped out prior to placement of concrete;
- The concrete is poured on the same day as drilling, inspection and cleaning.

6 Subject to the drilling of cored boreholes at max 10m grid spacing **or** cored bores for 50% of footings and spoon testing of remainder.

For the use of any design parameters for Units 5, 6 and 7 in **Site 1** and **3**, EI recommends the drilling of:

- **Site 1**: at least four additional cored boreholes; and
- **Site 3**: at least one additional cored borehole at the western corner of the site.

Furthermore, any existing buried services which run below the site will require diversion prior to the commencement of excavation or alternatively be temporarily supported during excavation, subject to permission or other instructions from the relevant service authorities. Enquiries should also be made for further information and details, such as invert levels, on the buried services.

Sydney Trains and RMS may require further assessment on the potential impact of the proposed development on their asset using computational analysis. If commissioned, we can carry out such works.

4.6 FOUNDATIONS

Following bulk excavations, the following materials are expected to be exposed at the base of each site:

- **Site 1:** Unit 3 – Class V Shale at the assumed BEL RL 30.95m AHD;
- **Site 2: B2:** Unit 3 to 5 – Class V to IIII Shale at the assumed B2 BEL RL 33.4m AHD;

  B3: Unit 5 to 6 – Class III to II Shale at the assumed B3 BEL RL 30.4m AHD;
- **Site 3:** Unit 4 to 7 – Class IV to I Shale at the assumed BEL RL 22.8m AHD;

It is recommended that all footings for the building and retaining walls be founded within shale bedrock of similar strength to provide uniform support and reduce the potential for differential settlements. The footing systems will require careful consideration due to the variable rock conditions and the expected moderate to high column loads

Footings founded within each Unit may be designed for the following allowable bearing capacities outlined below:

- Unit 3 – Class V Shale: 700kPa
- Unit 4 – Class IV Shale: 1000kPa
- Unit 5 – Class III Shale: 1500kPa
- Unit 6 – Class II Shale: 3500kPa
- Unit 7 – Class I Shale: 8000kPa.

Within the basement area, pad/strip footings may be used. Bored piers may be required to found in shale of better quality for certain bearing pressures.

Footings founded at or near the crest of an excavation should be founded below the zone of influence of the lower basement retaining walls, which may be taken as founding below a line drawn at 1 Vertical to 1 Horizontal from the base of the retaining walls. Piles may be required. Specific geotechnical advice should be obtained for such footings taken into consideration the basement excavation and the quality of shale at the particular footing location.

EI recommends the drilling of at least four additional cored boreholes within **Site 1**, and one additional cored borehole at the western corner of **Site 3**, once access is possible. The purpose of these boreholes is to assess the subsurface conditions and depth to quality bedrock across the site.

The use of the high allowable bearing pressure of 8000kPa must be confirmed by the drilling of additional deep cored boreholes across the site at maximum 10m grid spacing **or** by cored bores for 50% of footings and spoon testing of the remainder. The purpose of these works is to confirm the presence and depth of this high quality shale across the site.

Geotechnical inspections of foundations are recommended to determine that the required socket lengths have been achieved and founding material has been reached and determine any variations that may occur between the boreholes and inspected locations.

4.7 Lowest Basement Floor Slab

Following bulk excavations for the proposed basements, shale of variable strength is expected to be exposed at BEL. The lowest basement slab should be provided with a granular sub-base layer to provide a separation between the rock and the floor slab. We recommend that the sub-base layer comprise at least 100mm thickness of crushed rock to RMS QA specification 3051 (2013) unbound base material (or equivalent good quality and durable fine crushed rock) compacted to at least 100% of Standard Maximum Dry Density (SMDD). Concrete pavements should be designed with an effective shear transmission at all joints by way of either dowelled or keyed joints. The completed excavation should be inspected by the hydraulic engineer to confirm the extent of the drainage required

In addition, a system of sub-soil drains comprising a durable single sized aggregate with perforated drains/pipes leading to sumps should be provided. The basement floor slab should be isolated from columns.

Permission may need to be obtained from the NSW Department of Primary Industries (DPI) and possibly Council for any permanent discharge of seepage into the drainage system. Given the subsurface conditions, we expect that seepage volumes would be low and within the DPI limits. However, if permission for discharge is not obtained, the basement may need to be designed as a tanked basement.

5 RECOMMENDATIONS FOR FURTHER GEOTECHNICAL SERVICES

Below is a summary of the previously recommended additional work that needs to be carried out:

- Drilling of at least four additional cored boreholes within **Site 1**, and one additional cored borehole at the western corner of **Site 3**, once access is possible.
- Should higher bearing pressures be required (in the order of 8000kPa), cored boreholes at 10m grid spacing across the site **or** by cored boreholes for 50% of footings and spoon testing of the remainder;
- Pump-out tests within the installed wells;
- Dilapidation surveys;
- Design of working platforms (if required) for construction plant by an experienced and qualified geotechnical engineer;
- Computational analysis may be required to assess the potential impact of the proposed development on the adjacent Sydney Trains corridor and RMS asset road.
- Classification of all excavated material transported off site;
- Witnessing installation and proof-testing of anchors (if required).
- Geotechnical inspections of foundations;
- Spoon testing of footings, if required; and
- Ongoing monitoring of groundwater inflows into the bulk excavation;

We recommend that a meeting be held after initial structural design has been completed to confirm that our recommendations have been correctly interpreted. We also recommend a meeting at the commencement of construction to discuss the primary geotechnical issues and inspection requirements.

6 STATEMENT OF LIMITATIONS

This report has been prepared for the exclusive use of DeiCorp Projects Petersham Pty Ltd who is the only intended beneficiary of EI's work. The scope of the investigation carried out for the purpose of this report is limited to those agreed with DeiCorp Projects Petersham Pty Ltd

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments. Where the recommendations are not implemented in full, EI accept no responsibility whatsoever for the performance of the structure.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling and test locations chosen to be as representative as possible under the given circumstances.

In the instance where the proposed developments have changed, this report must be reviewed as the recommendations may not be applicable.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during construction. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

We draw your attention to the document "Important Information", which is included in **Appendix D** of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by EI, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

Should you have any queries regarding this report, please do not hesitate to contact EI.

7 REFERENCES

AS1170.4:2007, *Structural Design Actions, Part 4: Earthquake Actions in Australia*, Standards Australia.

AS1726:1993, *Geotechnical Site Investigations*, Standards Australia.

AS2159:2009, *Piling – Design and Installation*, Standards Australia.

AS3600:2009, *Concrete Structures,* Standards Australia

Excavation Work Code of Practice – July 2015 – WorkCover NSW,

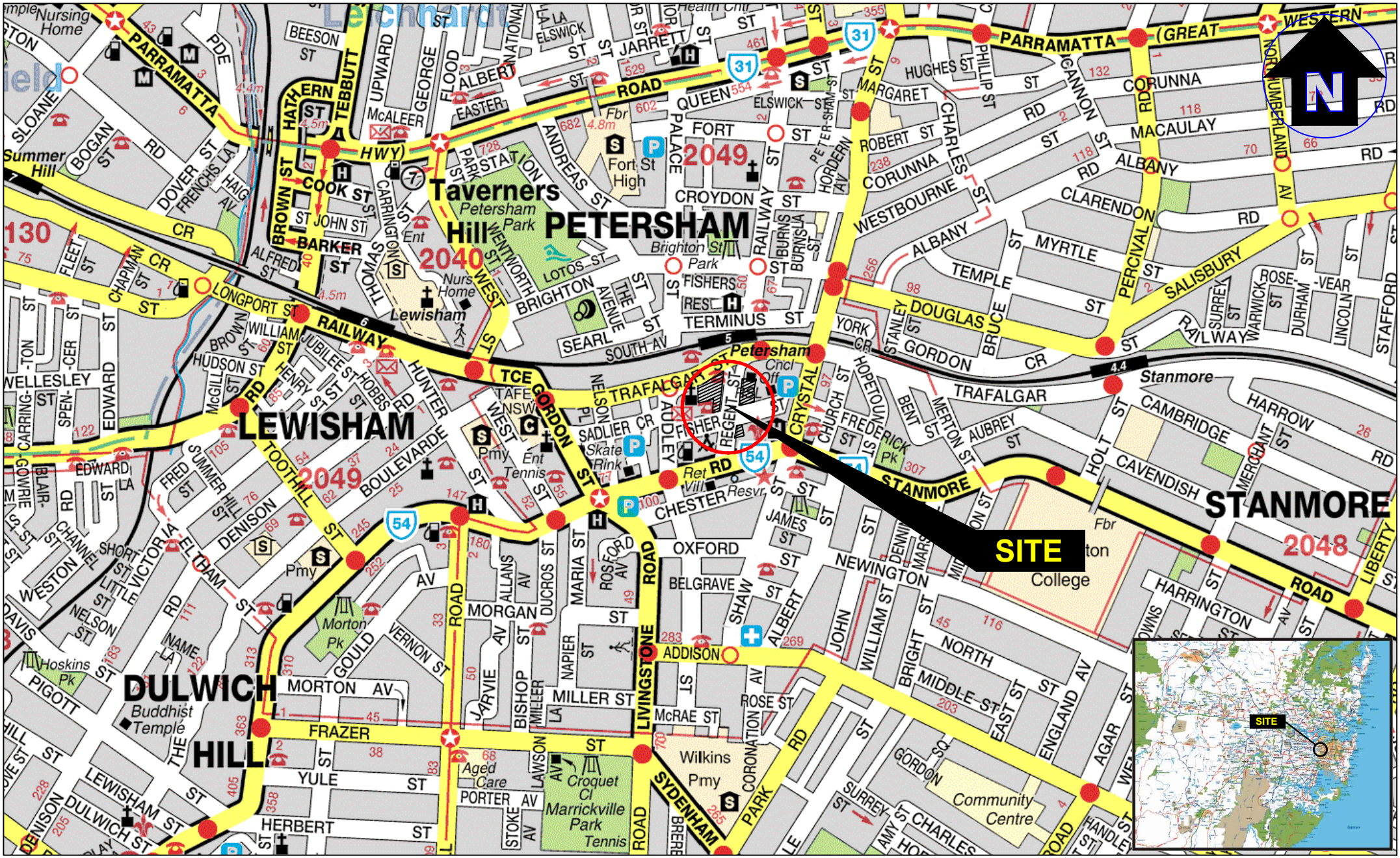
NSW Department of Finance and Service, Spatial Information Viewer, maps.six.nsw.gov.au.

NSW Department of Mineral Resources (1983) Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1). Geological Survey of New South Wales, Department of Mineral Resources.

8 ABBREVIATIONS

A-C	Asphaltic-Concrete
AHD	Australian Height Datum
AS	Australian Standard
BEL	Bulk Excavation Level
BEGL	Below Existing Ground Level
BH	Borehole
DBYD	Dial Before You Dig
DP	Deposited Plan
DSI	Detailed Site Investigation
EI	Environmental Investigations Australia Pty Ltd
FFL	Finish Floor Level
GI	Geotechnical Investigation
NATA	National Association of Testing Authorities, Australia
PVC	Polyvinyl Chloride
RL	Reduced Level
RMS	Roads and Maritime Services
SMDD	Standard Maximum Dry Density
SPT	Standard Penetration Testing
T-C	Tungsten-Carbide
UCS	Unconfined Compressive Strength

FIGURES



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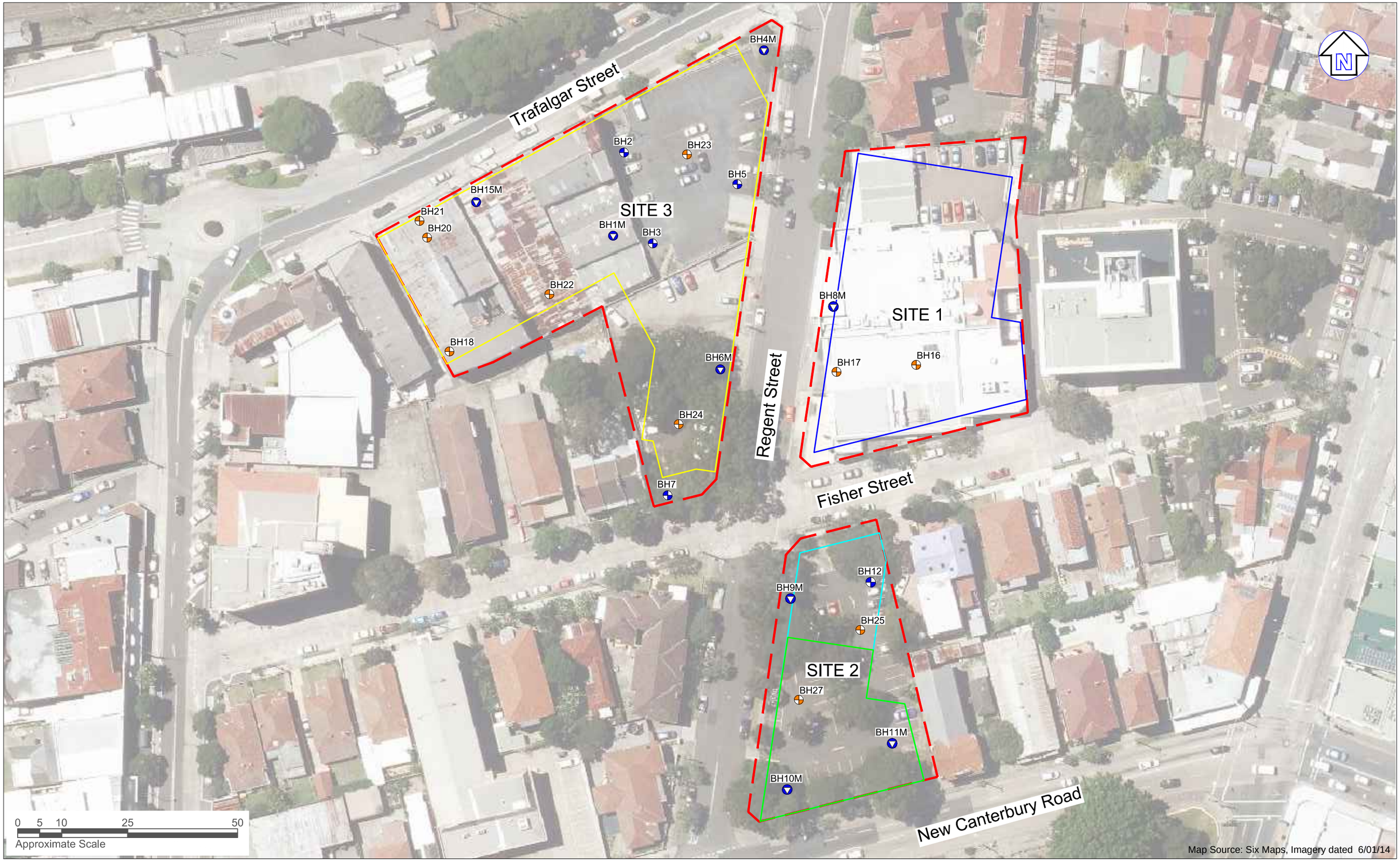
Drawn:	DR
Approved:	JC
Date:	24-5-16
Approx Scale:	N.T.S.

Deicorp Projects Petersham Pty Ltd
Geotechnical Investigation
3-7 & 13-17 Regent Street and 287-309 Trafalgar Street, Petersham, NSW
Site Locality Plan

Figure: 1

Project: E22913 GA



LEGEND

- Approximate Geotechnical Borehole Location
- Approximate Borehole/Monitoring Well Location
- Approximate Environmental Borehole Location
- Approximate Site Boundary
- Proposed Site 1 Basement Outline
- Proposed Site 2 Upper Basement Outline
- Proposed Site 2 Upper Basement Outline
- Proposed Site 3 Basement Outline

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Deicorp Pty Ltd
Detailed Site Investigation
3-7 & 13-17 Regent Street and
287-309 Trafalgar Street, Petersham, NSW

Borehole Location Plan

Figure: 2

Project: E22913 GA

APPENDIX A

BOREHOLE LOGS AND EXPLANATORY NOTES

BOREHOLE: BH1M

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Project	Proposed Mixed Use Development	East	329418.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247996.4 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	33.00 m AHD	Date Started	4/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	4/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 4/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	H		0	0.14				-	CONCRETE; 140mm thick.	-	-	CONCRETE HARDSTAND
				32.86				-	FILL: Silty CLAY; low to medium plasticity, dark grey, with fine to medium gravel and fine grained sand.	-	-	FILL
				0.85	SPT 0.50-0.95 m 2,4,5 N=9							
			1	32.15	BH1M_0.5-.85 BH1M_0.5-0.6 ES 0.50-0.60 m BH1M_0.7-0.8 ES 0.70-0.80 m			CH	Silty CLAY; high plasticity, grey mottled red-brown, with ironstone fragments.		St	RESIDUAL SOIL
		29/04/16		1.50	BH1M_0.85-0.95							
				31.50	PP =100-150 kPa SPT 1.50-1.95 m 3,7,12 N=19 BH1M_1.5-1.95 PP =300-400 kPa				From 1.5m, grey mottled yellow brown.	M (>PL)	VSt	
	E		2									
				3.00								
			3	30.00	SPT 3.00-3.45 m 8,16,16 N=32 BH1M_3.0-3.45			-	SHALE; grey mottled orange brown, extremely low strength, extremely weathered.			WEATHERED ROCK
AD/T			4									
					SPT 4.50-4.60 m 10/100mm HB N=SPT BH1M_4.5-4.6							
			5							-	-	
	F-H		6									
			7									
			8		BH1M_8.0-8.5 D 8.00-8.50 m							
				8.50								
									Continued as Cored Borehole			
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH1M

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Project	Proposed Mixed Use Development	East	329418.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247996.4 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	33.00 m AHD	Date Started	4/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	4/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 4/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	*DEPTH* RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
				6							
				7							
				8							
					8.50		Continuation from non-cored borehole				
NMLC	100% RETURN	100	59 (12)	9	24.50		SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey with grey laminations.	SW		8.52: BP 0° PR SM CN 8.54: BP 0° PR SM CN 8.55: JT 10° PR SM CN 8.57: BP 0° PR SM CN 8.58: BP 0° PR SM CN 8.62: BP 0° PR SM CN 8.63: BP 0° PR SM CN 8.70-8.71: DS 8.72-8.73: DS 8.79-8.80: DS 8.85: BP 0° PR SM CN 8.86: BP 0° PR SM CN 8.90: BP 0° PR SM CN	
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH1M

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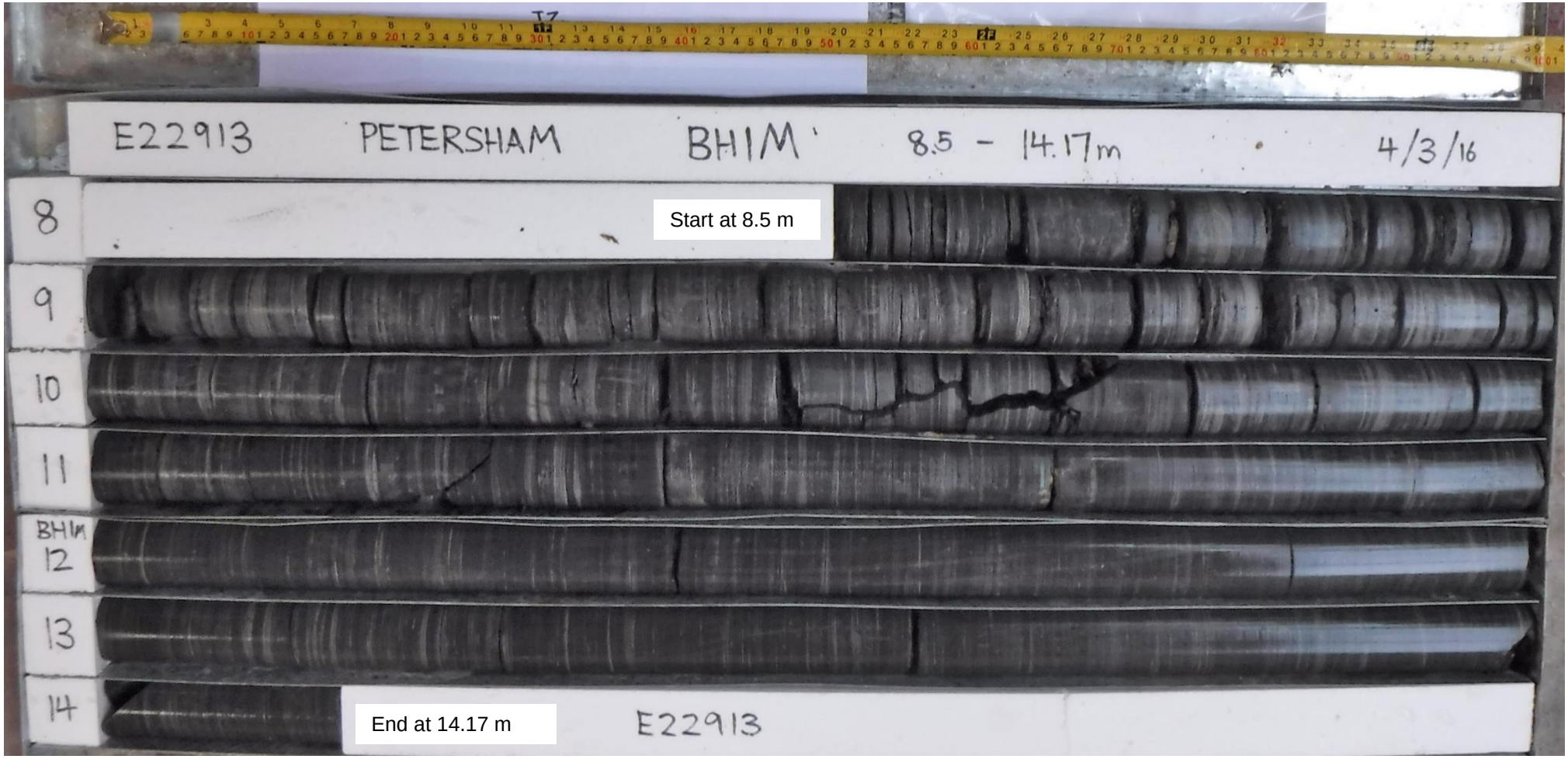
Project	Proposed Mixed Use Development	East	329418.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247996.4 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	33.00 m AHD	Date Started	4/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	4/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 4/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	100% RETURN	100	59 (12)	10			SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey with grey laminations.	SW		8.91-8.92: SZ	
								FR		8.96: JT UN SM CN	
										9.01-9.05: SZ	
										9.07: BP 0° PR SM CN	
										9.08: BP 0° PR SM CN	
										9.10: BP 0° PR SM CN	
										9.15: BP 0° PR SM CN	
										9.17: BP 0° PR SM CN	
				11						9.26: BP 0° PR SM CN	
										9.30: BP 0° PR SM CN	
										9.35: BP 0° PR SM CN	
										9.36: BP 0° PR SM CN	
										9.38: BP 0° PR SM CN	
										9.45: BP 0° PR SM CN	
										9.50: BP 0° PR SM CN	
										9.54: BP 0° PR SM CN	
										9.60: BP 0° PR SM CN	
				12						9.64-9.65: DS	
										9.70: BP 0° PR SM CN	
										9.75: BP 0° PR SM CN	
										9.78-9.81: DS	
		100	96 (100)							9.85: BP 0° PR SM CN	
										9.88: BP 0° PR SM CN	
										9.95: BP 0° PR SM CN	
										9.98: BP 0° PR SM CN	
				13						10.08: BP 0° PR SM CN	
										10.19: BP 0° PR SM CN	
										10.27: BP 0° PR SM CN	
										10.33: BP 0° PR SM VNR	
										10.39: BP 0° PR SM CN	
										10.47-10.69: JT 70 - 90° IRR SM CN	
										10.74: BP 0° PR SM CN	
										10.83: BP 0° PR SM CN	
										10.94: BP 0° PR SM CN	
				14						11.05: BP 0° PR SM CN	
										11.10: BP 0° PR SM CN	
					14.17					11.25: JT 45° PR SM CN	
					18.83		Hole Terminated at 14.17 m Borehole converted to monitoring well.			11.39: DB	
										11.66: BP 0° PR SM CN	
										12.40: BP 0° PR SM CN	
										12.82: BP 0° PR SM CN	
				15						13.13: BP 0° PR SM CN	
										13.28: BP 0° PR SM CN	
										13.56: BP 0° PR SM CN	
										14.02: JT 45° PR SM CN	
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH1M

Project:	Proposed Mixed Use Development	East:	329418.8 m	Depth Range:	8.50 m to 14.17 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247996.4 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	33.00 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 4/5/16
Job No. :	E22913	Box:	1 & 2 of 2	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	14.17 m		



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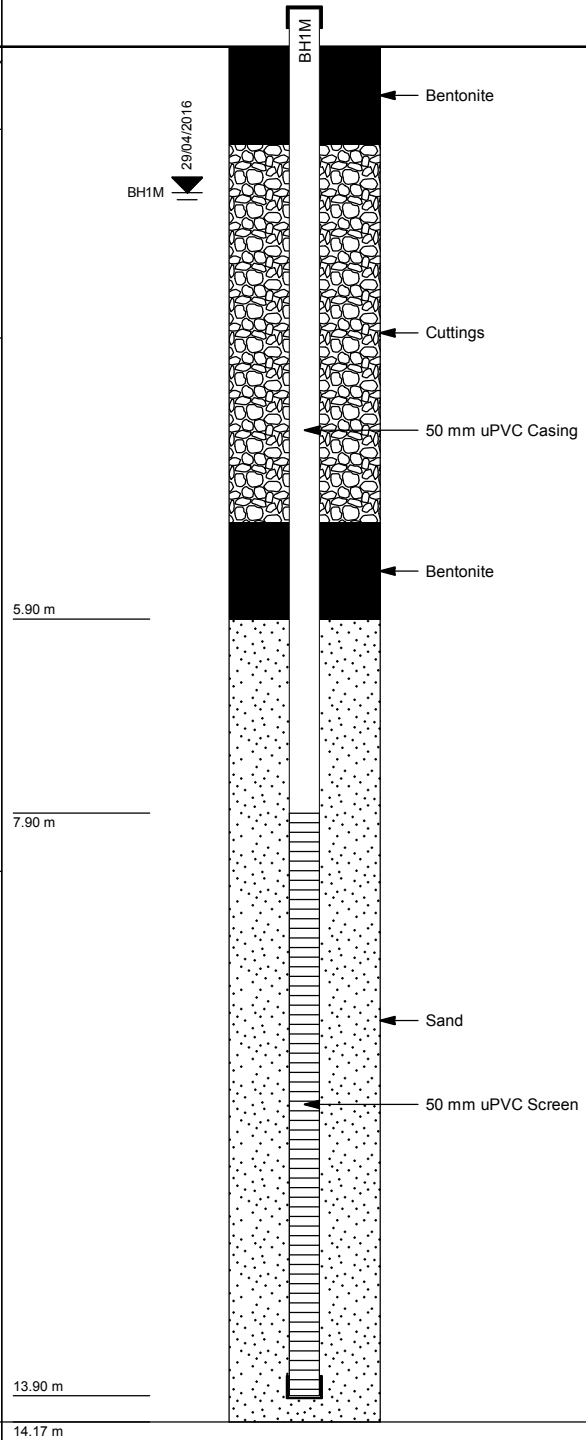
Hole ID
BH1M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 3	SHEET	: 1 OF 1
CONTRACTOR	: Rockwell Drilling Pty Ltd	EASTING	: 329418.8 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247996.4 m	LOGGED BY	: JZ
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 04/03/2016
PROJECT No.	: E22913	GROUND RL	: 33.00 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
DT		0			CONCRETE; 140mm thick.
AD/T	▽		32		FILL: Silty CLAY; low to medium plasticity, dark grey, with fine to medium gravel and fine grained sand.
		2			Silty CLAY; high plasticity, grey mottled red-brown, with ironstone fragments.
					From 1.5m, grey mottled yellow brown.
			30		SHALE; grey mottled orange brown, extremely low strength, extremely weathered.
		4	28		
		6			
			26		
		8			
NMLC	100% RETURN		24		SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey with grey laminations.
		10			
			22		
		12			
			20		
		14			
					Hole Terminated at 14.17 m Borehole converted to monitoring well.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH1M	Standpipe	13.90 m 19.10 m	04/03/2016	1.50m



RIG	:	CHECKED BY	: SK	REMARK	
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.	
AZIMUTH	:	APPROVED BY	:		
HOLE DIA.	:	APPROVED DATE	:		

BOREHOLE: BH2

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Project	Proposed Mixed Use Development	East	329421.4 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248018.4 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	32.70 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	32.65				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
					BH2_0.2-0.5 ES 0.20-0.50 m			-	FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.	D	-	FILL
				0.50								
				32.20	SPT 0.50-0.95 m 3,5,6 N=11			-	FILL: Silty CLAY; low plasticity, dark grey mottled red, trace of fine to medium, subangular gravel.	M (>PL)		
				0.80								
				31.90	BH2_0.5-0.8 BH2_0.8-0.95 0.80 m PP =200-250 kPa BH2_1.2-1.5 ES 1.20-1.50 m SPT 1.50-1.95 m 4,6,15 N=21			CH	Silty CLAY; high plasticity, grey mottled red-brown, with ironstone gravel, fine to medium, sub-rounded.	M (>PL)	VSt	RESIDUAL SOIL
	E		1									
				1.80								
				30.90	BH2_1.5-1.8 1.50 m PP =250-300 kPa BH2_1.8-1.95			-	SHALE; dark brown/grey/red-brown, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
			2									
			3		SPT 3.00-3.45 m 10,22,25 N=47 BH2_3.0-3.45					-	-	
	F		4									
					SPT 4.50-4.70 m 22,10/50mm HB N=10/50mm BH2_4.5-4.7							
			5		BH2_5.0-5.5 D 5.00-5.50 m							
				5.50								
									Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH2

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Project	Proposed Mixed Use Development	East	329421.4 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248018.4 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	32.70 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.50		Continuation from non-cored borehole				
NMLC	90-100% RETURN				27.20		CORELOSS: 300mm thick.				
					5.80						
				6	26.90		SHALE; dark grey/dark brown.	XW - DW		5.83-5.86: DS 30mm 5.87: BP 0 - 5° CU SM VNR 5.89: BP 0 - 5° CU SM VNR 5.91-6.03: DS Clay 120mm 6.03-6.91: DZ Clay 880mm	
		89	6 (0)	7						6.97: JT 5° CU SM VNR 6.98-7.00: DS 20mm 7.00-7.06: JT 45° PR SM VNR 7.03: BP PR SM VNR 7.06: BP PR SM VNR 7.13: BP PR SM VNR 7.17-7.21: JT 45° PR SM VNR 7.19: BP 0° PR SM CN	
					7.86						
				8	24.84		SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey with brown iron staining.	DW - SW		7.30: BP 5° PR SM VNR 7.38-7.50: DS 120mm 7.56-7.60: DS 40mm 7.70-7.85: CS 150mm 7.94: BP 0° PR SM CN 8.00-8.08: CS 80mm 8.08-8.11: JT 90° PR SM CN 8.11-8.33: CZ 220mm 8.35-8.37: DS 20mm 8.39: BP 0° PR SM CN 8.43-8.41: BP 0° PR SM CN 8.46-8.48: DS 20mm 8.50: BP 0° PR SM CN 8.51: BP 0° PR SM CN 8.55-8.56: DS 20mm 8.61: BP 0° PR SM CN 8.67-8.68: DS 10mm 8.71: BP 0° PR SM CN 8.81: BP 0° PR SM CN	
		100	27 (8)	9							
		100	22 (7)	10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH2

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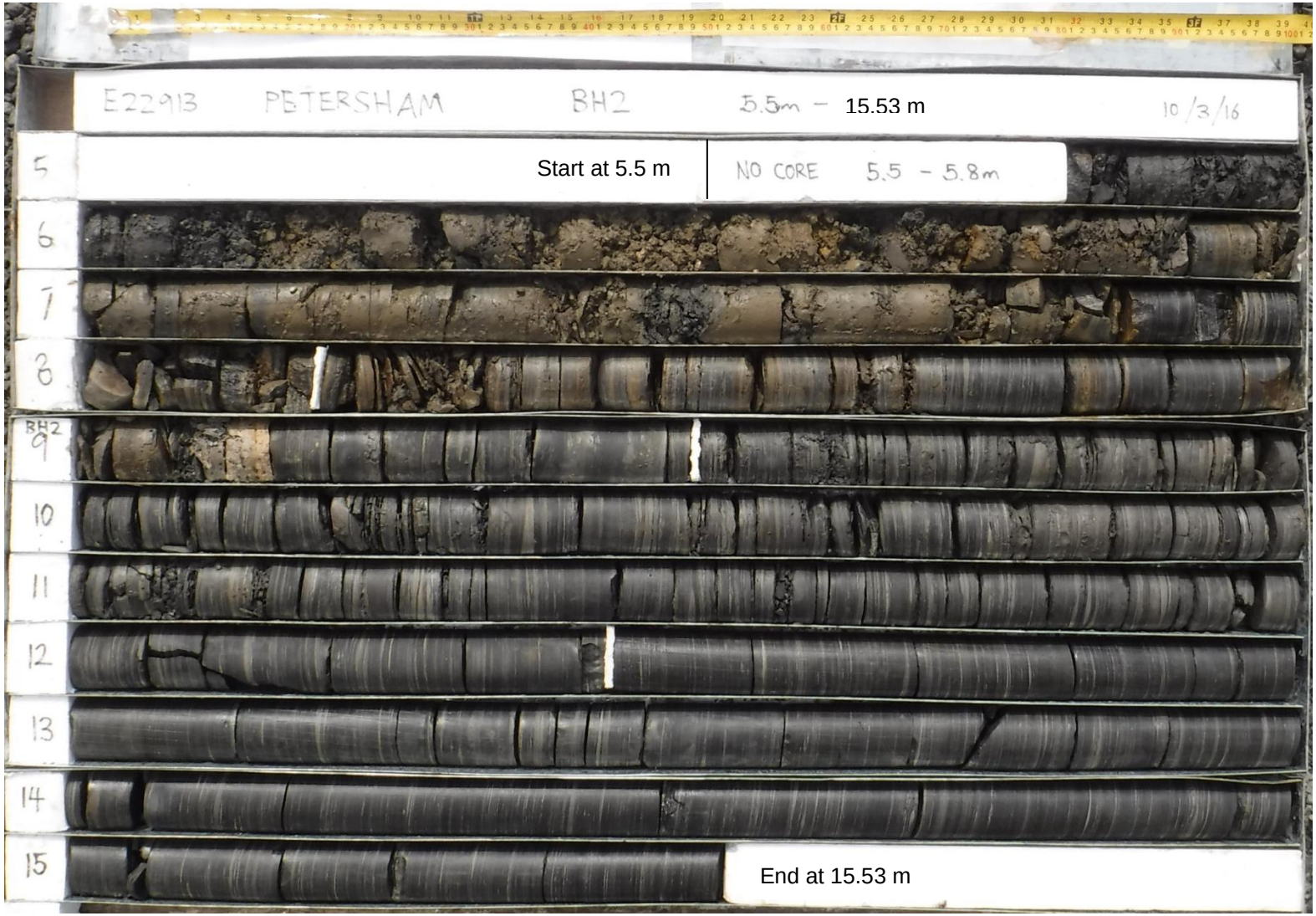
Project	Proposed Mixed Use Development	East	329421.4 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248018.4 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	32.70 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	90-100% RETURN	100	22 (7)	10			SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey with brown iron staining.	DW - SW		8.85: BP 0° PR SM CN 8.89: BP 0° PR SM CN 8.95: BP 0° PR SM CN 9.00-9.03: CS 30mm 9.07-9.12: CS 50mm 9.12-9.16: IS Clay 40mm 9.21: BP 0° PR SM CN 9.25: BP 0° PR SM CN 9.30: BP 0° PR SM CN 9.33: BP 0° PR SM CN 9.37: BP 0° PR SM CN 9.48: BP 0° PR SM CN 9.53-9.54: DS 10mm 9.58: BP 0° PR SM CN 9.61-9.63: DS 20mm 9.63-10.00: BPx10 0° PR SM CN 9.97: JT 90° PR SM CN	
				11							
				12	*12.00* 20.70		SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.	FR		10.53: BP 0° PR SM CN 10.55: BP 0° PR SM CN 10.59: BP 0° PR SM CN 10.61: BP 0° PR SM CN 10.65: BP 0° PR SM CN 10.71: BP 0° PR SM CN 10.75-10.77: DS Clay 20mm 10.79-10.80: DS Clay 10mm 10.83-10.84: DS 10mm 10.89: BP 0° PR SM CN 10.93: BP 0° PR SM CN 10.94: BP 0° PR SM CN 10.95: BP 0° PR SM CN 10.97: BP 0° PR SM CN 11.01: BP 0° PR SM CN 11.03-11.10: CS 70mm 11.15-11.16: DS 10mm 11.19: BP 0° PR SM CN 11.22: BP 0° PR SM CN 11.24: BP 0° PR SM VNR 11.26: BP 0° PR SM CN 11.30: BP 0° PR SM CN 11.32: BP 0° PR SM CN 11.33: BP 0° PR SM CN 11.44: BP 0° PR SM CN 11.49: BP 0° PR SM CN 11.52: BP 0° PR SM CN 11.55: BP 0° PR SM CN 11.94-11.96: JT 80 - 90° ST SM CN 12.06-12.18: JT 70 - 90° UN SM CN 12.10: BP 0° PR SM CN 12.21: BP 0° PR SM CN	
		100	89 (74)	13							
				14							
				15	*15.53* 17.17		Hole Terminated at 15.53 m Backfilled with drilling spoil and concrete capped.			12.32: BP 0° PR SM CN 12.41: BP 0° PR SM CN 12.55: BP 0° PR SM CN 12.68: BP 0° PR SM CN 12.81: BP 0° PR SM CN 12.91: BP 0° PR SM CN 12.95: BP 0° PR SM CN 13.13: BP 0° PR SM CN 13.26: BP 0° PR SM CN 13.29: BP 0° PR SM CN 13.36: BP 0° PR SM CN 13.46: BP 0° PR SM CN 13.57: BP 0° PR SM CN 13.68: BP 0° PR SM CN 13.71-13.75: JT 45° UN SM CN 13.81: BP 0° PR SM CN 13.88: BP 0° PR SM CN 14.01: BP 0° PR SM CN 14.05-14.06: DS 10mm 14.18: BP 0° PR SM CN 14.47: BP 0° PR SM CN 14.68: BP 0° PR SM CN 14.94: BP 0° PR SM CN 15.04-15.06: CS 20mm 15.17: BP 0° PR SM CN 15.26: BP 0° PR SM CN 15.38: BP 0° PR SM CN	
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH2

Project:	Proposed Mixed Use Development	East:	329421.4 m	Depth Range:	5.50 m to 15.53 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6248018.4 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	32.70 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 10/3/16
Job No. :	E22913	Box:	1, 2 & 3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	15.53 m		



BOREHOLE: BH3

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Project	Proposed Mixed Use Development	East	329427.3 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247994.5 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	34.50 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	9/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 9/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	34.45				-	ASPHALT: 50mm thick.	-		PAVEMENT
					BH3_0.2-0.5 ES 0.20-0.50 m			-	FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.	D		FILL
				0.50								
				34.00	SPT 0.50-0.95 m 2,2,2 N=4 BH3_0.5-0.95			-	FILL: Silty CLAY; low plasticity, dark grey mottled red, trace of fine to medium gravel.		-	
			1		BH3_0.8-1.0 ES 0.80-1.00 m							
				1.50								
	E			33.00	SPT 1.50-1.95 m 3,4,6 N=10 BH3_1.5-1.95 1.50 m PP =200-300 kPa			CH	Silty CLAY; high plasticity, grey mottled brown.	M (>PL)	St - VSt	RESIDUAL SOIL
			2									
				3.00								
			3	31.50	SPT 3.00-3.45 m 17,18,29 N=47 BH3_3.0-3.45			-	SHALE; dark brown/grey, extremely low to very low strength, extremely to distinctly weathered.	-	-	WEATHERED ROCK
	F											
			4		BH3_4.0-4.5 D 4.00-4.50 m							
				4.50								
									Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH3

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Project	Proposed Mixed Use Development	East	329427.3 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247994.5 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	34.50 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	9/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 9/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
					4.50		Continuation from non-cored borehole				
NMLC	90-100% RETURN	100	18 (23)	5	30.00		SHALE; grey to dark grey with red-brown iron staining.	XW - DW		4.50-4.75: DS Clay 250mm 4.75-4.90: CS 150mm 4.97-5.11: DS 5.15: JT 10° ST SM SN 5.29: JT 30° UN SM SN 5.32-5.50: DS Clay 180mm	
		100	25 (0)	6	*6.70*					5.59-5.66: DS Clay 70mm 5.76: JT 45° PR SM VNR 5.80-5.86: DS Clay 5.90: JT 30° UN SM VNR 6.00-6.09: DS Clay 90mm 6.14-6.35: CS 210mm 6.35-6.37: DS 20mm 6.42-6.44: DS Clay 20mm 6.47: BP 0° UN SM VNR	
		94	57 (49)	7	27.70		CORELOSS: 100mm thick. SHALE; grey to dark grey with red-brown iron staining.	DW		6.49: JT 45° UN SM VNR 6.50: BP 0° PR SM VNR 6.60-6.66: DS Clay 60mm 6.80-6.89: JT 80° PR SM CN 6.89-6.92: DS Clay 30mm 6.95-6.97: DS Clay 20mm 7.12: BP 0° PR SM VNR 7.16-7.22: CS 60mm 7.22-7.25: DS Clay 30mm 7.30-7.34: CS 40mm 7.34-7.37: DS Clay 30mm 7.64-7.65: DS 10mm 7.92: BP 0° PR SM CN 8.16: BP 0° PR SM CN	
				8	*7.37*						
		100	43 (35)	9	27.13		SHALE; bedding dipping 0-5°, <1mm thick, dark grey, with occasional brown ironstaining.	SW		8.34: BP 0° PR SM CN 8.42: BP 0° PR SM CN 8.46: BP 0° PR SM CN 8.57: BP 0° PR SM CN 8.71: BP 0° PR SM CN 8.74: BP 0° PR SM CN 8.77: JT 30° UN SM CN 8.78: BP 0° PR SM CN 8.85: BP 0° PR SM CN 8.90: BP 0° PR SM CN 8.94: BP 0° PR SM CN 8.96: JT 45° PR SM CN 8.97-9.00: DS 30mm 9.12: BP 0° PR SM CN	
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH3

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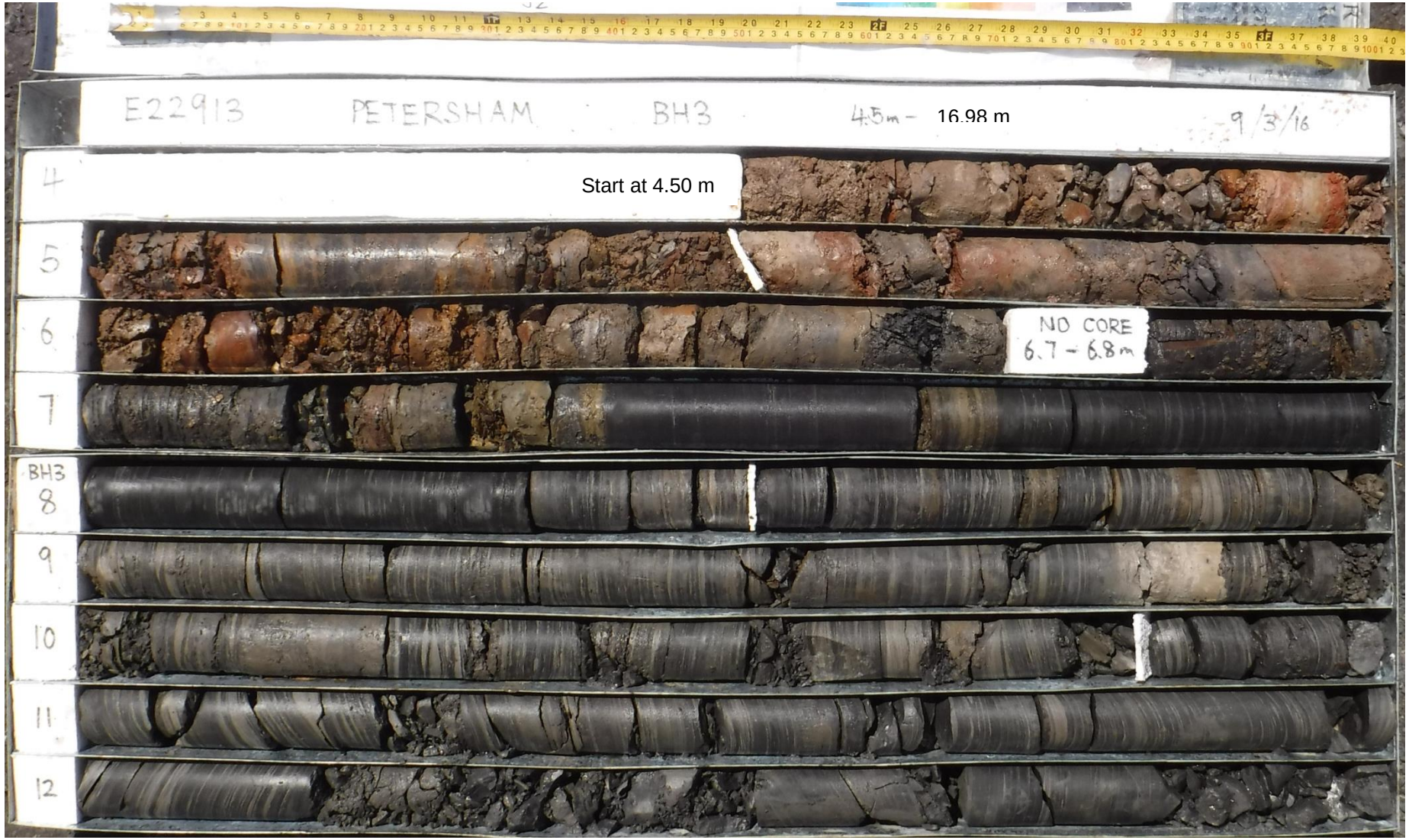
Project	Proposed Mixed Use Development	East	329427.3 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247994.5 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	34.50 m AHD	Date Started	9/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	9/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 9/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	90-100% RETURN	100	43 (35)	10			SHALE; bedding dipping 0-5°, <1mm thick, dark grey, with occasional brown ironstaining.	SW		9.13: BP 0° PR SM CN 9.20: BP 0° PR SM CN 9.23: BP 0° PR SM CN 9.33: BP 0 - 5° UN SM CN 9.50: JT 45° UN SM CN 9.52-9.54: CS 20mm 9.68: JT 0 - 10° CU SM CN 9.70-9.73: JT 70° PR SM CN 9.71: BP 0° PR SM CN 9.79-9.86: DS Clay 70mm 9.87: BP 0 - 5° UN SM CN 9.90-9.93: CS 30mm 9.95-10.06: CS 110mm 10.24: BP 5° PR SM CN 10.30-10.32: DS Clay 20mm 10.39-10.43: JT 60° UN SM VNR	
					11.00 23.50		From 11m, bedding dipping 0-20°.				
		100	31 (15)	12				XW		10.42: BP 0° PR SM CN 10.51-10.55: CS 40mm 10.55-10.59: JT 80° UN SM CN 10.61: BP 0° PR SM CN 10.65: BP 0° PR SM CN 10.67-10.70: JT 45° PR SM CN 10.74-10.80: CS 60mm 10.84: BP 5° PR SM CN 10.89: BP 5° PR SM CN 11.06-11.09: JT 45 - 60° CU SM CN 11.14: BP 15° PR SM CN	
					13.00 21.50		SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.	FR		11.19: JT 15° ST SM CN 11.23-11.29: DS 60mm 11.32: BP 15° PR SM CN 11.33-11.37: JT 45° CU SM CN 11.36-11.38: DS 20mm 11.42: BP 0° PR SM CN 11.57: BP 5° PR SM CN 11.61: JT 0 - 10° CU SM CN 11.66: BP 0° PR SM CN 11.72: BP 5° PR SM CN 11.76: JT 0 - 10° CU SM CN 11.94-11.97: CS 30mm 12.02: BP 15° PR SM CN 12.05: BP 15° PR SM CN 12.19-12.52: CZ 330mm 12.59: BP 15° PR SM CN 12.62: JT 80° ST SM CN 12.63-12.67: CS 40mm 12.73: JT 30° UN SM CN 12.80-12.83: JTx2 45° UN SM CN 12.83-12.97: CS 140mm 13.06: BP 0° PR SM CN 13.09: BP 0° PR SM CN 13.13: BP 0° PR SM CN 13.16: BP 0° PR SM CN 13.25-13.26: DS 10mm 13.34: BP 0° PR SM CN 13.42: BP 0° PR SM CN 13.48: BP 0° PR SM CN 13.55: BP 0° PR SM CN 13.61: BP 0° PR SM CN 13.71: BP 0° PR SM CN 13.82-13.83: BP 0° PR SM CN 13.85: JT 45° PR SM CN 13.88: BP 0° PR SM CN	
		100	84 (39)	14							
		100	97 (89)	16	*16.98* 17.52		Hole Terminated at 16.98 m Backfilled with drilling spoil and concrete capped.			14.02: BP 0° PR SM CN 14.09: BP 0° PR SM CN 14.61: DB 15.15: BP 0° PR SM CN 15.59: BP 0° PR SM CN 16.06: BP 0° PR SM CN 16.37: BP 0° PR SM CN 16.42: BP 0° PR SM CN 16.49-1.66: JT 45° PR SM CN 16.51: JT 30° PR SM CN 16.53: BP 0° PR SM CN	

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

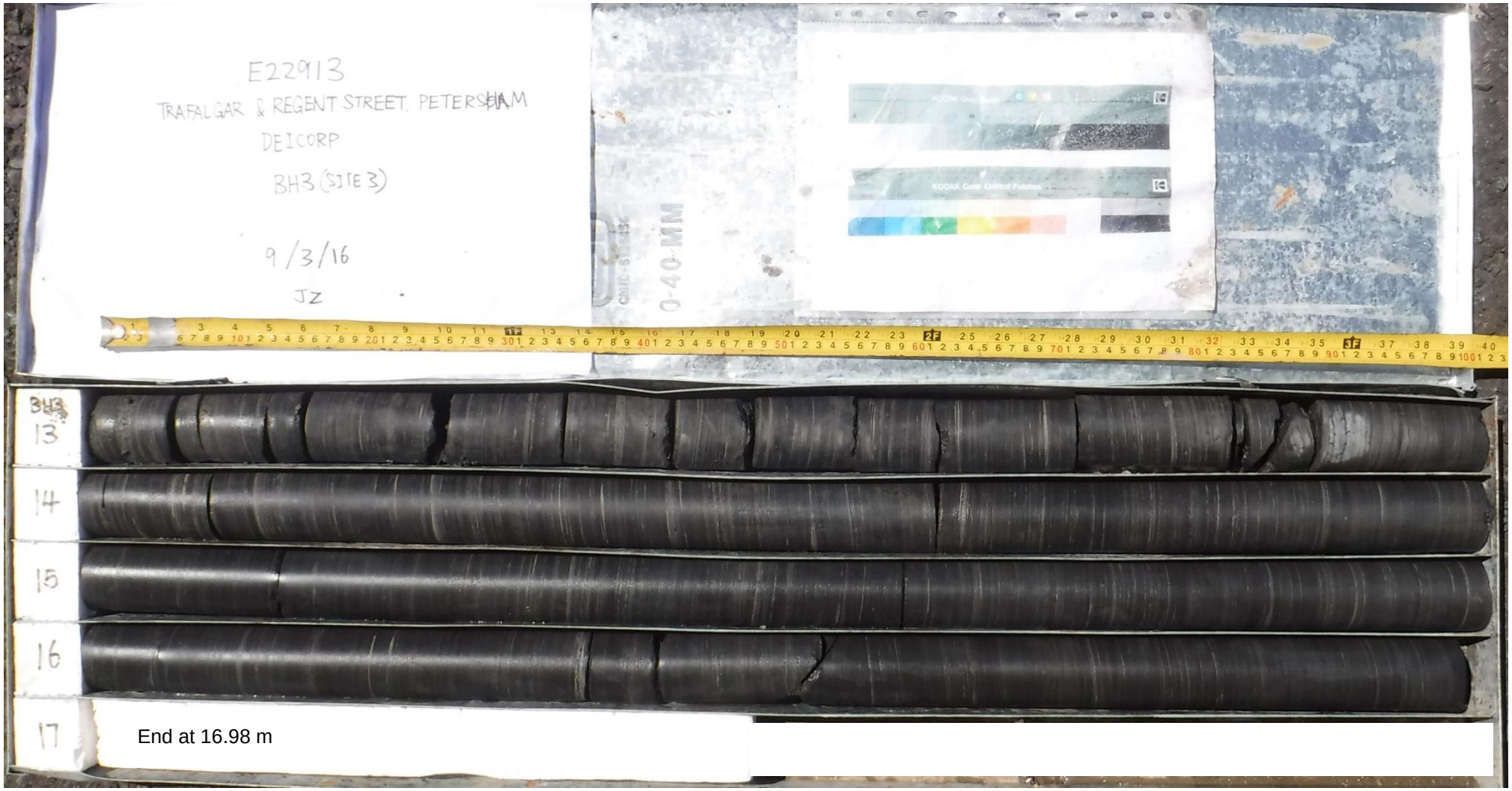
CORE PHOTOGRAPH OF BOREHOLE: BH3

Project:	Proposed Mixed Use Development	East:	329427.3 m	Depth Range:	4.50 m to 13.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247994.5 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	34.50 m AHD	Drill Rig:	Hanjin DB8
Position:	Refer to Figure 2	Inclination:	-90°	LOGGED: JZ	DATE: 9/3/16
Job No. :	E22913	Box:	1 & 2 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.98 m		



CORE PHOTOGRAPH OF BOREHOLE: BH3

Project:	Proposed Mixed Use Development	East:	329427.3 m	Depth Range:	13.00 m to 16.98 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247994.5 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	34.50 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 9/3/16
Job No. :	E22913	Box:	3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.98 m		



BOREHOLE: BH4M

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Project	Proposed Mixed Use Development	East	329450.2 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248038.2 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	35.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	35.45				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
					BH4M_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.	D		FILL
				0.50								
				35.00	SPT 0.50-0.95 m 3,6,16 N=22 BH4M_0.5-0.95			-	FILL: Sandy CLAY; low to medium plasticity, dark brown/dark grey, sand is fine to medium grained, with fine to medium gravel.		-	
	E		1		BH4M_1.0-1.3 ES 1.00-1.30 m					M (>PL)		
				1.50								
				34.00	SPT 1.50-1.95 m 7,12,19 N=31 BH4M_1.5-1.95			CH	Silty CLAY; high plasticity, grey mottled orange-brown, grading into extremely weathered shale.	M (<PL)	VSt - H	RESIDUAL SOIL
			2	*2.20*	1.50 m PP =300-400 kPa							
				33.30				-	SHALE: red-brown/grey, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
			3		SPT 3.00-3.45 m 10,18,22 N=40 BH4M_3.0-3.45							
	F		4							-	-	
				4.50								
				31.00	SPT 4.50-4.72 m 18,25/70mm HB N>25 BH4M_4.5-4.72				From 4.5m, red brown/dark grey			
			5		BH4M_5.0-5.5 D 5.00-5.50 m							
				5.50								
									Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH4M

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Project	Proposed Mixed Use Development	East	329450.2 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248038.2 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	35.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.50		Continuation from non-cored borehole				
NMLC	90-100% RETURN	100	46 (30)	6	30.00		SHALE; bedding dipping 0-5°, <1mm thick, dark grey with occasional brown iron staining.	XW - DW		5.50-5.58: JT 90° UN SM SN 5.58: BP 0° UN SM SN 5.60: BP 0° UN SM SN 5.62: BP 0° UN SM SN 5.68-5.70: DS 20mm thick 5.75-5.77: DS 20mm thick 5.79-5.80: DS 10mm thick 5.82-5.83: DS 10mm thick 5.93: BP 0° PR SM CN 5.96: BP 0° PR SM CN 6.00-6.30: CZ Clay 300mm 6.36-6.42: DS Clay 60mm 6.58-6.61: DS Clay 30mm 6.74: BP 5° PR SM CN 7.09: BP 0° PR SM CN 7.24: BP 0° PR SM CN 7.35: BP 0° PR SM CN 7.43: BP 0° PR SM CN 7.45-7.47: DS 20mm 7.50-7.51: DS 10mm 7.55-7.57: DS 20mm 7.63-7.67: DS 40mm 7.70-7.73: DS 30mm 7.75-7.90: JT 70° PR SM CN 7.77: BP 0° PR SM CN 7.87: BP 0° PR SM CN 7.91-8.05: CS Clay 140mm 8.19: BP 5° PR SM CN 8.35: JT 30° PR SM CN 8.40: BP 0 - 5° CU SM CN 8.43-8.45: DS 20mm 8.46-8.55: DS Clay 90mm 8.57-8.58: DS 10mm 8.60-8.66: DS 60mm 8.72-8.73: DS 10mm 8.77-8.86: CS 90mm 8.93: BP 0° UN SM VNR 8.95: BP 5° PR SM CN 8.98: BP 5° PR SM CN	
				7							
				8	8.05						
		100	51 (30)	9	27.45		SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey.	DW SW			
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH4M

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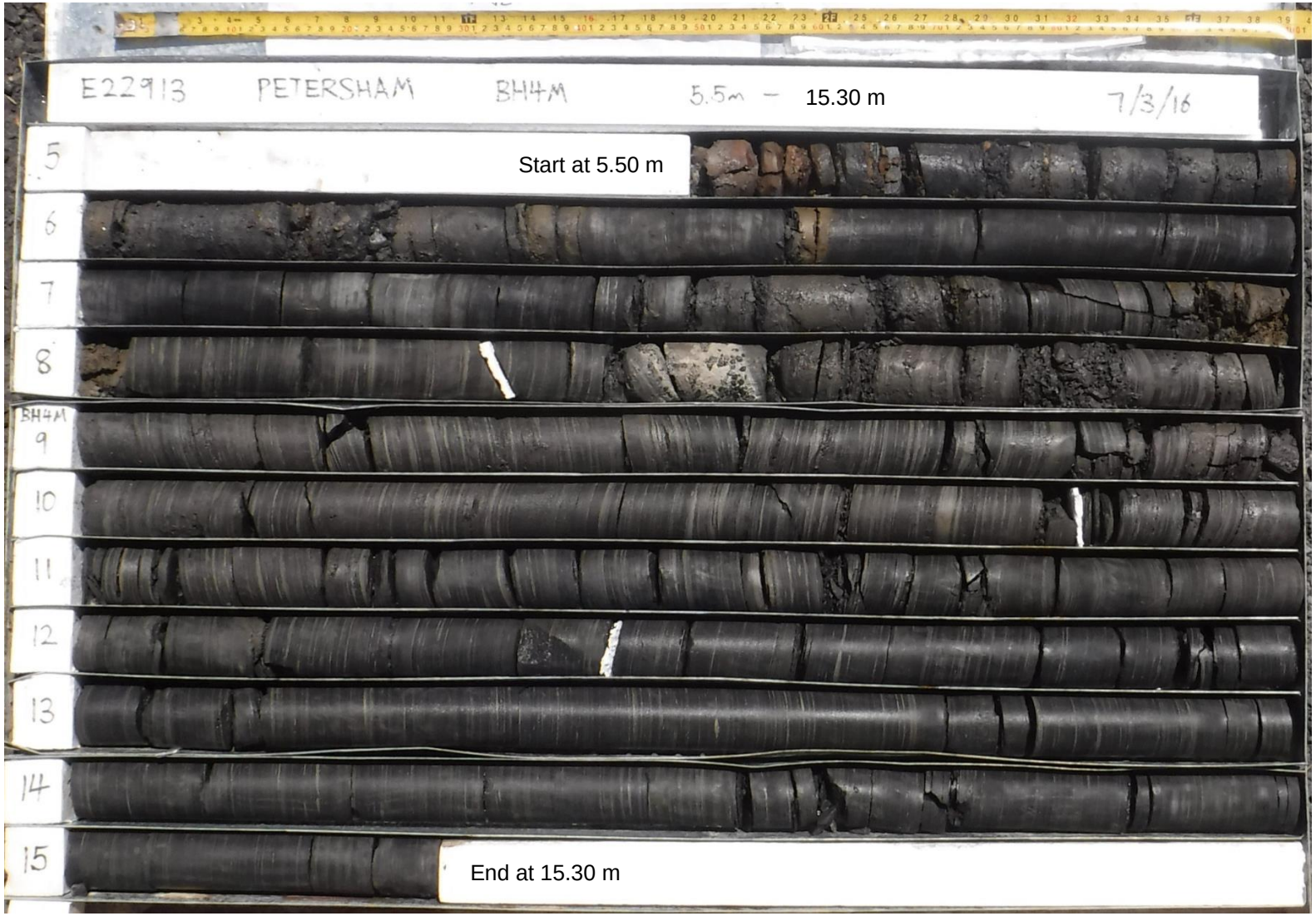
Project	Proposed Mixed Use Development	East	329450.2 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248038.2 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	35.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	90-100% RETURN	100	51 (30)	10			SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey.	SW - FR		9.15: BP 5° PR SM CN 9.22: JT 45° CM SM CN 9.25: BP 5° PR SM CN 9.45: BP 5° PR SM CN 9.55: BP 5° PR SM CN 9.71: BP 5° PR SM CN 9.74: JT 30° PR SM VNR 9.82: BP 0° PR SM CN 9.90-9.93: DS Clay 30mm 9.93-10.00: JT 80 - 90° CU SM CN 10.14: JT 10° PR SM CN 10.15: BP 5° PR SM CN 10.20: JT 10 - 20° ST SM CN 10.33: BP 10° PR SM CN 10.45: BP 10° PR SM CN 10.59: JT 45° ST SM CN 10.63-10.64: DS 10mm 10.79-10.82: JT 90° PR SM CN 10.82-10.85: BPx3 PR SM CN 10.88: BP 5° PR SM CN 10.90: BP 5° PR SM CN 10.92: BP 5° PR SM CN 11.00-11.03: SZ 30mm 11.03-11.03: BPx4 0° PR SM CN 11.13: BP 5° PR SM CN 11.21: BP 0° PR SM CN 11.23: BP 5° PR SM CN 11.25: JT 10° PR SM CN 11.26: BP 0° PR SM CN 11.30: JT 10° PR SM CN 11.36: BP 5° PR SM CN 11.41: BP 0° PR SM CN 11.55: BP 5° PR SM CN 11.56: BP 5° PR SM CN 11.61-11.63: CS 20mm 11.64: JT 10° PR SM CN 11.67: JT 0 - 80° CU SM CN 11.68: BP 5° PR SM CN 11.72: BP 5° PR SM CN 11.73: JT 45° PR SM CN 11.80: BP 0° PR SM CN 11.89: BP 5° PR SM CN 11.93: BP 5° PR SM CN 12.03: BP 5° PR SM CN 12.07-12.08: DS 10mm 12.15-12.16: DS Clay 10mm 12.26: BP 0° PR SM CN 12.37: BP 5° PR SM CN 12.45: BP 5° PR SM CN 12.50: BP 5° PR SM CN 12.59: BP 5° PR SM CN 12.66: BP 5° PR SM CN 12.78: BP 5° PR SM CN 12.85: BP 5° PR SM CN 12.89-12.94: BPx4 0 - 5° PR SM CN 12.91: JT 50° PR SM CN 13.07: JT 45° CU SM CN 13.13: BP 5° CU SM CN 13.16: BP 5° CU SM CN 13.37: JT 45° PR SM CN 13.71: BP 0° PR SM CN 13.75: BP 0° PR SM CN 13.78: BP 0° PR SM CN 13.93: BP 0° PR SM CN 13.96: BP 0° PR SM CN 14.11: BP 0° PR SM CN 14.23: BP 0° PR SM CN 14.34: BP 0° PR SM CN 14.47: BP 0° PR SM CN 14.54-14.55: DS 10mm 14.59: BP 5° UN SM CN 14.61-14.62: CS 10mm 14.63: JT 40° PR SM CN 14.63: BP 0° PR SM CN 14.69: BP 0° PR SM CN	
		100	34 (6)	11							
		100	65 (58)	12							
				13							
				14							
				15	15.30						
				16	20.20		Hole Terminated at 15.30 m Borehole converted to monitoring well.				
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH4M

Project:	Proposed Mixed Use Development	East:	329450.2 m	Depth Range:	5.50 m to 15.30 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6248038.2 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	35.50 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 7/3/16
Job No. :	E22913	Box:	1, 2 & 3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	15.30 m		



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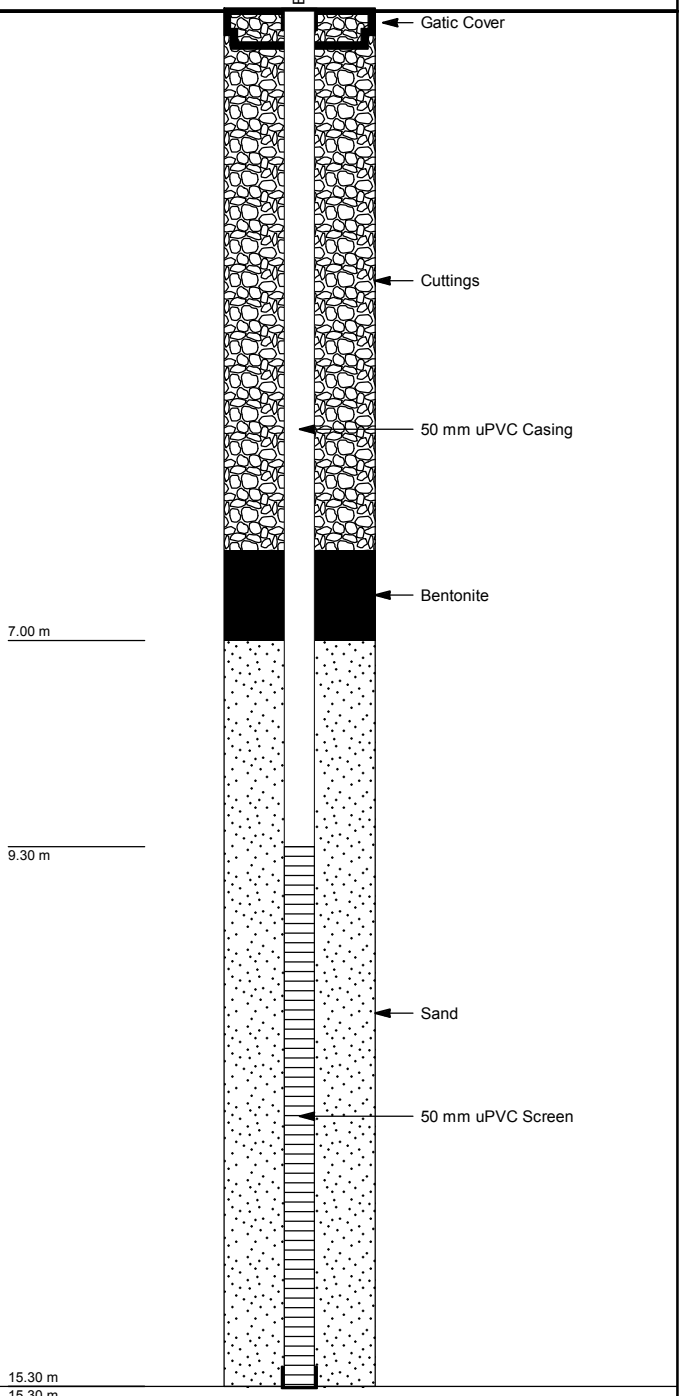
Hole ID
BH4M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 3	SHEET	: 1 OF 1
CONTRACTOR	: Rockwell Drilling Pty Ltd	EASTING	: 329450.2 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6248038.2 m	LOGGED BY	: JZ
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 07/03/2016
PROJECT No.	: E22913	GROUND RL	: 35.50 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T	GWNE on completion of augering	0	35.5		ASPHALT: 50mm thick.
					FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.
					FILL: Sandy CLAY; low to medium plasticity, dark brown/dark grey, sand is fine to medium grained, with fine to medium gravel.
		2	34		Silty CLAY; high plasticity, grey mottled orange-brown, grading into extremely weathered shale.
					SHALE: red-brown/grey, extremely low to very low strength, extremely to distinctly weathered.
		4	32		From 4.5m, red brown/dark grey
NMLC	90-100% RETURN	6	30		SHALE; bedding dipping 0-5°, <1mm thick, dark grey with occasional brown iron staining.
		8	28		SHALE; bedding dipping 0-5°, <1-3mm thick, dark grey.
		10	26		
		12	24		
		14	22		
		16	20		Hole Terminated at 15.30 m Borehole converted to monitoring well.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH4M	Standpipe	15.30 m 20.20 m	07/03/2016	



RIG	:	CHECKED BY	: SK	REMARK
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.
AZIMUTH	:	APPROVED BY	:	
HOLE DIA.	:	APPROVED DATE	:	

BOREHOLE: BH5

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Project	Proposed Mixed Use Development	East	329446.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248007.5 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	36.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	36.35				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
					BH5_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.	D	-	FILL
				0.50								
				35.90	SPT 0.50-0.95 m			CH	Silty CLAY; high plasticity, grey mottled orange-brown.	M (>PL)	VSt	RESIDUAL SOIL
				0.75	4,8,13							
				35.65	N=21			-	SHALE; grey mottled brown, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
	E		1		BH5_0.5-0.75 BH5_0.75-0.95 0.75 m PP =200-250 kPa							
					SPT 1.50-1.80 m 15,30 HB N>30 BH5_1.5-1.8					-	-	
			2		BH5_2.0-2.5 D 2.00-2.50 m							
	F			*2.50*								
									Continued as Cored Borehole			
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH5

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Project	Proposed Mixed Use Development	East	329446.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248007.5 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	36.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2	2.50		Continuation from non-cored borehole				
NMLC	90-100% RETURN	14	4 (5)	3	33.90		CORELOSS: 2.5m thick.				
				4							
				5	5.00 31.40		SHALE; bedding dipping 0-5°, dark grey with red-brown iron staining.	XW - DW		5.00-5.14: DS 140mm	
		40	17 (14)	6	6.30 30.10		CORELOSS: 250mm thick.			5.31: BP 0 - 5° UN SM VNR 5.35: JT 10° CU SM VNR 5.38: JT 10° CU SM VNR 5.40-5.55: BPx10 0° PR SM SN/CN 5.58: BP 0° PR SM CN 5.63: BP 0° PR SM CN 5.72: BP 5° PR SM CN 5.82-5.88: CS 60mm 5.88-5.91: DS 30mm 5.92: BP 0° PR SM CN 5.98-6.30: DS 320mm	
					6.55 29.85		SHALE; bedding dipping 0-5°, dark grey with red-brown iron staining.	XW - DW		6.64: BP 0° PR SM CN 6.68-6.73: DS 50mm 6.78-6.84: DS 60mm 6.88: JT 45° CU SM VNR 6.90: JT 45° CU SM VNR 6.98-7.06: DS 80mm 7.06-7.18: SZ 120mm 7.22: BP 0° PR SM CN	
		100	77 (73)	7	7.51 28.89		SHALE; bedding dipping 0-5°, <1mm thick, dark grey.	DW		7.31: BP 0° PR SM CN 7.32: JT 30° PR SM CN 7.46: JT 5 - 15° CU SM CN 7.54: BP 0° PR SM CN 7.76: BP 0° PR SM CN 7.96: BP 0° PR SM CN 8.05-8.48: BPx6 0° PR SM CN avg sp = 30-200mm	
				8	8.50 27.90		From 8.5m, bedding is <1-2mm thick.			8.54-8.60: DS 60mm 8.65: JT 30° UN SM CN 8.69: BP 0° PR SM CN 8.74: BP 0° PR SM CN 8.79: BP 0° PR SM CN 8.87-8.89: CS 8.96: BP 0° PR SM CN 8.98: BP 0° PR SM CN 9.05: BP 5° PR SM CN 9.10: BP 0° PR SM CN 9.15: JT 45° ST SM CN 9.17-9.19: BPx3 0° PR SM CN 9.22-9.31: JT UN SM CN	
		100	27 (5)	9							
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH5

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Project	Proposed Mixed Use Development	East	329446.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248007.5 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	36.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Rockwell Drilling Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hanjin DB8	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	90-100% RETURN	100	27 (5)	10			SHALE; bedding dipping 0-5°, <1mm thick, dark grey.	DW		9.24: BP 0° PR SM CN	
								SW - FR		9.26: BP 0° PR SM CN	
										9.32: BP 0° PR SM CN	
										9.39: BP 0° PR SM CN	
										9.44: BP 0° PR SM CN	
										9.49: JT 45° PR SM CN	
										9.52: BP 0° PR SM CN	
				11						9.58-9.67: DS Clay 90mm	
										9.59: JT 60° PR SM CN	
										9.67: JT 70° PR SM CN	
										9.75-9.79: SZ 40mm	
										9.86: BP 0° PR SM CN	
										9.93-10.02: DS 90mm	
										10.03: JT 10 - 30° CU SM CN	
										10.12: BP 5° PR SM CN	
										10.15: BP 5° PR SM VNR	
										10.17: BP 5° PR SM CN	
				12						10.18: BP 5° PR SM CN	
										10.22: BP 5° PR SM CN	
										10.24: BP 5° PR SM CN	
										10.26-10.30: JT 90° ST SM CN	
										10.37: BP 5° PR SM CN	
										10.44: BP 5° PR SM CN	
										10.49: BP 5° PR SM CN	
										10.53: BP 5° PR SM CN	
		100	54 (20)	13						10.54-10.56: DS 20mm	
										10.63: BP 5° PR SM CN	
										10.63-10.67: DS 40mm	
										10.64: JT 45° PR SM CN	
										10.67-10.71: JT 90° PR SM CN	
										10.78-10.79: DS 10mm	
										10.81-10.82: DS 10mm	
										10.82-10.87: JT 80 - 90° UN SM CN	
				14						10.87: BP 10° PR SM CN	
										10.89-10.91: DS 20mm	
										10.94: BP 5° PR SM CN	
										10.97-11.00: DS 30mm	
										12.56: BP 0° PR SM CN	
										12.64: BP 0° PR SM CN	
										12.66: BP 0° PR SM CN	
										12.67: JT 90° PR SM CN	
				15						12.71: BP 0° PR SM CN	
										12.76: BP 0° PR SM CN	
										12.77-12.82: JT UN SM CN	
										12.82: BP 0° PR SM CN	
										12.92: BP 0° PR SM CN	
										12.95: BP 0° PR SM CN	
										13.02: BP 0° PR SM CN	
										13.10: BP 0° PR SM CN	
										13.12: JT 90° ST SM CN	
										13.16: BP 0° PR SM CN	
										13.28: JT 80 - 90° CU SM CN	
		100	60 (20)	16						13.29-13.71: BPx6 0° PR SM CN avg sp = 60-100mm	
										13.74: BP 0° PR SM VNR	
										13.75-13.80: JT 60° UN SM CN	
										13.77: BP 0° PR SM CN	
										13.80: BP 0° PR SM CN	
								DW		13.94: BP 0° PR SM CN	
										13.96-14.00: CS 40mm	
										14.02: JT 90° PR SM CN	
										14.12-14.88: BPx10 0° PR SM CN avg sp = 60-200mm	
				17						14.92: JT 0 - 5° ST SM CN	
					17.15					14.94-15.00: SZ 60mm	
					19.25		Hole Terminated at 17.15 m Backfilled with drilling spoil and concrete capped.			15.05-15.35: BPx8 0° PR SM CN avg sp = 30-100mm	
										15.37: JT 10° UN SM CN	
										15.40: BP 0° PR SM CN	
										15.44-15.55: BPx8 0° PR SM CN	
										15.56-15.58: DS 20mm	
										15.61-15.64: JT 80° UN SM CN	
										15.74: BP 0° PR SM CN	
										15.78: BP 0° PR SM CN	
										15.86: BP 0° PR SM CN	
										15.93: BP 0° PR SM CN	
										15.99-16.00: DS 10mm	
										16.08: BP 0° PR SM CN	
										16.10: BP 0° PR SM CN	
										16.15: BP 0° PR SM CN	
										16.21: BP 0° PR SM CN	
										16.24: JT 10° ST SM CN	
										16.30: BP 0° PR SM CN	
										16.35: BP 0° PR SM CN	
										16.70-16.71: CS 10mm	

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH5

Project:	Proposed Mixed Use Development	East:	329446.6 m	Depth Range:	2.50 m to 10.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6248007.5 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	36.40 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 8/3/16
Job No. :	E22913	Box:	1 & 2 of 4	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	17.15 m		

CORE PHOTOGRAPH OF BOREHOLE: BH5

Project:	Proposed Mixed Use Development	East:	329446.6 m	Depth Range:	10.00 m to 17.15 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6248007.5 m MGA94 Zone 56	Contractor:	Rockwell Drilling Services Pty Ltd
		Surface RL:	36.40 m AHD	Drill Rig:	Hanjin DB8
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 8/3/16
Job No. :	E22913	Box:	3 & 4 of 4	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	17.15 m		

BOREHOLE: BH6M

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Project	Proposed Mixed Use Development	East	329444.0 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247965.1 m MGA94 Zone 56	Sheet	1 OF 1
Position	Site 3	Surface RL	36.70 m AHD	Date Started	11/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	11/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 11/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H		0	36.65				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
					BH6M_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.	D		FILL
				0.50								
				36.20	SPT 0.50-0.95 m 3,5,4 N=9 BH6M_0.5-0.95			-	FILL: Silty CLAY; low plasticity, dark brown/dark grey/red, with fine to medium grained sand and fine to medium gravel, trace of sandstone fragments.			
			1									
					BH6M_1.3-1.5 ES 1.30-1.50 m SPT 1.50-1.95 m 5,7,6 N=13 BH6M_1.5-1.95					M (<PL)	-	
	E		2									
		29/04/16		*2.50*								
				34.20				-	SHALE; dark brown/grey, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
			3		BH6M_2.8-3.0 ES 2.80-3.00 m SPT 3.00-3.45 m 15,21,25 N=46 BH6M_3.0-3.45							
			4									
	F			*4.50*								
				32.20	SPT 4.50-4.95 m 16,29,29 N=58 BH6M_4.5-4.95				From 4.5m, dark grey mottled red.			
	E		5									
				6.00						-	-	
			6	30.70	SPT 6.00-6.45 m 21,22,29 N=51 BH6M_6.0-6.45				From 6.0m, very low strength, distinctly weathered.			
	F											
			7		SPT 7.00-7.12 m 25/120mm HB N=SPT							
				7.50								
	H			29.20	BH6M_7.5-7.62				SHALE; dark grey, very low to low strength, distinctly weathered.			ROCK
			8									
				8.50								
	VH			28.20	BH6M_8.5-9.0 D 8.50-9.00 m				From 8.5m, low strength.			
				9.00								
			9						Hole Terminated at 9.00 m Borehole converted to monitoring well.			
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

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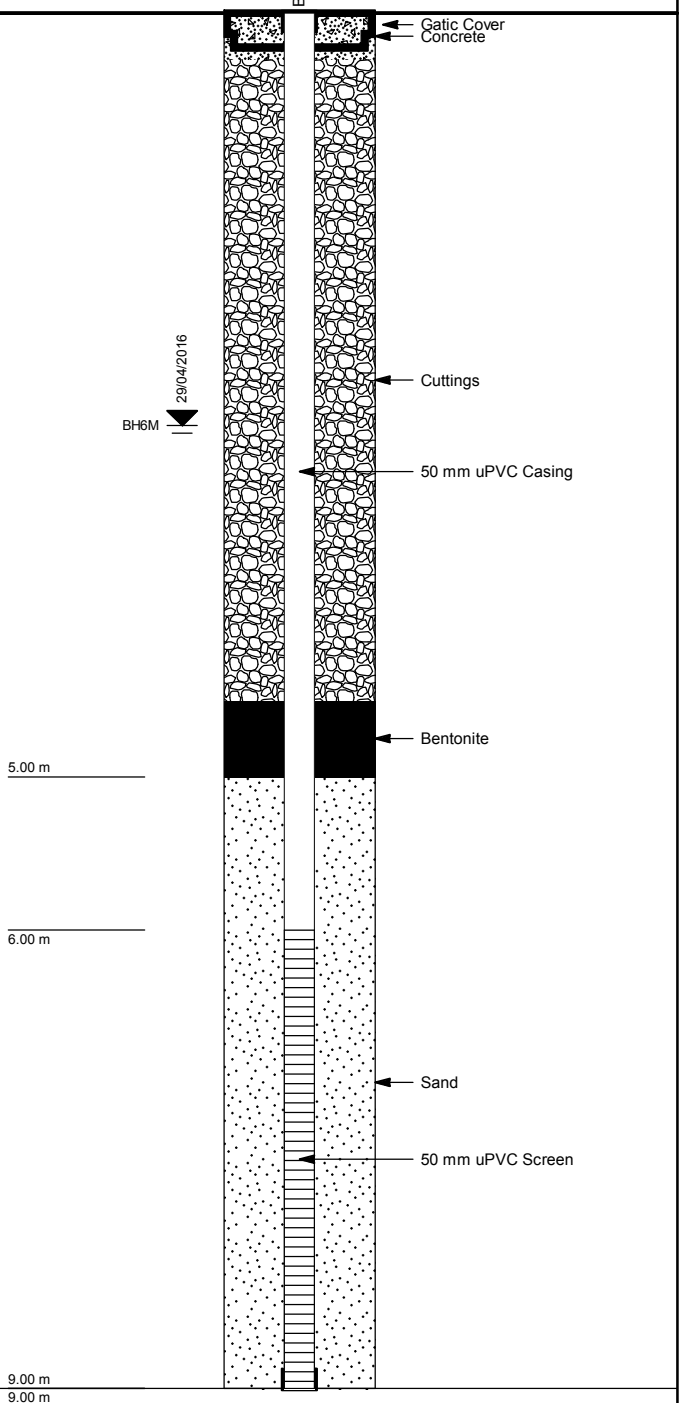
Hole ID
BH6M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 3	SHEET	: 1 OF 1
CONTRACTOR	: Terratest Pty Ltd	EASTING	: 329444.0 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247965.1 m	LOGGED BY	: JZ
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 11/03/2016
PROJECT No.	: E22913	GROUND RL	: 36.70 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T		0	36		ASPHALT: 50mm thick.
					FILL: Gravelly SAND; fine to medium grained, dark grey/dark brown, gravel is fine to medium, sub-angular, with clay.
		1			FILL: Silty CLAY; low plasticity, dark brown/dark grey/red, with fine to medium grained sand and fine to medium gravel, trace of sandstone fragments.
			35		
		2			
			34		SHALE; dark brown/grey, extremely low to very low strength, extremely to distinctly weathered.
		3			
			33		
		4			
			32		From 4.5m, dark grey mottled red.
		5			
	▽		31		
		6			From 6.0m, very low strength, distinctly weathered.
			30		
		7			
			29		SHALE; dark grey, very low to low strength, distinctly weathered.
		8			
			28		From 8.5m, low strength.
		9			
			27		Hole Terminated at 9.00 m Borehole converted to monitoring well.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH6M	Standpipe	9.00 m 27.70 m	11/03/2016	2.70m



RIG	:	CHECKED BY	: SK
INCLINATION	:	CHECKED DATE	: 24/05/2016
AZIMUTH	:	APPROVED BY	:
HOLE DIA.	:	APPROVED DATE	:

REMARK
Borehole converted to monitoring well.

BOREHOLE: BH7

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Project	Proposed Mixed Use Development	East	329430.9 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247937.7 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	36.60 m AHD	Date Started	10/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	36.55				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
					BH7_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly SAND; fine to medium grained, dark brown/red, gravel is fine to medium, sub-angular, with clay.	D		FILL
				0.50								
				36.10	SPT 0.50-0.95 m 4,6,6 N=12 BH7_0.5-0.95			-	FILL: Silty CLAY; low plasticity, dark grey/dark brown/red-brown, with fine to medium grained sand and fine to medium gravel.			
	E		1		BH7_0.8-1.0 ES 0.80-1.00 m					M (<PL)	-	
					SPT 1.50-1.95 m 5,7,10 N=17 BH7_1.5-1.95							
			2	*2.30*								
				34.30	BH7_2.3-2.5 ES 2.30-2.50 m			CH	Silty CLAY; high plasticity, grey mottled red-brown, with dark brown ironstone gravel, fine to medium, sub-rounded.	M (>PL)	VSt - H	RESIDUAL SOIL
			3		SPT 3.00-3.45 m 5,8,10 N=18							
				3.40	BH7_3.0-3.4 3.00 m PP =200-500 kPa							
	F			33.20	BH7_3.4-3.45			-	SHALE; dark grey/brown, extremely low strength, extremely weathered.			WEATHERED ROCK
			4							-	-	
					SPT 4.50-4.95 m 11,18,20 N=38 BH7_4.5-4.95							
			5	*5.50*								
									Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH7

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Project	Proposed Mixed Use Development	East	329430.9 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247937.7 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	36.60 m AHD	Date Started	10/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.50		Continuation from non-cored borehole				
NMLC	90-100% RETURN	21	0 (0)	6	31.10		CORELOSS: 2.2m thick.				
				7							
					7.70						
				8	28.90		SHALE; dark grey/dark brown.	XW - DW		7.82-7.91: DS Clay 90mm 7.96-8.00: DS 40mm 7.97: JT 40° PR SM SN 8.01: JT 45° PR SM SN 8.07: BP UN SM VNR 8.23-8.30: CS 70mm 8.40-9.08: DZ Clay 680mm	
					8.30						
					28.20		CORELOSS: 100mm thick.				
		96	21 (13)	9			SHALE; dark grey.	XW - DW		9.13: BP 5° PR SM CN 9.15: BP 5° PR SM CN 9.16-9.20: JT 70° UN SM CN 9.20-9.23: DS 30mm 9.29-9.43: DS 140mm 9.49-9.71: DZ Clay 220mm 9.77-9.80: JT 45° UN SM VNR	
				10							

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BOREHOLE: BH7

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Project	Proposed Mixed Use Development	East	329430.9 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247937.7 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	36.60 m AHD	Date Started	10/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	10/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 10/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (El, VL 0.03, L 0.1, M 0.3, H 1, VH 3, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	90-100% RETURN	96	21 (13)	10			SHALE; dark grey.	XW - DW		9.90-10.08: CS 180mm 10.10: BP 0° PR SM CN 10.21-10.27: DS Clay 60mm 10.35-10.45: DS 100mm	
				11	*11.10* 25.50		SHALE; bedding dipping 0-10°, <1-2mm thick, dark grey.	DW		10.57-10.63: DS 60mm 10.68-10.79: CS 110mm 10.81: JT 90° PR SM CN 10.85-10.86: DS Clay 10mm 10.90-11.10: DS 200mm 11.13: BP 0° PR SM CN 11.17-11.24: SZ 70mm 11.32: BP 0° PR SM CN 11.38: BP 0° PR SM CN 11.44: BP 0° PR SM CN 11.49: BP 0° PR SM CN 11.59: BP 0° PR SM CN 11.71: BP 0° PR SM CN	
		100	35 (18)	12				FR		11.77: BP 0° PR SM CN 11.89: BP 0° PR SM CN 11.92: JT 5 - 10° ST SM CN 12.12: JT 10° CU SM CN 12.19: BP 0° PR SM CN 12.24: BP 0° PR SM CN 12.27-12.31: JT 90° UN SM CN 12.30: BP 0° PR SM CN 12.35: BP 0° PR SM CN 12.42-12.43: DS 10mm 12.48-12.50: DS 20mm 12.56-12.57: DS 10mm 12.62: BP 0° PR SM CN 12.71-12.73: JT CU SM CN 12.74-12.80: JT ST SM CN 12.89-12.90: DS Clay 10mm 12.94-12.96: DS 20mm 13.04: BP 0° PR SM CN 13.05-13.21: JT 70 - 90° ST SM CN 13.08: BP 0° PR SM CN 13.12: BP 0° PR SM CN 13.22: BP 0° PR SM CN 13.25: BP 0° PR SM CN 13.38: BP 0° PR SM CN 13.43-13.45: JT 10 - 30° CU SM CN 13.50-13.53: JT 90° PR SM VNR 13.60-13.61: DS 10mm 13.64-13.75: JT 80° UN SM CN 13.70: BP 0° PR SM CN 13.77: BP 0° PR SM CN 13.85: BP 0° PR SM CN 13.94: BP 0° PR SM CN 14.00-14.07: JT 85° UN SM CN 14.07: BP 0° PR SM CN 14.11: BP 0° PR SM CN 14.20-14.25: DS 50mm 14.29: BP 0° PR SM CN 14.35: BP 0° PR SM CN 14.43: BP 0° PR SM CN 14.53: BP 0° PR SM CN 14.55: BP 0° PR SM CN 14.60-14.70: JT 80° CU SM CN 14.72: BP 0° PR SM CN 14.82-14.89: JT 80° UN SM CN	
		100	31 (17)	16							
				17	*17.00* 19.60		Hole Terminated at 17.00 m Backfilled with drilling spoil and concrete capped.			14.83-14.89: JT 80° UN SM CN 14.90-15.00: JT 80° PR SM CN 15.00-15.06: JT 90° PR SM CN 15.06-15.10: CS 40mm 15.17: BP 0° PR SM CN 15.18: JT 15° CU SM CN 15.22: BP 0° PR SM CN 15.28: BP 0° PR SM CN 15.61: BP 0° PR SM CN 15.67: BP 0° PR SM CN 15.73-15.90: JT 70 - 90° UN SM CN 15.76-15.79: DS 30mm 15.82-15.86: DS 40mm 15.93: BP 0° PR SM CN 16.00-16.06: JT 70° PR SM CN 16.16: BP 0° PR SM CN 16.35-16.56: JT 90° UN SM CN 16.37: BP 0° PR SM CN 16.43: BP 0° PR SM CN 16.44: BP 0° PR SM CN 16.50: BP 0° PR SM CN 16.56-16.60: CS 40mm 16.61-16.66: JT 45° UN SM CN 16.68-16.90: CZ 120mm 16.80-16.86: JT 80° UN SM CN	
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH7

Project:	Proposed Mixed Use Development	East:	329430.9 m	Depth Range:	5.50 m to 17.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247937.7 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	36.60 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 10/3/16
Job No. :	E22913	Box:	1, 2 & 3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	17.00 m		

BOREHOLE: BH8M

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Project	Proposed Mixed Use Development	East	329468.0 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247979.6 m MGA94 Zone 56	Sheet	1 OF 2
Position	Site 1	Surface RL	37.70 m AHD	Date Started	5/4/16
Job No.	E22913	Contractor	BG Drilling	Date Completed	5/4/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Dando Dual Mast Terrier	Logged JZ	Date: 5/4/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	H		0	37.70 *0.20*				-	CONCRETE: 200mm thick.	-	-	CONCRETE HARDSTAND
				37.50				CH	Silty CLAY; high plasticity, pale grey/ brown/ red-brown, with fine to medium ironstone gravel, grading into weathered shale.	M (<PL)	VSt - H	RESIDUAL SOIL
	E			*0.80* 36.90	SPT 0.50-0.95 m 4,15,14 N=29			-	SHALE; grey/ dark brown,extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
AD/T		29/04/16	1		BH8M 0.5-0.8 0.50 m PP =300-400 kPa BH8M 0.8-0.95							
		GWNE on completion of augering			BH8M 1.3-1.5 D 1.30-1.50 m							
	F		2									
					BH8M 2.5-3.0 D 2.50-3.00 m					-	-	
			3									
	H		4		BH8M 4.0-4.5 D 4.00-4.50 m							
			5	*5.60*								
									Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH8M

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Project	Proposed Mixed Use Development	East	329468.0 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247979.6 m MGA94 Zone 56	Sheet	2 OF 2
Position	Site 1	Surface RL	37.70 m AHD	Date Started	5/4/16
Job No.	E22913	Contractor	BG Drilling	Date Completed	5/4/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Dando Dual Mast Terrier	Logged JZ	Date: 5/4/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.60		Continuation from non-cored borehole				
NMLC	90-100% RETURN				32.10		CORELOSS; 500mm thick.				
				6	*6.10*						
		75	8 (19)		31.60		SHALE; bedding dipping 0-5°, <1mm thick, dark grey/ brown.	DW		6.10-6.18: SZ 80mm 6.21: BP 0° PR S CN 6.22: BP 5° CU S CN 6.24: JT 0° PR S CN 6.26: JT 0° PR S CN 6.29: JT 0° PR S CN 6.31-6.49: DS 180mm 6.52: BP 0° PR S CN 6.53: BP 0° PR S CN 6.57: BP 0° PR S CN 6.62-6.64: DS 20mm 6.70-6.73: DS 30mm 6.80-6.89: BPx5 0° PR S CN avg sp = 10-30mm 6.95-6.98: DS 30mm 7.12: BP 0° PR S CN 7.19-7.32: CS 130mm 7.43-7.77: DS 340mm 7.83-7.87: DS 40mm 7.93-7.98: DS 50mm 8.04: BP 0° PR S CN 8.11-8.15: JT 30 - 45° ST S CN 8.22: JT 10° PR S CN 8.23: BP 0° PR S CN 8.28: BP 0° PR S CN 8.42: BP 0° PR S CN 8.42-8.59: HB 8.59: DB 8.80-9.41: BPx5 0° PR S CN avg sp = 60-200mm	
				7							
		100	21 (26)		*7.77*						
					29.93		SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.				
				8							
		100	81 (99)	9	*9.55*						
					28.15		Hole Terminated at 9.55 m Borehole converted to monitoring well.				
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH8M

Project:	Proposed Mixed Use Development	East:	329468.0 m	Depth Range:	5.60 m to 9.55 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247979.6 m MGA94 Zone 56	Contractor:	BG Drilling Pty Ltd
		Surface RL:	37.70 m AHD	Drill Rig:	Dando Dual Mast Terrier
Position:	Site 1	Inclination:	-90°	LOGGED: JZ	DATE: 5/4/16
Job No. :	E22913	Box:	1 of 1	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	9.55 m		

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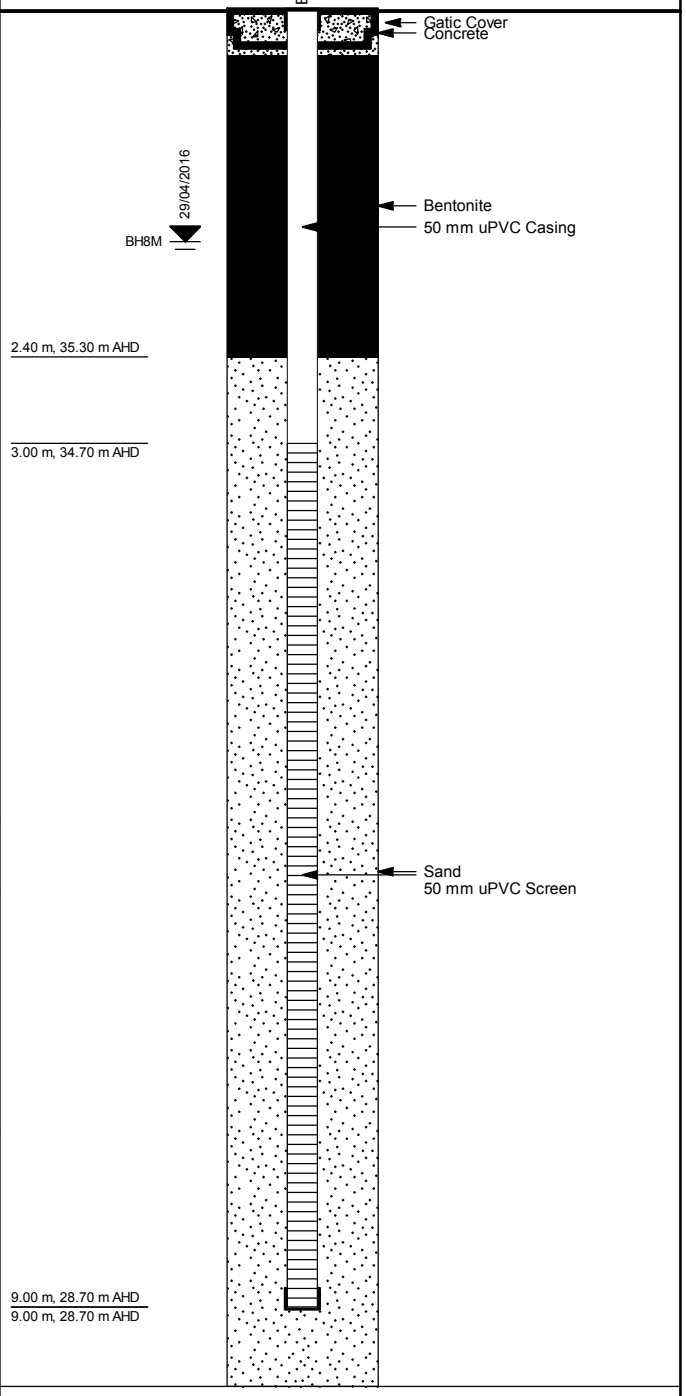
Hole ID
BH8M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 1	SHEET	: 1 OF 1
CONTRACTOR	: BG Drilling	EASTING	: 329468.0 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247979.6 m	LOGGED BY	: JZ
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 05/04/2016
PROJECT No.	: E22913	GROUND RL	: 37.70 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
DT	GWNE on completion of augering	0	38		CONCRETE: 200mm thick.
AD/T					Silty CLAY; high plasticity, pale grey/ brown/ red-brown, with fine to medium ironstone gravel, grading into weathered shale.
		1	37		SHALE; grey/ dark brown,extremely low to very low strength, extremely to distinctly weathered.
		2	36		
		3	35		
		4	34		
		5	33		
NMLC	90-100% RETURN	6	32		CORELOSS; 500mm thick.
		7	31		SHALE; bedding dipping 0-5°, <1mm thick, dark grey/ brown.
		8	30		SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.
		9	29		
		10	28		Hole Terminated at 9.55 m Borehole converted to monitoring well.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH8M	Standpipe	9.00 m 28.70 m	05/04/2016	1.60m



RIG	:	CHECKED BY	: SK	REMARK
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.
AZIMUTH	:	APPROVED BY	:	
HOLE DIA.	:	APPROVED DATE	:	

BOREHOLE: BH9M

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Project	Proposed Mixed Use Development	East	329461.7 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247914.4 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 2	Surface RL	39.30 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	Commencement of augering	0	39.25				-	ASPHALT: 50mm thick.	-	-	PAVEMENT
				0.40	BH9M_0.2-0.3 ES 0.20-0.30 m			-	FILL: Silty SAND; fine grained, brown to light brown, with some rootlets and terracotta/concrete fragments.	M		FILL
				38.90	SPT 0.50-0.95 m 7,10,13 N=23			-	FILL: Silty Gravelly CLAY; low plasticity, brown mottled dark grey, gravel is fine to medium, sub-angular, with some timber and brick fragments.			
				1.00	BH9M_0.5-0.95							
			1	38.30	BH9M_1.0-1.1 ES 1.00-1.10 m			-	FILL: Silty CLAY; low plasticity, dark brown, with some brick and timber fragments, slight organic odour.	M (<PL)	-	
					SPT 1.50-1.95 m 7,10,13 N=23							
				1.89	BH9M_1.5-1.89							
	E		2	37.41 2.10	BH9M_1.89-1.95 1.89 m			CH	Silty CLAY; high plasticity, brown with some red mottling, with some fine to medium sub-angular ironstone gravel.	M (>PL)	VSt - H	RESIDUAL SOIL
				37.20	PP =370-500 kPa BH9M_2.0-2.1 ES 2.00-2.10 m			-	SHALE; grey-brown, with some orange ironstaining, very low strength, distinctly weathered.			WEATHERED ROCK
					BH9M_2.6-2.7 D 2.60-2.70 m							
			3		SPT 3.00-3.06 m 6/60mm HB N=SPT					-	-	
					BH9M_3.0-3.06 BH9M_3.4-3.5 D 3.40-3.50 m							
					BH9M_3.8-3.9 D 3.80-3.90 m							
			4	4.10								
	H			35.20	BH9M_4.2-4.3 D 4.20-4.30 m				From 4.1m, grey, very low to low strength.			
				4.50								
									Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH9M

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Project	Proposed Mixed Use Development	East	329461.7 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247914.4 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 2	Surface RL	39.30 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
					4.50		Continuation from non-cored borehole				
NMLC	85-90% RETURN	78	32 (28)	5	34.80 *4.73* 34.57 *5.06* 34.24		SHALE; bedding dipping 0-5°, dark grey, with some orange staining. CORELOSS; 330mm thick. SHALE; bedding dipping 0-5°, dark grey, with some orange staining, interbedded with clay.	XW - DW DW		4.57: BP 0° PR RF VNR 4.61-4.64: DS Clay 30mm 4.64-4.71: JT 90° CU RF Fe SN 5.06-5.08: DS Clay 20mm 5.11-5.16: CS some fine to medium, sub-angular shale 5.34: BP 0 - 10° UN RF Clay VNR 5.52: JT 20° PR RF Fe SN 5.53-5.54: DS Clay 10mm 5.58-5.62: DS Clay 40mm 5.68: BP 10° PR RF Fe SN 5.88: BP 0 - 5° PR RF Fe SN clay infill	
		60	16 (29)	6	*6.00* 33.30		From 6.0m, heavy iron staining, no clay.			6.24: JT 30° PR RF Fe SN 6.37-6.55: JT PR RF Fe SN 6.66: BP 10° PR RF Fe SN 6.79: BP 0° IR RF Clay VNR 6.87-6.90: JT 90° PR RF Fe SN 7.02-7.04: DS extremely weathered and clay, 20mm	
				7						7.32: JT 20° PR RF Fe SN 7.37-7.43: JT 60° PR RF Fe SN 7.43-7.48: JT 60° PR RF Fe SN 7.50: JT 30° IR RF Fe SN 7.56: BP 0° PR RF VNR 7.69: BP 0° PR RF CN gravel infill 7.78-7.82: JT 90° PR RF CN 7.93-7.98: JT 50 - 60° PR RF Fe SN 8.04: JT 20° PR RF Fe SN 8.07-8.11: JT 50° PR RF Fe SN 8.16: JT 30° PR RF Fe SN 8.25: BP 0 - 10° PR RF Clay VNR 8.28: JT 30° PR RF CN 8.37-8.46: JT 70° PR RF Fe SN 8.46-8.48: DS 20mm 8.48-8.56: JT 70° PR RF Fe SN 8.90-8.95: JT 70° PR RF CN 9.02-9.05: JT 90° PR RF CN 9.25: BP 0° PR RF Clay VNR gravel infill 9.40-9.43: CS with fine to medium, sub-rounded, shale, 30mm 9.48-9.55: JT 0 - 90° UN RF Clay VNR	
				8	*8.56*						
	60-70% RETURN	100	73 (79)	9	30.74		SHALE; bedding dipping 0-5°, <1mm thick, dark grey.				
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH9M

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Project	Proposed Mixed Use Development	East	329461.7 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247914.4 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 2	Surface RL	39.30 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	70-75% RETURN	100	73 (79)	10			SHALE; bedding dipping 0-5°, <1mm thick, dark grey.	DW		10.29-10.53: JT 70 - 90° CU RF CN	
				11						10.79-10.93: JT 70° PR RF CN 10.93-11.02: DS 90mm 11.04-11.12: JT 80 - 90° UN RF CN 11.05: JT 45° PR RF CN 11.26: BP 0 - 20° UN RF Clay VNR 11.28-11.37: JT 90° UN RF CN	
		100	92 (93)	12				DW - SW		11.58: JT 45° PR RF CN 11.75-11.81: JT 80° PR RF CN 11.81: BP 0 - 10° PR RF Clay VNR 12.03: BP 0° UN RF Clay VNR 12.03-12.07: JT 50° PR RF CN	
				13	*13.00* 26.30		Hole Terminated at 13.00 m Borehole converted to monitoring well.				
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH9M

Project:	Proposed Mixed Use Development	East:	329461.7 m	Depth Range:	4.50 m to 13.00 m
Location:	3-7 Regent Street (Site 1),13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247914.4 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	39.30 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 2	Inclination:	-90°	LOGGED: JZ	DATE: 8/3/16
Job No. :	E22913	Box:	1 & 2 of 2	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	13.00 m		

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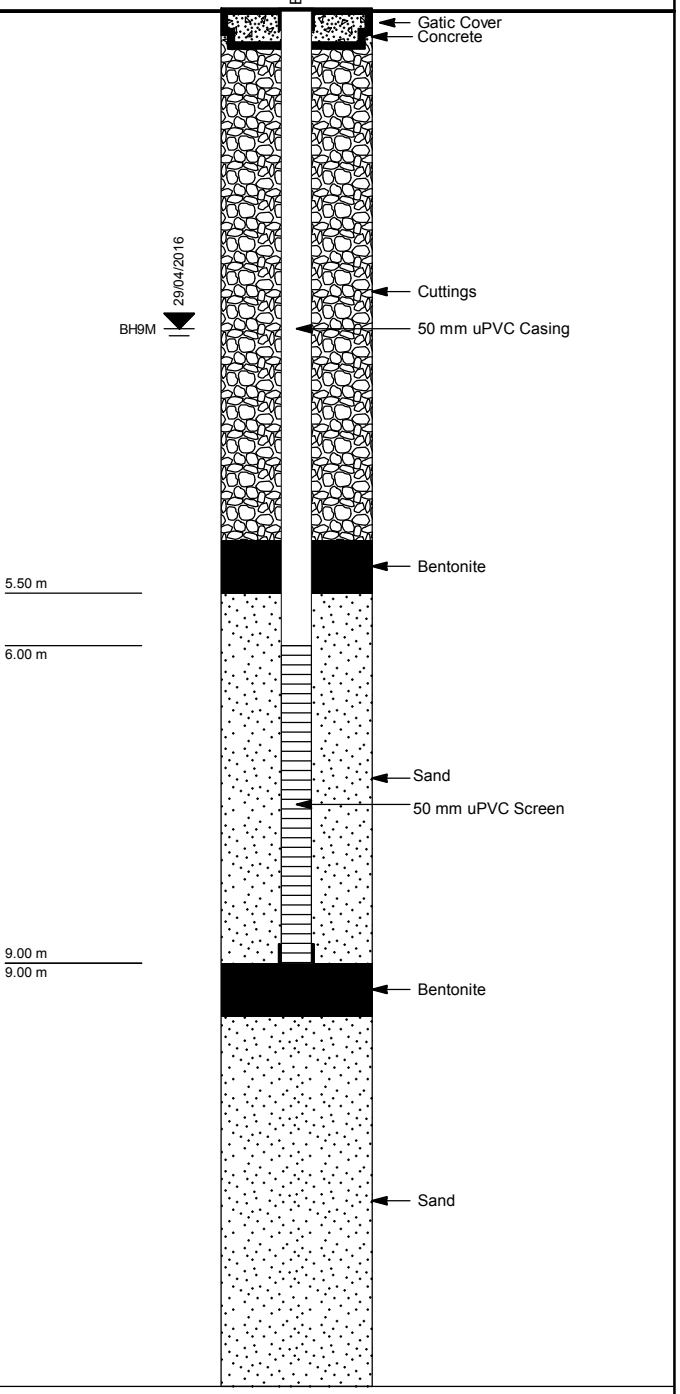
Hole ID
BH9M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 2	SHEET	: 1 OF 1
CONTRACTOR	: Terratest Pty Ltd	EASTING	: 329461.7 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247914.4 m	LOGGED BY	: SY
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 08/03/2016
PROJECT No.	: E22913	GROUND RL	: 39.30 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T	GWNE on completion of augering	0	39		ASPHALT: 50mm thick.
					FILL: Silty SAND; fine grained, brown to light brown, with some rootlets and terracotta/concrete fragments.
					FILL: Silty Gravelly CLAY; low plasticity, brown mottled dark grey, gravel is fine to medium, sub-angular, with some timber and brick fragments.
			38		FILL: Silty CLAY; low plasticity, dark brown, with some brick and timber fragments, slight organic odour.
		2			Silty CLAY; high plasticity, brown with some red mottling, with some fine to medium sub-angular ironstone gravel.
					SHALE; grey-brown, with some orange ironstaining, very low strength, distinctly weathered.
			36		
		4			From 4.1m, grey, very low to low strength.
NMLC	85-90% RETURN				SHALE; bedding dipping 0-5°, dark grey, with some orange staining.
					CORELOSS; 330mm thick.
			34		SHALE; bedding dipping 0-5°, dark grey, with some orange staining, interbedded with clay.
		6			From 6.0m, heavy iron staining, no clay.
			32		
		8			
	60-70% RETURN				SHALE; bedding dipping 0-5°, <1mm thick, dark grey.
			30		
	70-75% RETURN	10			
			28		
		12			
			26		Hole Terminated at 13.00 m Borehole converted to monitoring well.
		14			

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Stick Up & RL	Tip Depth & RL	Installation Date	Static Water Level
BH9M	Standpipe	0.00 m 39.30 m	9.00 m 30.30 m	08/03/2016	3.00m



RIG	:	CHECKED BY	: SK	REMARK
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.
AZIMUTH	:	APPROVED BY	:	
HOLE DIA.	:	APPROVED DATE	:	

BOREHOLE: BH10M

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Project	Proposed Mixed Use Development	East	329457.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247869.9 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 2	Surface RL	43.00 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	0.12				-	ASPHALT: 120mm thick.	-	-	PAVEMENT
				42.88				-	SHALE; grey-brown, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
	E				BH10M_0.2-0.3 ES 0.20-0.30 m							
					SPT 0.50-0.57 m 8/70mm HB N=SPT					-	-	
			1		BH10M_0.5-0.57 BH10M_0.9-1.0 ES 0.90-1.00 m							
				1.30	BH10M_1.0-1.1 D							
	H			41.70	1.00-1.10 m				From 1.3m, grey-brown, interbedded with iron indurated bands.			
				1.51	BH10M_1.4-1.5 D 1.40-1.50 m				Continued as Cored Borehole			
					SPT 1.50-1.51 m 6/10mm HB N=SPT BH10M_1.5-1.51							
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH10M

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Project	Proposed Mixed Use Development	East	329457.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247869.9 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 2	Surface RL	43.00 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
					1.51		Continuation from non-cored borehole				
NMLC	85-90% RETURN	100	40 (28)	2	41.49		SHALE; pale-grey brown, with orange-red iron staining.	XW - DW		1.71-1.96: JT 60 - 70° PR RF Fe SN 2.37-2.40: DS fine to medium ironstone gravel, 30mm 2.66-2.67: DS fine to medium ironstone gravel, 10mm 2.86-2.88: DS fine to medium ironstone gravel, 20mm	
	29/04/16				*3.00*						
		100	68 (64)	3	40.00		From 3.0m, grey-brown, with some orange iron staining.			3.95: BP 15 - 20° PR RF Fe SN 4.32: BP 10 - 30° UN RF Fe SN 4.39: BP 20° PR RF Fe SN 4.62-4.66: CS fine to medium ironstone gravel, 40mm 4.72-4.76: BP 0 - 10° PR RF Clay VNR 4.85: BP 10° PR RF Fe SN 5.00-5.04: CS medium ironstone gravel, 40mm 5.17: BP 20° PR RF Fe SN	
				4							
				5	*5.50*						
		100	23 (18)	6	37.50		From 5.5m, bedding dipping 0-5°, dark grey, with brown iron staining.	DW		5.60: JT 40° PR RF CN 5.70-5.80: CZ fine to medium ironstone gravel, 100mm 5.88: JT 30° PR RF CN 5.95: BP 0 - 5° PR RF Clay VNR 6.14: BP 0 - 5° PR RF Fe SN 6.14-6.17: JT 45° PR RF Fe SN 6.23-6.31: DS extremely weathered and clay, 80mm 6.41-6.47: JT 45° PR RF Fe SN 6.47: JT 25 - 30° PR RF Clay VNR 6.54-6.65: JT 30 - 90° CU RF Clay VNR	
					6.80						
				7	*6.93*		CORELOSS: 130mm thick.				
		94	76 (51)		36.07		SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.	DW		7.00-7.15: DZ Clay 150mm 7.16: BP 0 - 5° PR RF CN 7.30-7.33: BPx2 0 - 5° PR RF CN 7.44: BP 0 - 5° PR RF CN	
				8						7.78: BP 0 - 5° PR RF CN 7.79-7.81: DS extremely weathered and clay, 20mm 7.86: BP 0 - 5° PR RF Clay VNR 8.00-8.04: CS fine to medium sandstone, 40mm 8.41: BP 0 - 5° PR RF Clay VNR	
				9							
		100	84 (84)							9.06: BP 0 - 5° PR RF Clay VNR 9.16-9.22: BPx2 0 - 5° PR RF CN 9.41: JT 45° PR RF CN	
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH10M

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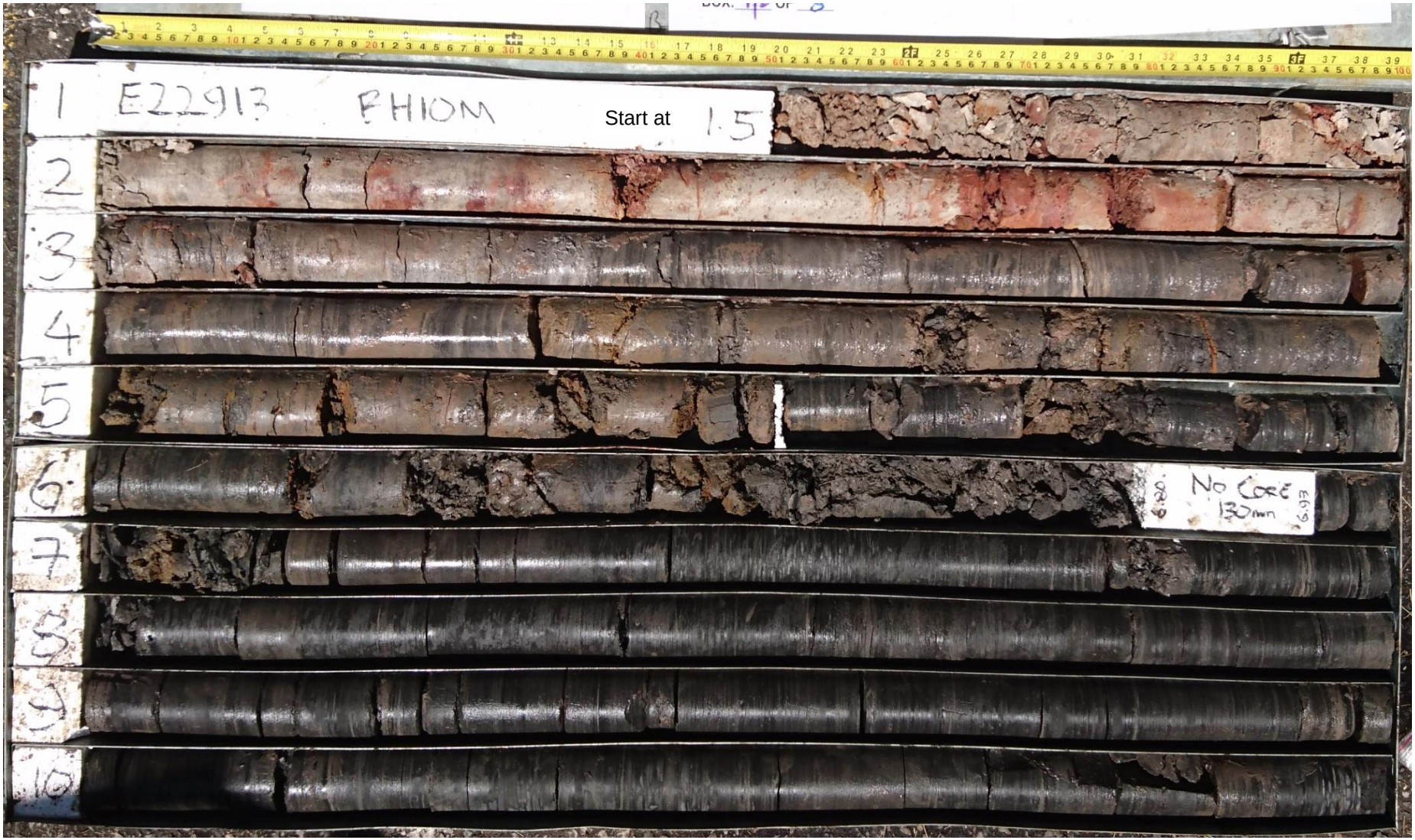
Project	Proposed Mixed Use Development	East	329457.8 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247869.9 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 2	Surface RL	43.00 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	85-90% RETURN	100	84 (84)	10			SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.	DW		9.92: BP 0 - 5° PR RF Clay VNR 10.14: BP 0 - 5° PR RF Clay VNR 10.25: BP 0 - 5° PR RF Clay VNR	
				11						10.69-10.86: JT 70 - 80° PR RF CN	
										11.21-11.30: JT 80° PR RF CN 11.30-11.35: BPx2 0 - 5° PR RF CN 11.38-11.42: CS fine to medium sub-rounded to sub-angular, 40mm 11.42-11.57: JT 60 - 90° CU RF Clay VNR	
				12	12.27						
					30.73 12.47		CORELOSS: 200mm thick.			12.25-12.27: CS fine to medium, sub-angular shale	
					30.53		SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.	FR		12.47-12.50: DS Clay 30mm	
		93	81 (81)	13						12.89: BP 0 - 5° PR RF CN 12.93-12.95: DS extremely weathered and clay, 20mm	
										13.62: BP 0 - 5° PR RF Clay VNR 13.77-13.95: JTx3 30 - 40° PR RF Clay VNR	
				14						14.13: JT 30° PR RF CN	
					14.57 28.43		From 14.57m, interbedded with fine grained sandstone				
		100	100 (100)	15						14.86-14.91: JT 50° PR RF CN	
					16.00						
				16	27.00		Hole Terminated at 16.00 m Borehole converted to monitoring well.				
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

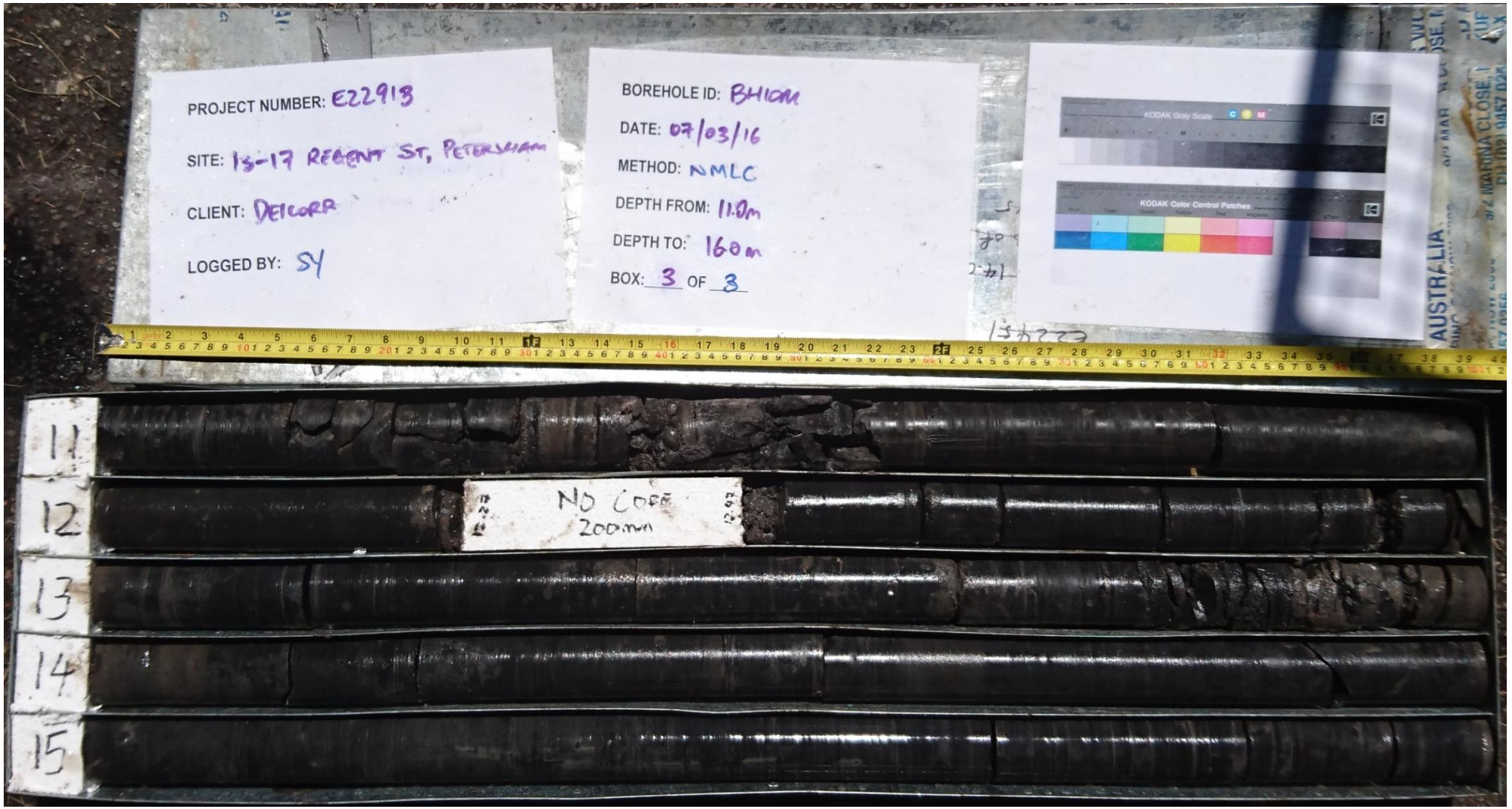
CORE PHOTOGRAPH OF BOREHOLE: BH10M

Project:	Proposed Mixed Use Development	East:	329457.8 m	Depth Range:	1.50 m to 11.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247869.9 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	43.00 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 2	Inclination:	-90°	LOGGED: JZ	DATE: 7/3/16
Job No. :	E22913	Box:	1 & 2 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.00 m		



CORE PHOTOGRAPH OF BOREHOLE: BH10M

Project:	Proposed Mixed Use Development	East:	329457.8 m	Depth Range:	11.00 m to 16.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247869.9 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	43.00 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 2	Inclination:	-90°	LOGGED: JZ	DATE: 7/3/16
Job No. :	E22913	Box:	3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.00 m		



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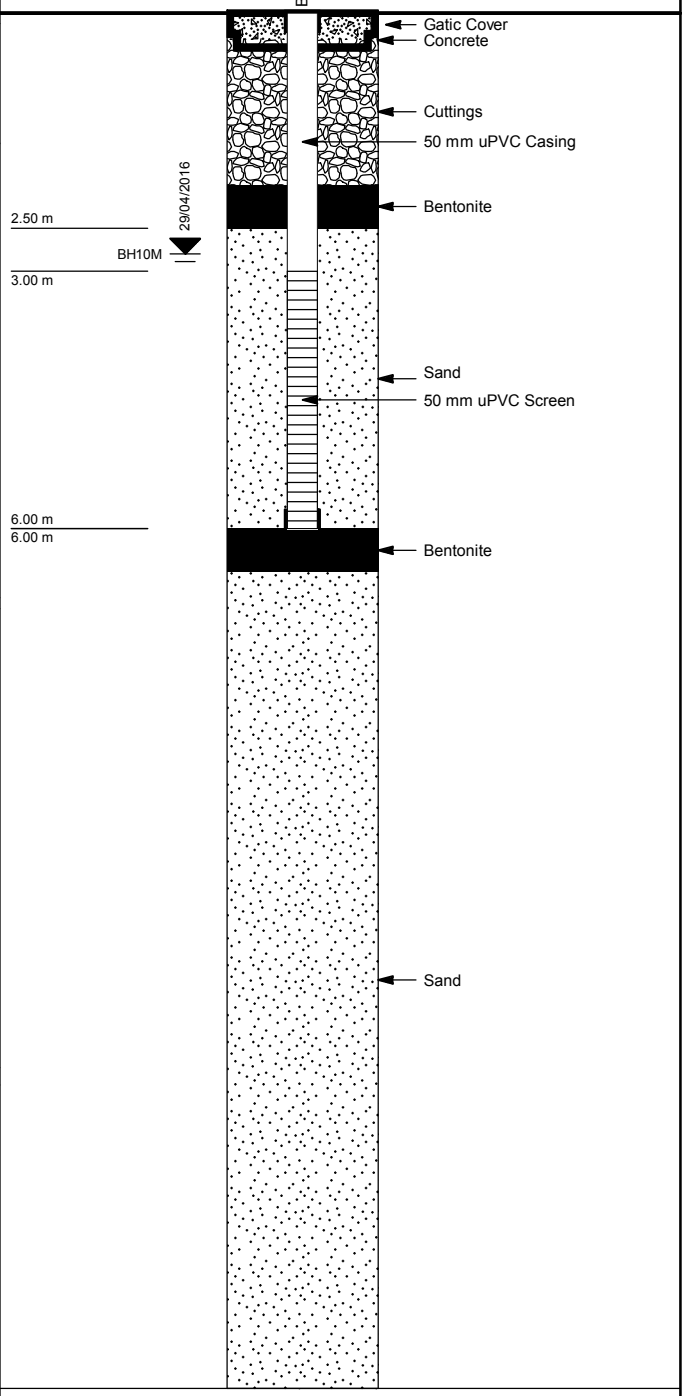
Hole ID
BH10M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 2	SHEET	: 1 OF 1
CONTRACTOR	: Terratest Pty Ltd	EASTING	: 329457.8 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247869.9 m	LOGGED BY	: SY
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 07/03/2016
PROJECT No.	: E22913	GROUND RL	: 43.00 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T	GWNE on completion of augering	0	43		ASPHALT: 120mm thick.
					SHALE; grey-brown, extremely low to very low strength, extremely to distinctly weathered.
			42		
					From 1.3m, grey-brown, interbedded with iron indurated bands.
		2			SHALE; pale-grey brown, with orange-red iron staining.
			40		
					From 3.0m, grey-brown, with some orange iron staining.
NMLC	85-90% RETURN	4			
			38		
					From 5.5m, bedding dipping 0-5°, dark grey, with brown iron staining.
		6			
			36		CORELOSS: 130mm thick.
					SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.
		8			
			34		
		10			
			32		
		12			
					CORELOSS: 200mm thick.
			30		SHALE; bedding dipping 0-5°, <1-1mm thick, dark grey.
		14			
					From 14.57m, interbedded with fine grained sandstone
			28		
		16			Hole Terminated at 16.00 m Borehole converted to monitoring well.
			26		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH10M	Standpipe	6.00 m 37.00 m	07/03/2016	2.80m



RIG	:	CHECKED BY	: SK	REMARK	
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.	
AZIMUTH	:	APPROVED BY	:		
HOLE DIA.	:	APPROVED DATE	:		

BOREHOLE: BH11M

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Project	Proposed Mixed Use Development	East	329483.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247883.2 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 2	Surface RL	43.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	GWNE on completion of augering	0	43.45	BH11M_0.1-0.2 ES 0.10-0.20 m			-	ASPHALT: 50mm thick.	-	-	PAVEMENT
	E							-	SHALE; pale grey, extremely low strength, extremely weathered, interbedded with iron indurated bands.			WEATHERED ROCK
					SPT 0.50-0.54 m 3/40mm HB N=SPT							
				0.90	BH11M_0.5-0.54							
			1	42.60	C 1.00-14.70 m				From 0.9m, grey-brown, very low strength, distinctly weathered.			
	F				BH11M_1.0-1.1 ES 1.00-1.10 m							
					SPT 1.50-1.53 m 4/30mm HB N=SPT							
			2		BH11M_1.5-1.53					-	-	
					BH11M_1.6-1.7 ES 1.60-1.70 m							
					BH11M_2.0-2.1 ES 2.00-2.10 m							
	F-H				BH11M_2.6-2.7 ES 2.60-2.70 m							
			3									
		29/04/16			BH11M_3.5-3.6 ES 3.50-3.60 m							
				4.00	BH11M_3.9-4.0 D 3.90-4.00 m							
			4						Continued as Cored Borehole			
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH11M

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Project	Proposed Mixed Use Development	East	329483.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247883.2 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 2	Surface RL	43.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4	*4.00*		Continuation from non-cored borehole				
NMLC	85-90% RETURN	100	71 (71)	5	39.50		SHALE; pale grey, with red ironstaining.	DW		4.16-4.23: CS 70mm 4.38: JT 30° PR RF Fe SN 4.85: JT 40° PR RF Fe SN 4.88: BP PR RF Fe SN 4.90: JT 0 - 80° CU RF Fe SN	
					5.20						
					38.30		SHALE; bedding dipping 0-10°, grey, with occasional orange iron staining, interbedded with some clay.			5.59: BP 0 - 5° PR RF Fe SN	
		100	88 (83)	6						6.10: JT 30° PR RF Fe SN 6.52-6.55: DS Clay 30mm 6.82: BP 0 - 10° UN RF Fe SN	
				7						7.30: BP 0 - 20° CU RF CN 7.61: BP 0 - 5° PR RF CN	
				8						7.86-7.91: CS fine to medium sub-rounded to sub-angular shale, 50mm 8.04-8.11: DS Clay 70mm	
										8.59-8.65: JT 60° PR RF Fe SN 8.76: BP 0 - 10° PR RF Fe SN	
				9	*9.20*						
	80-85% RETURN	100	17 (14)		34.30		SHALE; dark grey.	XW - DW		9.20-9.25: CZ fine to medium sub-rounded to sub-angular shale, 50mm 9.34-9.56: CZ fine to medium sub-rounded to sub-angular shale, 220mm 9.54-9.68: JT 50° PR RF Clay VNR 9.60-9.71: CZ fine to medium sub-rounded to sub-angular shale, 110mm	
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH11M

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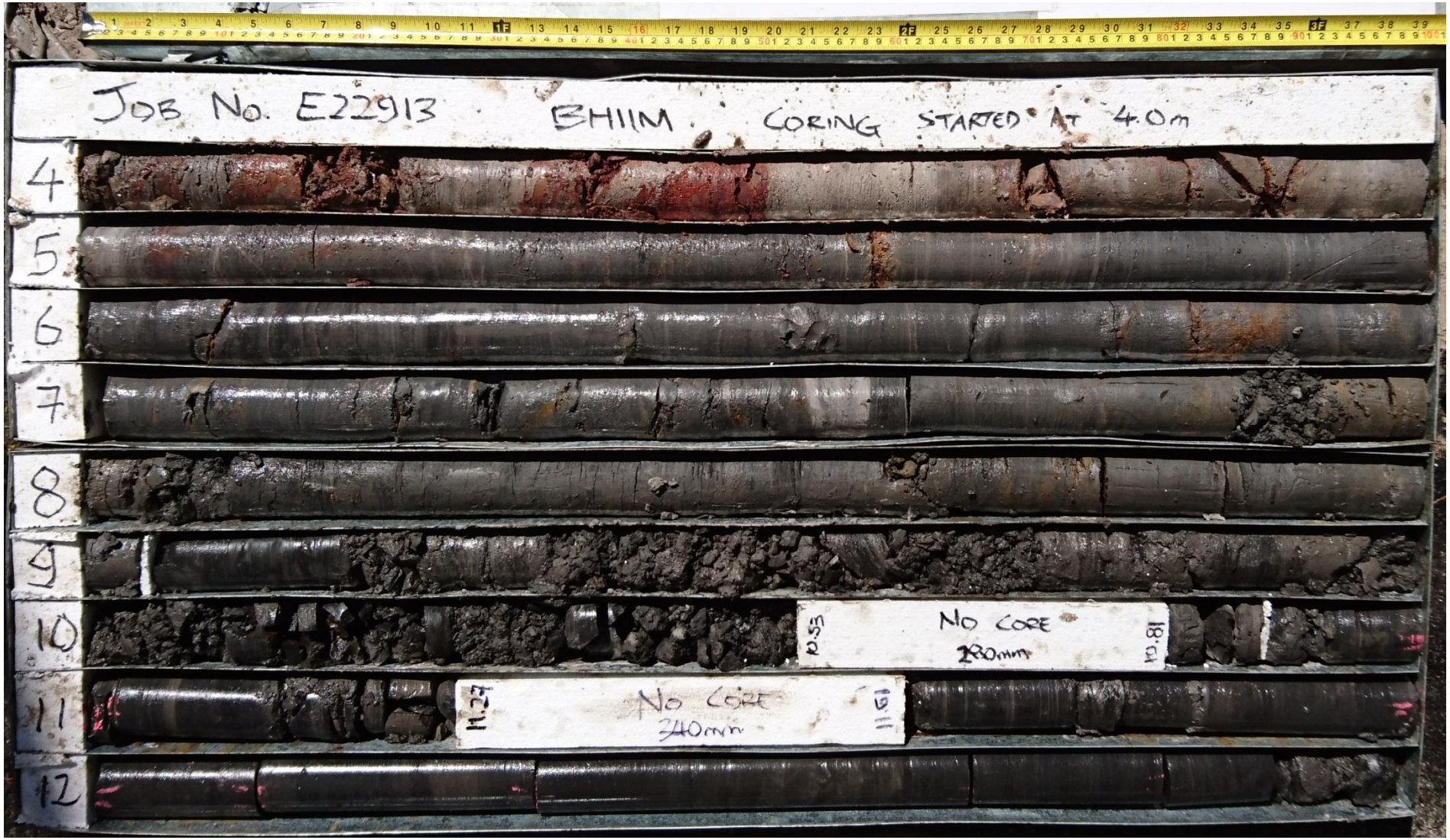
Project	Proposed Mixed Use Development	East	329483.6 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247883.2 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 2	Surface RL	43.50 m AHD	Date Started	7/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	7/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged SY	Date: 7/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	80-85% RETURN	100	17 (14)	10	*10.53*		SHALE; dark grey.	XW - DW		9.93-9.97: JT 50° PR RF Clay VNR 9.93-10.11: CZ fine to medium sub-rounded to sub-angular shale, 180mm 10.11-10.25: JT 90° PR RF Fe SN 10.27-10.35: CS fine to medium sub-rounded to sub-angular shale, 80mm 10.36-10.41: JT 50° PR RF CN 10.41-10.53: CZ fine to medium sub-rounded to sub-angular shale, 120mm 10.90-10.93: DS Clay 30mm 11.15: BP 0 - 10° PR RF Clay VNR 11.16: JT 30° PR RF CN 11.18-11.22: BPx3 0 - 5° PR RF CN 11.22-11.27: JT 90° PR RF CN 11.62: JT 0 - 30° CU RF CN 11.74-11.83: BPx3 0 - 5° PR RF Clay VNR	
					32.97 *10.81*		CORELOSS: 280mm thick.				
				11	32.69 *11.27*		SHALE; dark grey.	XW - DW			
					32.23 *11.61*		CORELOSS: 340mm thick.	SW			
		84	56 (56)		31.89		SHALE; bedding dipping 0-10°, <1mm thick, dark grey.	DW			
				12							
				13				FR			
		100	94 (94)	14	*14.53*					14.24: BP 0 - 5° PR RF CN 14.33-14.48: DS Clay 15mm 14.41-14.44: DS extremely weathered, 30mm 14.53: BP 0° PR RF Clay VNR 14.57: BP 0 - 5° PR RF Clay VNR	
					28.97		From 14.53m, interbedded with fine grained sandstone.				
		100	84 (97)	15						15.12-15.16: JT 0 - 80° UM RF CN 15.23-15.27: JT 50° PR RF CN	
				16	*16.00*						
					27.50		Hole Terminated at 16.00 m Borehole converted to monitoring well.				
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

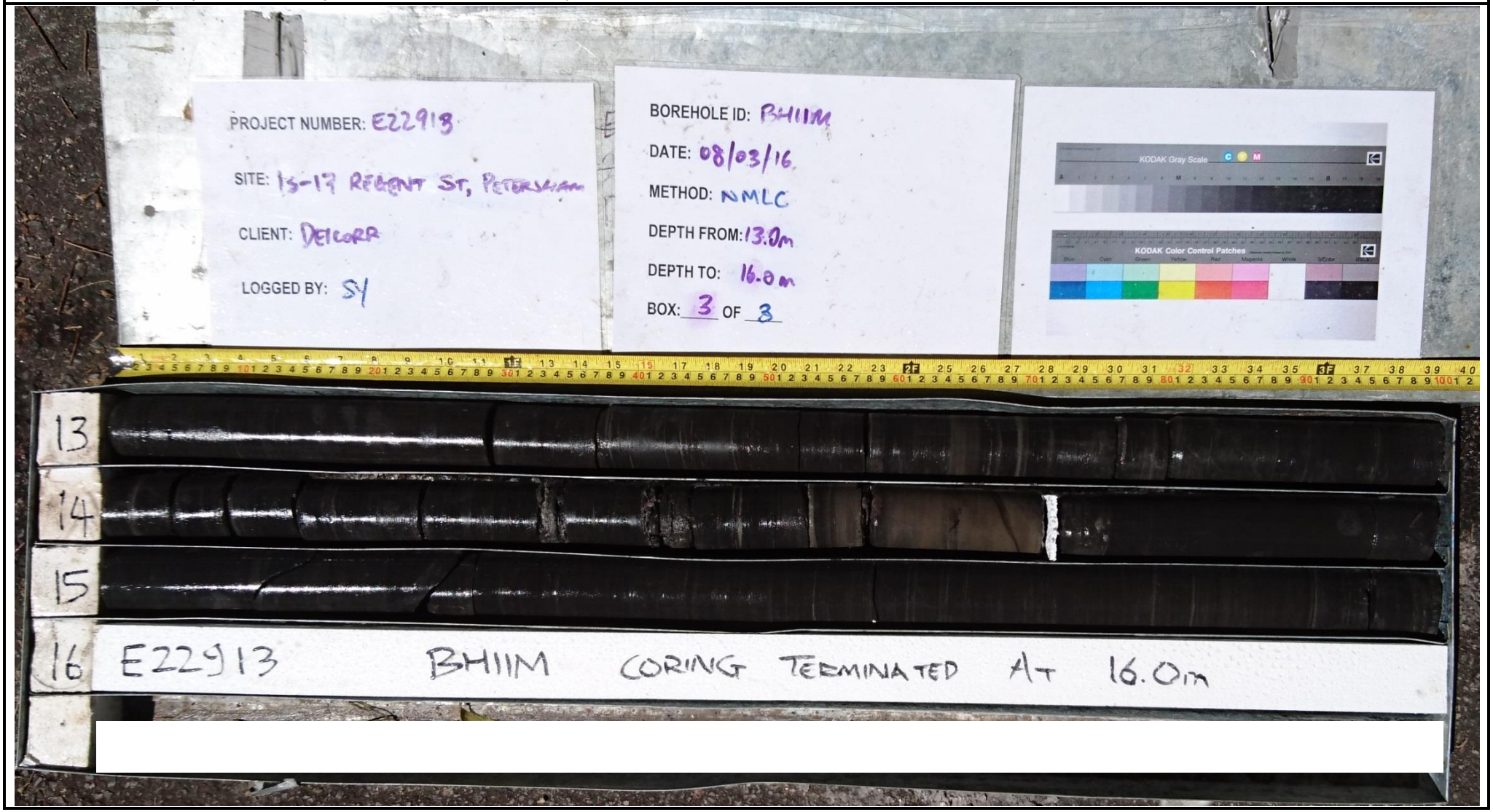
CORE PHOTOGRAPH OF BOREHOLE: BH11M

Project:	Proposed Mixed Use Development	East:	329483.6 m	Depth Range:	4.00 m to 13.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247883.2 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	43.50 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 2	Inclination:	-90°	LOGGED: JZ	DATE: 7/3/16
Job No. :	E22913	Box:	1 & 2 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.00 m		



CORE PHOTOGRAPH OF BOREHOLE: BH11M

Project:	Proposed Mixed Use Development	East:	329483.6 m	Depth Range:	13.00 m to 16.00 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6247883.2 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	43.50 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 2	Inclination:	-90°	LOGGED: JZ	DATE: 7/3/16
Job No. :	E22913	Box:	3 of 3	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	16.00 m		



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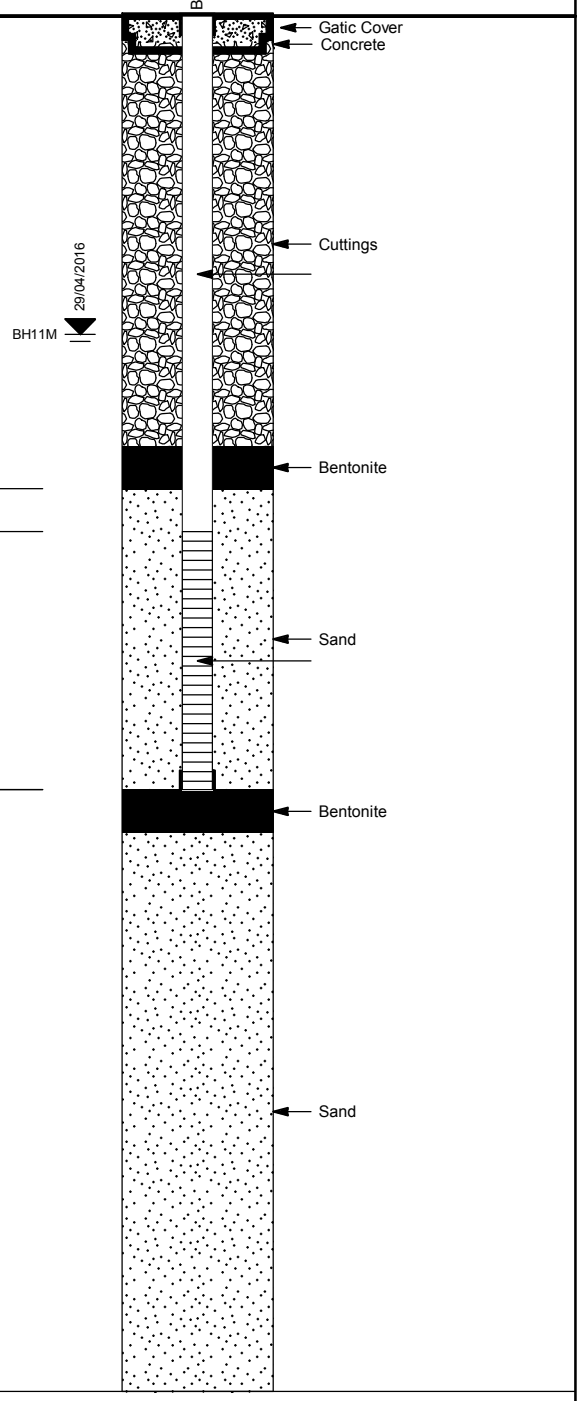
Hole ID
BH11M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 2	SHEET	: 1 OF 1
CONTRACTOR	: Terratest Pty Ltd	EASTING	: 329483.6 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6247883.2 m	LOGGED BY	: SY
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 07/03/2016
PROJECT No.	: E22913	GROUND RL	: 43.50 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T	GWNE on completion of augering	0	43.5		ASPHALT: 50mm thick.
					SHALE; pale grey, extremely low strength, extremely weathered, interbedded with iron indurated bands.
		2	42		From 0.9m, grey-brown, very low strength, distinctly weathered.
			40		
NMLC		4			SHALE; pale grey, with red ironstaining.
	85-90% RETURN		38		SHALE; bedding dipping 0-10°, grey, with occasional orange iron staining, interbedded with some clay.
		6			
			36		
		8			
			34		SHALE; dark grey.
	80-85% RETURN	10			
					CORELOSS: 280mm thick.
					SHALE; dark grey.
			32		CORELOSS: 340mm thick.
		12			SHALE; bedding dipping 0-10°, <1mm thick, dark grey.
			30		
		14			From 14.53m, interbedded with fine grained sandstone.
			28		
		16			Hole Terminated at 16.00 m Borehole converted to monitoring well.
			26		

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH11M	Standpipe	9.00 m 34.50 m	07/03/2016	3.70m



RIG	:	CHECKED BY	: SK
INCLINATION	:	CHECKED DATE	: 24/05/2016
AZIMUTH	:	APPROVED BY	:
HOLE DIA.	:	APPROVED DATE	:

REMARK
Borehole converted to monitoring well.

BOREHOLE: BH12

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Project	Proposed Mixed Use Development	East	329476.3 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6247918.0 m MGA94 Zone 56	Sheet	1 OF 1
Position	Site 2	Surface RL	40.50 m AHD	Date Started	11/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	11/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 11/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H		0	40.47				-	ASPHALT: 30mm thick.	-	-	PAVEMENT
					BH12_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly SAND; fine to medium grained, dark brown, with fine to coarse, sub-angular gravel.	D		FILL
				0.50								
				40.00	SPT 0.50-0.95 m 8,9,8 N=17 BH120.5-0.95			-	FILL: Silty CLAY; low plasticity, dark grey/dark brown, with fine to medium gravel and fine to medium grained sand, trace of sandstone fragments.	M (<PL)	-	
			1	*1.30*								
	E			39.20	BH12_1.3-1.5 ES 1.30-1.50 m SPT 1.50-1.95 m 11,11,11 N=22 BH12_1.5-1.95			-	SHALE; dark brown/dark grey/red, extremely low strength, extremely weathered.			WEATHERED ROCK
			2									
					SPT 3.00-3.05 m 15/50mm HB N=SPT BH12_3.0-3.1					-	-	
	F		3									
			4									
		▷		*4.50*								
	H		5	36.00	SPT 4.50-4.63 m 30/130mm HB N=SPT BH12_4.5-4.63				From 4.5m, very low strength, distinctly weathered.			
				5.50								
	VH			35.00	BH12_5.5-6.0 D 5.50-6.00 m				From 5.5m, very low to low strength.			
			6	*6.00*								
									Hole Terminated at 6.00 m Backfilled with drilling spoil and concrete capped.			
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH15M

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Project	Proposed Mixed Use Development	East	329386.5 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248003.3 m MGA94 Zone 56	Sheet	1 OF 3
Position	Site 3	Surface RL	31.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	H	29/04/16	0	31.32				-	ASPHALT: 80mm thick.	-	-	PAVEMENT
				0.50	BH15M_0.2-0.4 ES 0.20-0.40 m			-	FILL: Gravelly CLAY; low plasticity, dark grey/dark brown, gravel is fine to medium, sub-angular, with fine to medium grained sand.			FILL
				30.90	SPT 0.50-0.95 m 3,4,3 N=7 BH15M_0.5-0.9 BH15M_0.9-0.95			-	FILL: Silty CLAY; medium plasticity, grey mottled red-brown, with fine to medium, sub-angular to sub-rounded gravel.	M (<PL)	-	
			1	1.50								
				29.90	SPT 1.50-1.95 m 3,3,4 N=7 BH15M_1.5-1.95 1.50 m PP =100-200 kPa BH15M_1.8-2.0 ES 1.80-2.00 m			CH	Silty CLAY; high plasticity, dark grey.	M (>PL)	St - VSt	RESIDUAL SOIL
	E		2									
			3	3.00								
				28.40	SPT 3.00-3.45 m 4,10,12 N=22				From 3.0m, red mottled grey, with ironstone bands.			
				3.30								
				28.10	BH15M_3.0-3.3 3.00 m PP =200-220 kPa BH15M_3.3-3.45			-	SHALE; red-brown/dark grey, extremely low to very low strength, extremely to distinctly weathered.			WEATHERED ROCK
			4	4.50						-	-	
	F			26.90	SPT 4.50-4.95 m 13,20,23 N=43 BH15M_4.5-4.95				From 4.5m, grey mottled red-brown.			
			5	5.50								
									Continued as Cored Borehole			
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH15M

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Project	Proposed Mixed Use Development	East	329386.5 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248003.3 m MGA94 Zone 56	Sheet	2 OF 3
Position	Site 3	Surface RL	31.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
				0							
				1							
				2							
				3							
				4							
				5							
					5.50		Continuation from non-cored borehole				
NMLC	-	100	0 (0)	6	25.90		SHALE; dark grey to dark brown.	XW - DW		5.50-5.81: DZ Clay 310mm 5.81-5.88: BPx6 0° UN SM SN 5.88-5.93: DS Clay 50mm 5.93-6.26: CZ Clay 330mm 6.26-6.33: DS Clay 70mm 6.34-6.50: CS 160mm	
					6.50						
		63	0 (0)	7	24.90		CORELOSS: 500mm thick.				
					7.00						
					24.40		SHALE; bedding dipping 0-5°, <1mm thick, grey/dark brown, highly fractured.	DW		7.00-7.29: DZ Clay 290mm 7.33: BP 0° PR SM CN 7.38-7.41: DS Clay 30mm 7.42-7.45: DS Clay 30mm 7.46-7.85: DZ Clay 390mm	
					7.85						
					8.00		CORELOSS: 150mm thick.				
		94	70 (65)	8	23.40		SHALE; dark grey.	DW		8.00-8.28: CZ 380m	
					8.42						
					22.98		SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.	FR		8.32: BP 0° PR SM CN 8.33: BP 0° PR SM CN 8.36: BP 0° PR SM CN 8.39: BP 0° PR SM CN 8.41: BP 0° PR SM CN 8.53: BP 0° PR SM CN 8.58: BP 0° PR SM CN 8.64: BP 0° PR SM CN 8.70: BP 0 - 5° ST SM CN 8.77: BP 0° PR SM CN 8.89: BP 0° PR SM CN 9.01: BP 0° PR SM CN 9.18: BP 0° PR SM CN 9.45: BP 0° PR SM CN 9.68-9.73: JT 30 - 90° ST SM CN	
				9							
				10							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH15M

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Project	Proposed Mixed Use Development	East	329386.5 m		
Location	Regent & Trafalgar Street, Petersham, NSW	North	6248003.3 m MGA94 Zone 56	Sheet	3 OF 3
Position	Site 3	Surface RL	31.40 m AHD	Date Started	8/3/16
Job No.	E22913	Contractor	Terratest Pty Ltd	Date Completed	8/3/16
Client	Deicorp Projects Petersham Pty Ltd	Drill Rig	Hydropower Scout	Logged JZ	Date: 8/3/16
		Inclination	-90°	Checked SK	Date: 24/5/16

Drilling						Field Material Description				Defect Information	
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH $Is_{(50)}$ MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH 10)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm) (10, 30, 100, 300, 1000, 3000)
NMLC	-	94	70 (65)	10			SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.	FR		10.06: BP 0° PR SM CN	
										10.41: BP 0° PR SM CN	
				11						10.83: BP 0° PR SM CN	
										11.08: BP 0° PR SM CN	
		100	81 (93)							11.31: JT 10° CU SM CN	
										11.43: BP 0° PR SM CN	
										11.44: JT CU SM CN	
										11.45-11.49: JT 45° CU SM CN	
										11.51: JT 5° CU SM CN	
				12						11.61: JT 15° PR SM CN	
										11.79-11.83: JT 50° CU SM CN	
										12.05-12.09: JT 45° PR SM CN	
										12.20: BP 0° PR SM CN	
										12.27-12.37: JT 70 - 80° ST SM CN	
										12.38: JT 45° CU SM CN	
										12.50: BP 0° PR SM CN	
					12.70					12.51-12.55: JT 45° UN SM CN	
					18.70		Hole Terminated at 12.70 m Borehole converted to monitoring well.				
				13							
				14							
				15							
				16							
				17							
				18							
				19							
				20							

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

CORE PHOTOGRAPH OF BOREHOLE: BH15M

Project:	Proposed Mixed Use Development	East:	329386.5 m	Depth Range:	5.50 m to 12.70 m
Location:	3-7 Regent Street (Site 1), 13-17 Regent Street (Site 2) & 287-309 Trafalgar Street (Site 3), Petersham, NSW	North:	6248003.3 m MGA94 Zone 56	Contractor:	Terratest Pty Ltd
		Surface RL:	31.40 m AHD	Drill Rig:	Hydropower Scout
Position:	Site 3	Inclination:	-90°	LOGGED: JZ	DATE: 8/3/16
Job No. :	E22913	Box:	1 & 2 of 2	CHECKED: SK	DATE: 24/5/16
Client:	DeiCorp Projects Petersham Pty Ltd	Hole Depth:	12.70 m		

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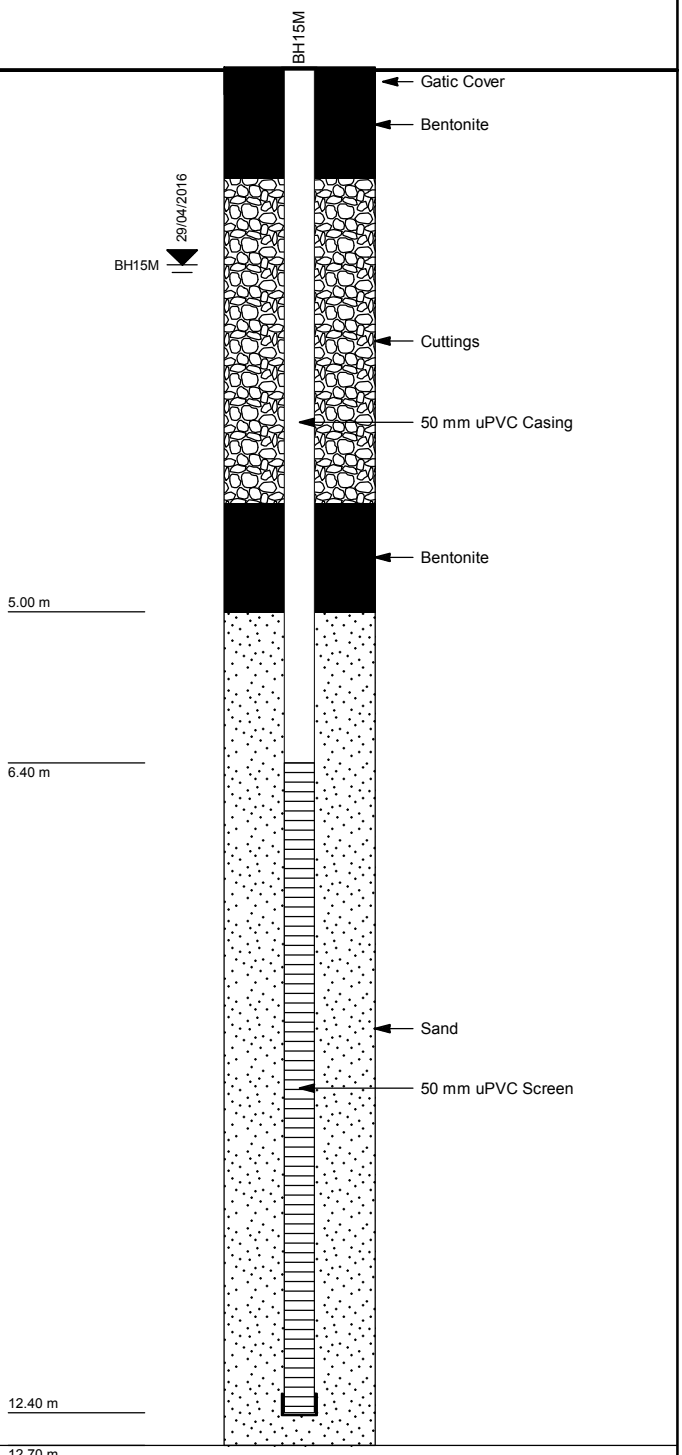
Hole ID
BH15M

CLIENT	: Deicorp Projects Petersham Pty Ltd	POSITION	: Site 3	SHEET	: 1 OF 1
CONTRACTOR	: Terratest Pty Ltd	EASTING	: 329386.5 m	STATUS	:
PROJECT	: Proposed Mixed Use Development	NORTHING	: 6248003.3 m	LOGGED BY	: JZ
LOCATION	: Regent & Trafalgar Street, Petersham, NSW	COORD. SYS.	: MGA94 Zone 56	DRILL DATE	: 08/03/2016
PROJECT No.	: E22913	GROUND RL	: 31.40 m AHD		

Method	Drilling Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/T	▽	0	31.40		ASPHALT: 80mm thick.
					FILL: Gravelly CLAY; low plasticity, dark grey/dark brown, gravel is fine to medium, sub-angular, with fine to medium grained sand.
					FILL: Silty CLAY; medium plasticity, grey mottled red-brown, with fine to medium, sub-angular to sub-rounded gravel.
		2	30		Silty CLAY; high plasticity, dark grey.
					From 3.0m, red mottled grey, with ironstone bands.
		4	28		SHALE; red-brown/dark grey, extremely low to very low strength, extremely to distinctly weathered.
					From 4.5m, grey mottled red-brown.
		6	26		SHALE; dark grey to dark brown.
					CORELOSS: 500mm thick.
			24		SHALE; bedding dipping 0-5°, <1mm thick, grey/dark brown, highly fractured.
		8			CORELOSS: 150mm thick.
					SHALE; dark grey.
NMLC	-				SHALE; bedding dipping 0-5°, <1-2mm thick, dark grey.
			22		
		10			
			20		
		12			
			18		Hole Terminated at 12.70 m Borehole converted to monitoring well.

PIEZOMETER CONSTRUCTION DETAILS

ID	Type	Tip Depth & RL	Installation Date	Static Water Level
BH15M	Standpipe	12.40 m 19.00 m	08/03/2016	1.80m



RIG	:	CHECKED BY	: SK	REMARK
INCLINATION	:	CHECKED DATE	: 24/05/2016	Borehole converted to monitoring well.
AZIMUTH	:	APPROVED BY	:	
HOLE DIA.	:	APPROVED DATE	:	

EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT LOGS

DRILLING/EXCAVATION METHOD

HA	Hand Auger	**RD**	Rotary blade or drag bit	**NQ**	Diamond Core - 47 mm
DTC	Diatube Coring	**RT**	Rotary Tricone bit	**NMLC**	Diamond Core - 52 mm
NDD	Non-destructive digging	**RAB**	Rotary Air Blast	**HQ**	Diamond Core - 63 mm
AS*	Auger Screwing	**RC**	Reverse Circulation	**HMLC**	Diamond Core - 63 mm
AD*	Auger Drilling	**PT**	Push Tube	**BH**	Tractor Mounted Backhoe
***V**	V-Bit	**CT**	Cable Tool Rig	**EX**	Tracked Hydraulic Excavator
***T**	TC-Bit, e.g. AD/T	**JET**	Jetting	**EE**	Existing Excavation
ADH	Hollow Auger	**WB**	Washbore or Bailer	**HAND**	Excavated by Hand Methods

PENETRATION RESISTANCE

L	**Low Resistance**	Rapid penetration/ excavation possible with little effort from equipment used.
M	**Medium Resistance**	Penetration/ excavation possible at an acceptable rate with moderate effort from equipment used.
H	**High Resistance**	Penetration/ excavation is possible but at a slow rate and requires significant effort from equipment used.
R	**Refusal/Practical Refusal**	No further progress possible without risk of damage or unacceptable wear to equipment used.

These assessments are subjective and are dependent on many factors, including equipment power and weight, condition of excavation or drilling tools and experience of the operator.

WATER

Water level at date shown

Partial water loss

Water inflow

Complete Water Loss

GWNE	GROUNDWATER NOT OBSERVED - Observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave-in of the borehole/ test pit.
GWNO	GROUNDWATER NOT ENCOUNTERED - Borehole/ test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/ test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18 seating	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm
30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
Sampling	
DS	Disturbed Sample
BDS	Bulk disturbed Sample
GS	Gas Sample
WS	Water Sample
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
Testing	
FP	Field Permeability test over section noted
FVS	Field Vane Shear test expressed as uncorrected shear strength (sv= peak value, sr= residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket Penetrometer test expressed as instrument reading in kPa
WPT	Water Pressure tests
DCP	Dynamic Cone Penetrometer test
CPT	Static Cone Penetration test
CPTu	Static Cone Penetration test with pore pressure (u) measurement

ROCK CORE RECOVERY

TCR=Total Core Recovery

$$= \frac{Length\ of\ core\ recovered}{Length\ of\ core\ run} \times 100$$

SCR=Solid Core Recovery (%)

$$= \frac{\sum Length\ of\ cylindrical\ core\ recovered}{Length\ of\ core\ run} \times 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\sum Axial\ lengths\ of\ core > 100mm}{Length\ of\ core\ run} \times 100$$

MATERIAL BOUNDARIES

———————— = Inferred Boundary

– – – – – – – – – = Probable Boundary

– ? – ? – ? – ? – ? – = Possible Boundary

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

 FILL

 COUBLES or BOULDERS

 GRAVEL (GP or GW)

 ORGANIC SOILS (OL, OH or Pt)

 SILT (ML or MH)

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay

 CLAY (CL, CI or CH)

 SAND (SP or SW)

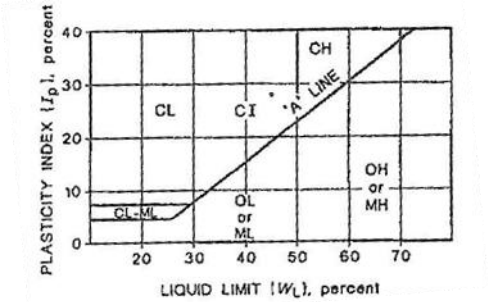
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/tactile methods.

PARTICLE SIZE CHARACTERISTICS

Major Division	Sub Division	Particle Size
BOULDERS		>200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	20 to 63 mm
	Medium	6 to 20 mm
	Fine	2 to 6 mm
SAND	Coarse	0.6 to 2 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2mm
SILT		0.002 to 0.075 mm
CLAY		<0.002 mm

PLASTICITY PROPERTIES



USCS SYMBOLS

Major Divisions		Symbol	Description
COARSE GRAINED SOILS More than 50% by dry mass less than 63mm is greater than 0.075mm	More than 50% of coarse grains are >2.mm	GW	Well graded gravel and gravel-sand mixtures, little or no fines.
		GP	Poorly graded gravel and gravel-sand mixtures, little or no fines.
		GM	Silty gravel, gravel-sand-silt mixtures.
		GC	Clayey gravel, gravel-sand-clay mixtures.
	More than 50% of coarse grains are <2 mm	SW	Well graded sand and gravelly sand, little or no fines.
		SP	Poorly graded sand and gravelly sand, little or no fines.
		SM	Silty sand, sand-silt mixtures.
		SC	Clayey sand, sandy-clay mixtures.
FINE GRAINED SOILS More than 50% by dry mass less than 63mm is less than 0.075mm	Liquid Limit less < 50%	ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		OL	Organic silts and organic silty clays of low plasticity.
	Liquid Limit > than 50%	MH	Inorganic silts of high plasticity.
		CH	Inorganic clays of high plasticity.
		OH	Organic clays of medium to high plasticity.
		PT	Peat muck and other highly organic soils.

MOISTURE CONDITION

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

Moisture content of cohesive soils may also be described in relation to plastic limit (WP) or liquid limit (WL) [» much greater than, > greater than, < less than, « much less than].

CONSISTENCY

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0. to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	Above 200 kPa

DENSITY

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	< 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Density	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.
SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.

MINOR COMPONENTS

Term	Assessment Guide	Proportion by Mass
Trace	Presence just detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: ≤ 5% Fine grained soil: ≤15%
Some	Presence easily detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: 5 - 12% Fine grained soil: 15 - 30%

TERMS FOR ROCK MATERIAL STRENGTH AND WEATHERING

CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/ tactile methods.

STRENGTH

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

 # Rock Strength Test Results

▼ Point Load Strength Index, $Is_{(50)}$, Axial test (MPa)

● Point Load Strength Index, $Is_{(50)}$, Diametral test (MPa)

Relationship between rock strength test result ($Is_{(50)}$) and unconfined compressive strength (UCS) will vary with rock type and strength, and should be determined on a site-specific basis. UCS is typically 10 to 30 x $Is_{(50)}$, but can be as low as 5 MPa.

ROCK MATERIAL WEATHERING

Symbol		Term	Field Guide
RS		Residual Soil	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.
EW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. In some environments it is convenient to subdivide into Highly Weathered and Moderately Weathered, with the degree of alteration typically less for MW.
	MW		
SW		Slightly Weathered	Rock slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

ABBREVIATIONS AND DESCRIPTIONS FOR ROCK MATERIAL AND DEFECTS

CLASSIFICATION AND INFERRED STRATIGRAPHY

Rock is broadly classified and described in Borehole Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/ tactile methods.

ROCK MATERIAL DESCRIPTION

Layering

Term	Description
Massive	No layering apparent
Poorly Developed	Layering just visible; little effect on properties
Well Developed	Layering (bedding, foliation, cleavage) distinct; rock breaks more easily parallel to layering

Structure

Term	Spacing (mm)
Thinly laminated	<6
Laminated	6 – 20
Very thinly bedded	20 – 60
Thinly bedded	60 – 200
Medium bedded	200 – 600
Thickly bedded	600 – 2,000
Very thickly bedded	> 2,000

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT TYPES

Defect Type	Abbr.	Description
Joint	JT	Surface of a fracture or parting, formed without displacement, across which the rock has little or no tensile strength. May be closed or filled by air, water or soil or rock substance, which acts as cement.
Bedding Parting	BP	Surface of fracture or parting, across which the rock has little or no tensile strength, parallel or sub-parallel to layering/ bedding. Bedding refers to the layering or stratification of a rock, indicating orientation during deposition, resulting in planar anisotropy in the rock material.
Foliation	FL	Repetitive planar structure parallel to the shear direction or perpendicular to the direction of higher pressure, especially in metamorphic rock, e.g. Schistosity (SH) and Gneissosity.
Contact	CO	The surface between two types or ages of rock.
Cleavage	CL	Cleavage planes appear as parallel, closely spaced and planar surfaces resulting from mechanical fracturing of rock through deformation or metamorphism, independent of bedding.
Sheared Seam/ Zone (Fault)	SS/SZ	Seam or zone with roughly parallel almost planar boundaries of rock substance cut by closely spaced (often <50 mm) parallel and usually smooth or slickensided joints or cleavage planes.
Crushed Seam/ Zone (Fault)	CS/CZ	Seam or zone composed of disoriented usually angular fragments of the host rock substance, with roughly parallel near-planar boundaries. The brecciated fragments may be of clay, silt, sand or gravel sizes or mixtures of these.
Decomposed Seam/ Zone	DS/DZ	Seam of soil substance, often with gradational boundaries, formed by weathering of the rock material in places.
Infilled Seam	IS	Seam of soil substance, usually clay or clayey, with very distinct roughly parallel boundaries, formed by soil migrating into joint or open cavity.
Schistocity	SH	The foliation in schist or other coarse grained crystalline rock due to the parallel arrangement of platy or prismatic mineral grains, such as mica.
Vein	VN	Distinct sheet-like body of minerals crystallised within rock through typically open-space filling or crack-seal growth.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT SHAPE AND ROUGHNESS

Shape	Abbr.	Description	Roughness	Abbr.	Description
Planar	Pl	Consistent orientation	Polished	Pol	Shiny smooth surface
Curved	Cu	Gradual change in orientation	Slickensided	SL	Grooved or striated surface, usually polished
Undulating	Un	Wavy surface	Smooth	S	Smooth to touch. Few or no surface irregularities
Stepped	St	One or more well defined steps	Rough	RF	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper
Irregular	Ir	Many sharp changes in orientation	Very Rough	VR	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper

Orientation: **Vertical Boreholes –** The dip (inclination from horizontal) of the defect.
Inclined Boreholes – The inclination is measured as the acute angle to the core axis.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT COATING

Coating	Abbr.	Description
Clean	CN	No visible coating or infilling
Stain	SN	No visible coating but surfaces are discoloured by staining, often limonite (orange-brown)
Veneer	VNR	A visible coating of soil or mineral substance, usually too thin to measure (< 1 mm); may be patchy

DEFECT APERTURE

Aperture	Abbr.	Description
Closed	CL	Closed.
Open	O	Without any infill material.
Infilled	-	Soil or rock i.e. clay, talc, pyrite, quartz, etc.

APPENDIX B

LABORATORY CERTIFICATES

POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9625-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9625	BH1M 8.7m	Laminite	Diametral	-	51.0	0.47	0.18	0.18	
			Axial	51.0	35.0	2.05	0.90	0.88	
S9626	BH1M 9.2m	Laminite	Diametral	-	51.0	0.23	0.09	0.09	
			Axial	51.0	29.0	1.75	0.93	0.87	
S9627	BH1M 10.2m	Laminite	Diametral	-	52.0	0.13	0.05	0.05	
			Axial	52.0	46.0	3.79	1.24	1.30	
S9628	BH1M 11.1m	Laminite	Diametral	-	51.0	1.07	0.41	0.42	
			Axial	51.0	32.0	2.70	1.30	1.25	
S9629	BH1M 12.0m	Laminite	Diametral	-	51.0	1.02	0.39	0.40	
			Axial	51.0	38.0	3.36	1.36	1.36	
S9630	BH1M 13.0m	Laminite	Diametral	-	51.0	1.21	0.47	0.47	
			Axial	51.0	46.0	5.08	1.70	1.77	
S9631	BH1M 14.1m	Laminite	Diametral	-	51.0	1.65	0.63	0.64	
			Axial	51.0	47.0	5.45	1.79	1.87	

Comments:

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Authorised Signatory:

Chris Lloyd

23/03/2016

Date:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9632-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9632	BH2 5.9m	Shale	Diametral	-	48.0	0.02	0.01	0.01	
			Axial	48.0	13.0	0.13	0.16	0.13	
S9633	BH2 6.9m	Shale	Diametral	-	44.0	0.02	0.01	0.01	
			Axial	44.0	25.0	0.31	0.22	0.19	
S9634	BH2 7.9m	Laminite	Diametral	-	51.0	0.04	0.02	0.02	
			Axial	51.0	47.0	1.37	0.45	0.47	
S9635	BH2 8.8m	Laminite	Diametral	-	51.0	0.80	0.31	0.31	
			Axial	51.0	36.0	1.95	0.83	0.82	
S9636	BH2 9.4m	Laminite	Diametral	-	50.0	0.02	0.01	0.01	
			Axial	50.0	22.0	0.95	0.68	0.60	
S9637	BH2 10.4m	Laminite	Diametral	-	51.0	0.64	0.25	0.25	
			Axial	51.0	25.0	2.69	1.66	1.50	
S9638	BH2 11.4m	Laminite	Diametral	-	51.0	0.98	0.38	0.38	
			Axial	51.0	41.0	1.62	0.61	0.62	
S9639	BH2 12.0m	Laminite	Diametral	-	51.0	1.02	0.39	0.40	
			Axial	51.0	29.0	1.79	0.95	0.89	
S9640	BH2 13.0m	Laminite	Diametral	-	51.0	0.97	0.37	0.38	
			Axial	51.0	44.0	1.12	0.39	0.40	
S9641	BH2 14.1m	Laminite	Diametral	-	51.0	1.14	0.44	0.44	
			Axial	51.0	42.0	1.99	0.73	0.74	

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9642-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9642	BH2 15.1m	Laminite	Diametral	-	51.0	0.84	0.32	0.33	
			Axial	51.0	43.0	4.89	1.75	1.80	

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9643-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9643	BH3 4.9m	Shale	Diametral	-	40.0	0.01	0.01	0.01	
			Axial	40.0	16.0	0.01	0.01	0.01	
S9644	BH3 5.9m	Shale	Diametral	-	30.0	0.04	0.04	0.04	
			Axial	30.0	25.0	0.02	0.02	0.02	
S9645	BH3 6.6m	Shale	Diametral	-	36.0	0.03	0.02	0.02	
			Axial	36.0	26.0	0.03	0.03	0.02	
S9646	BH3 7.5m	Shale	Diametral	-	51.0	0.17	0.07	0.07	
			Axial	51.0	47.0	0.63	0.21	0.22	
S9647	BH3 8.4m	Laminite	Diametral	-	50.0	0.18	0.07	0.07	
			Axial	50.0	17.0	0.86	0.79	0.66	
S9648	BH3 9.4m	Laminite	Diametral	-	51.0	0.03	0.01	0.01	
			Axial	51.0	21.0	0.53	0.39	0.34	
S9649	BH3 10.4m	Laminite	Diametral	-	51.0	0.06	0.02	0.02	
			Axial	51.0	32.0	2.65	1.28	1.22	
S9650	BH3 11.5m	Laminite	Diametral	-	50.0	0.44	0.18	0.18	
			Axial	50.0	31.0	2.96	1.50	1.42	
S9651	BH3 12.1m	Laminite	Diametral	-	50.0	0.28	0.11	0.11	
			Axial	50.0	32.0	1.52	0.75	0.71	
S9652	BH3 12.8m	Laminite	Diametral	-	45.0	0.14	0.07	0.07	
			Axial	45.0	44.0	0.02	0.01	0.01	

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9653-PL
Job No:	S16101	**Date Tested:**	23/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9653	BH3 13.2m	Shale	Diametral	-	51.0	0.60	0.23	0.23	
			Axial	51.0	40.0	1.11	0.43	0.43	
S9654	BH3 14.1m	Shale	Diametral	-	51.0	1.00	0.38	0.39	
			Axial	51.0	36.0	4.11	1.76	1.73	
S9655	BH3 15.1m	Shale	Diametral	-	51.0	0.85	0.33	0.33	
			Axial	51.0	44.0	3.96	1.39	1.43	
S9656	BH3 16.0m	Shale	Diametral	-	51.0	0.40	0.15	0.16	
			Axial	51.0	47.0	1.77	0.58	0.61	
S9657	BH3 16.9m	Shale	Diametral	-	51.0	0.16	0.06	0.06	
			Axial	51.0	32.0	2.67	1.28	1.23	

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9658-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9658	BH4M 5.8m	Shale	Diametral	-	48.0	0.02	0.01	0.01	
			Axial	48.0	10.0	0.14	0.22	0.16	
S9659	BH4M 6.3m	Shale	Diametral	-	46.0	0.38	0.18	0.17	
			Axial	46.0	27.0	0.42	0.27	0.24	
S9660	BH4M 7.3m	Shale	Diametral	-	52.0	0.02	0.01	0.01	
			Axial	52.0	22.0	0.28	0.19	0.17	
S9661	BH4M 8.1m	Shale	Diametral	-	51.0	0.34	0.13	0.13	
			Axial	51.0	38.0	0.61	0.25	0.25	
S9662	BH4M 8.7m	Shale	Diametral	-	51.0	0.02	0.01	0.01	
			Axial	51.0	23.0	0.33	0.22	0.20	
S9663	BH4M 9.0m	Shale	Diametral	-	51.0	0.11	0.04	0.04	
			Axial	51.0	32.0	1.17	0.56	0.54	
S9664	BH4M 10.0m	Shale	Diametral	-	51.0	0.02	0.01	0.01	
			Axial	51.0	20.0	0.79	0.61	0.52	
S9665	BH4M 11.1m	Shale	Diametral	-	52.0	0.02	0.01	0.01	
			Axial	52.0	11.0	0.41	0.56	0.43	
S9666	BH4M 12.1m	Shale	Diametral	-	51.0	0.24	0.09	0.09	
			Axial	51.0	33.0	1.40	0.65	0.63	
S9667	BH4M 13.1m	Shale	Diametral	-	51.0	0.45	0.17	0.17	
			Axial	51.0	45.0	2.23	0.76	0.79	

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9668-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9668	BH4M 14.1m	Shale	Diametral	-	51.0	0.54	0.21	0.21	
			Axial	51.0	31.0	4.20	2.09	1.99	
S9669	BH4M 15.1m	Shale	Diametral	-	51.0	0.30	0.12	0.12	
			Axial	51.0	25.0	3.15	1.94	1.76	

Comments:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9670-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9670	BH5 5.7m	Shale	Diametral	-	49.0	0.04	0.02	0.02	
			Axial	49.0	12.0	0.18	0.24	0.18	
S9671	BH5 6.6m	Shale	Diametral	-	48.0	0.03	0.01	0.01	
			Axial	48.0	25.0	0.12	0.08	0.07	
S9672	BH5 7.6m	Shale	Diametral	-	50.0	0.28	0.11	0.11	
			Axial	50.0	37.0	0.51	0.22	0.21	
S9673	BH5 8.4m	Shale	Diametral	-	50.0	0.05	0.02	0.02	
			Axial	50.0	26.0	0.47	0.28	0.26	
S9674	BH5 9.4m	Shale	Diametral	-	51.0	0.18	0.07	0.07	
			Axial	51.0	28.0	0.50	0.27	0.26	
S9675	BH5 10.3m	Shale	Diametral	-	51.0	0.13	0.05	0.05	
			Axial	51.0	14.0	0.59	0.65	0.52	
S9676	BH5 11.3m	Shale	Diametral	-	51.0	0.03	0.01	0.01	
			Axial	51.0	32.0	0.19	0.09	0.09	
S9677	BH5 12.3m	Shale	Diametral	-	50.0	0.01	0.00	0.00	
			Axial	50.0	18.0	0.98	0.86	0.72	
S9678	BH5 13.3m	Shale	Diametral	-	51.0	0.36	0.14	0.14	
			Axial	51.0	42.0	1.96	0.72	0.73	
S9679	BH5 14.3m	Shale	Diametral	-	51.0	0.15	0.06	0.06	
			Axial	51.0	38.0	1.85	0.75	0.75	

Comments:

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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9680-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9680	BH5 15.3m	Shale	Diametral	-	51.0	0.03	0.01	0.01	
			Axial	51.0	16.0	0.53	0.51	0.42	
S9681	BH5 16.3m	Shale	Diametral	-	51.0	0.04	0.02	0.02	
			Axial	51.0	44.0	0.24	0.08	0.09	
S9682	BH5 17.1m	Shale	Diametral	-	50.0	0.04	0.02	0.02	
			Axial	50.0	36.0	0.21	0.09	0.09	

Comments:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9683-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9683	BH7 8.2m	Shale	Diametral	-	34.0	0.25	0.22	0.18	
			Axial	34.0	19.0	0.20	0.24	0.19	
S9684	BH7 9.2m	Laminite	Diametral	-	50.0	0.11	0.04	0.04	
			Axial	50.0	30.0	0.21	0.11	0.10	
S9685	BH7 9.8m	Shale	Diametral	-	41.0	0.02	0.01	0.01	
			Axial	41.0	24.0	0.03	0.02	0.02	
S9686	BH7 10.5m	Shale	Diametral	-	41.0	0.03	0.02	0.02	
			Axial	41.0	44.0	0.03	0.01	0.01	
S9687	BH7 11.3m	Shale	Diametral	-	51.0	0.30	0.12	0.12	
			Axial	51.0	30.0	0.28	0.14	0.14	
S9688	BH7 12.0m	Laminite	Diametral	-	50.0	0.24	0.10	0.10	
			Axial	50.0	19.0	0.56	0.46	0.39	
S9689	BH7 12.8m	Laminite	Diametral	-	51.0	0.50	0.19	0.19	
			Axial	51.0	44.0	0.87	0.30	0.31	
S9690	BH7 13.3m	Laminite	Diametral	-	51.0	0.07	0.03	0.03	
			Axial	51.0	24.0	0.62	0.40	0.36	
S9691	BH7 14.3m	Shale	Diametral	-	50.0	0.34	0.14	0.14	
			Axial	50.0	27.0	2.25	1.31	1.20	
S9692	BH7 15.3m	Shale	Diametral	-	50.0	0.53	0.21	0.21	
			Axial	50.0	32.0	0.44	0.22	0.21	

Comments:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

23/03/2016

Date:

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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9693-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9693	BH7 15.6m	Shale	Diametral	-	51.0	0.75	0.29	0.29	
			Axial	51.0	51.0	2.32	0.70	0.75	
S9694	BH7 16.3m	Shale	Diametral	-	51.0	1.09	0.42	0.42	
			Axial	51.0	45.0	2.60	0.89	0.92	
S9695	BH7 16.9m	Shale	Diametral	-	51.0	0.94	0.36	0.36	
			Axial	51.0	42.0	2.59	0.95	0.97	

Comments:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Fisher & Regent St, Petersham (E22913)	**Report No:**	S10568-PL
Job No:	S16133	**Date Tested:**	13/04/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 5/04/2016

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S10568	BH8 6.7m	Shale	Diametral	-	40.0	0.41	0.26	0.23	
			Axial	40.0	34.0	0.09	0.05	0.05	
S10569	BH8 7.05m	Shale	Diametral	-	49.0	0.02	0.01	0.01	
			Axial	49.0	25.0	0.15	0.10	0.09	
S10570	BH8 7.8m	Shale	Diametral	-	50.0	0.02	0.01	0.01	
			Axial	50.0	12.0	0.09	0.12	0.09	
S10571	BH8 8.05m	Shale	Diametral	-	50.0	0.02	0.01	0.01	
			Axial	50.0	19.0	0.09	0.07	0.06	
S10572	BH8 8.65m	Shale	Diametral	-	49.0	0.76	0.32	0.31	
			Axial	49.0	33.0	0.44	0.21	0.20	
S10573	BH8 9.55m	Shale	Diametral	-	50.0	0.03	0.01	0.01	
			Axial	50.0	22.0	0.27	0.19	0.17	

Comments:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

13/04/2016

Date:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9696-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9696	BH9M 4.6m	Shale	Diametral	-	45.0	0.03	0.01	0.01	
			Axial	45.0	32.0	0.03	0.02	0.02	
S9697	BH9M 5.5m	Shale	Diametral	-	50.0	0.02	0.01	0.01	
			Axial	50.0	26.0	0.05	0.03	0.03	
S9698	BH9M 6.8m	Shale	Diametral	-	50.0	0.02	0.01	0.01	
			Axial	50.0	21.0	0.06	0.04	0.04	
S9699	BH9M 7.6m	Shale	Diametral	-	50.0	0.04	0.02	0.02	
			Axial	50.0	10.0	0.22	0.35	0.25	
S9700	BH9M 8.6m	Shale	Diametral	-	50.0	0.15	0.06	0.06	
			Axial	50.0	43.0	0.55	0.20	0.21	
S9701	BH9M 9.5m	Shale	Diametral	-	50.0	0.11	0.04	0.04	
			Axial	50.0	36.0	0.66	0.29	0.28	
S9702	BH9M 10.6m	Shale	Diametral	-	52.0	0.02	0.01	0.01	
			Axial	52.0	42.0	0.53	0.19	0.20	
S9703	BH9M 11.5m	Shale	Diametral	-	49.0	0.62	0.26	0.26	
			Axial	49.0	20.0	0.78	0.63	0.53	
S9704	BH9M 12.5m	Shale	Diametral	-	50.0	0.30	0.12	0.12	
			Axial	50.0	41.0	0.54	0.21	0.21	

Comments:

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Authorised Signatory:

Chris Lloyd

23/03/2016

Date:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9705-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9705	BH10M 2.5m	Mudstone	Diametral	-	37.0	0.04	0.03	0.03	
			Axial	37.0	35.0	0.08	0.05	0.04	
S9706	BH10M 3.5m	Shale	Diametral	-	47.0	0.02	0.01	0.01	
			Axial	47.0	31.0	0.05	0.03	0.03	
S9707	BH10M 4.6m	Shale	Diametral	-	45.0	0.04	0.02	0.02	
			Axial	45.0	27.0	0.03	0.02	0.02	
S9708	BH10M 5.6m	Shale	Diametral	-	42.0	0.17	0.10	0.09	
			Axial	42.0	23.0	0.15	0.12	0.10	
S9709	BH10M 6.4m	Shale	Diametral	-	50.0	0.04	0.02	0.02	
			Axial	50.0	34.0	0.43	0.20	0.19	
S9710	BH10M 7.4m	Shale	Diametral	-	50.0	0.44	0.18	0.18	
			Axial	50.0	23.0	2.59	1.77	1.57	
S9711	BH10M 8.5m	Shale	Diametral	-	50.0	0.04	0.02	0.02	
			Axial	50.0	24.0	0.28	0.18	0.16	
S9712	BH10M 9.5m	Shale	Diametral	-	50.0	0.20	0.08	0.08	
			Axial	50.0	16.0	0.45	0.44	0.36	
S9713	BH10M 10.6m	Shale	Diametral	-	50.0	0.17	0.07	0.07	
			Axial	50.0	37.0	0.39	0.17	0.16	
S9714	BH10M 11.6m	Shale	Diametral	-	50.0	0.04	0.02	0.02	
			Axial	50.0	20.0	0.26	0.20	0.18	

Comments:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

23/03/2016

Date:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9715-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9715	BH10M 12.5m	Shale	Diametral	-	50.0	0.27	0.11	0.11	
			Axial	50.0	39.0	1.02	0.41	0.41	
S9716	BH10M 13.6m	Shale	Diametral	-	50.0	0.17	0.07	0.07	
			Axial	50.0	20.0	1.06	0.83	0.72	
S9717	BH10M 14.6m	Shale	Diametral	-	50.0	0.43	0.17	0.17	
			Axial	50.0	24.0	0.77	0.50	0.45	
S9718	BH10M 15.6m	Shale	Diametral	-	50.0	0.39	0.16	0.16	
			Axial	50.0	32.0	0.61	0.30	0.29	

Comments:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

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23/03/2016

Date:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9719-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9719	BH11M 4.6m	Shale	Diametral	-	40.0	0.06	0.04	0.03	
			Axial	40.0	28.0	0.07	0.05	0.04	
S9720	BH11M 5.5m	Shale	Diametral	-	33.0	0.15	0.14	0.11	
			Axial	33.0	33.0	0.08	0.06	0.05	
S9721	BH11M 6.5m	Shale	Diametral	-	22.0	0.16	0.33	0.23	
			Axial	22.0	29.0	0.10	0.12	0.10	
S9722	BH11M 7.6m	Shale	Diametral	-	33.0	0.15	0.14	0.11	
			Axial	33.0	34.0	0.13	0.09	0.08	
S9723	BH11M 8.6m	Shale	Diametral	-	42.0	0.03	0.02	0.02	
			Axial	42.0	34.0	0.07	0.04	0.04	
S9724	BH11M 9.2m	Shale	Diametral	-	41.0	0.70	0.42	0.38	
			Axial	41.0	30.0	0.30	0.19	0.17	
S9726	BH11M 11.1m	Shale	Diametral	-	51.0	0.03	0.01	0.01	
			Axial	51.0	27.0	0.38	0.22	0.20	
S9727	BH11M 12.3m	Shale	Diametral	-	50.0	0.60	0.24	0.24	
			Axial	50.0	38.0	0.47	0.19	0.19	
S9728	BH11M 13.5m	Shale	Diametral	-	49.0	0.07	0.03	0.03	
			Axial	49.0	18.0	1.22	1.09	0.91	
S9729	BH11M 14.3m	Shale	Diametral	-	50.0	0.01	0.00	0.00	
			Axial	50.0	23.0	0.50	0.34	0.30	

Comments:

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Alexandria NSW

POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9729-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9730	BH11M 15.5m	Shale	Diametral	-	51.0	0.09	0.03	0.03	
			Axial	51.0	32.0	0.76	0.37	0.35	

Comments:

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POINT LOAD STRENGTH INDEX REPORT

Client:	Environmental Investigations	**Moisture Content Condition:**	As received
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Storage History:**	Core boxes
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9731-PL
Job No:	S16101	**Date Tested:**	22/03/2016

Test Procedure: ☑ AS4133 4.1 Rock strength tests - Determination of point load strength index

Sampling: Sampled by Client **Date Sampled:** 4-11/3/16

Preparation: Prepared in accordance with the test method

Sample Number	Sample Source	Sample Description	Test Type	Average Width (mm)	Platen Separation (mm)	Failure Load (kN)	Point Load Index Is (MPa)	Point Load Index $Is_{(50)}$ (MPa)	Notes
S9731	BH15M 5.6m	Shale	Diametral	-	32.0	0.06	0.06	0.05	
			Axial	32.0	35.0	0.09	0.06	0.06	
S9732	BH15M 6.3m	Shale	Diametral	-	18.0	0.03	0.09	0.06	
			Axial	18.0	20.0	0.03	0.07	0.04	
S9733	BH15M 7.3m	Shale	Diametral	-	13.0	0.04	0.24	0.13	
			Axial	13.0	15.0	0.04	0.16	0.10	
S9734	BH15M 8.5m	Laminite	Diametral	-	51.0	1.64	0.63	0.64	
			Axial	51.0	43.0	6.80	2.44	2.50	
S9735	BH15M 9.4m	Laminite	Diametral	-	51.0	0.85	0.33	0.33	
			Axial	51.0	37.0	6.19	2.58	2.55	
S9736	BH15M 10.4m	Laminite	Diametral	-	51.0	1.06	0.41	0.41	
			Axial	51.0	41.0	5.31	1.99	2.02	
S9737	BH15M 11.4m	Laminite	Diametral	-	51.0	1.86	0.72	0.72	
			Axial	51.0	38.0	5.72	2.32	2.31	
S9738	BH15M 12.2m	Laminite	Diametral	-	51.0	1.03	0.40	0.40	
			Axial	51.0	28.0	8.61	4.74	4.41	

Comments:

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Authorised Signatory:

Chris Lloyd

23/03/2016

Date:

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MOISTURE CONTENT TEST REPORT

Client:	Environmental Investigations	**Job No:**	S16101
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Report No:**	S9739-MC
Project:	Trafalgar & Regent St, Petersham NSW (E22913)		

Test Procedure:

- ☑ AS 1289 2.1.1 Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (Standard method).
- ☐ AS4133 1.1.1 Rock moisture content tests - Determination of the moisture content of rock - Oven drying method (standard method)
- ☐ RMS T120 Moisture content of road construction materials (Standard method)
- ☐ RMS T262 Determination of moisture content of aggregates (Standard method)

Sampling:	Sampled by Client	**Date Sampled:**	4-11/3/16
Preparation:	Prepared in accordance with the test method		

Sample No.	Source	Sample Description	Moisture Content %
S9739	BH3 1.5 - 1.95m	silty CLAY	**25.5**

Notes:

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

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6/04/2016

Date:

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SOIL CLASSIFICATION REPORT

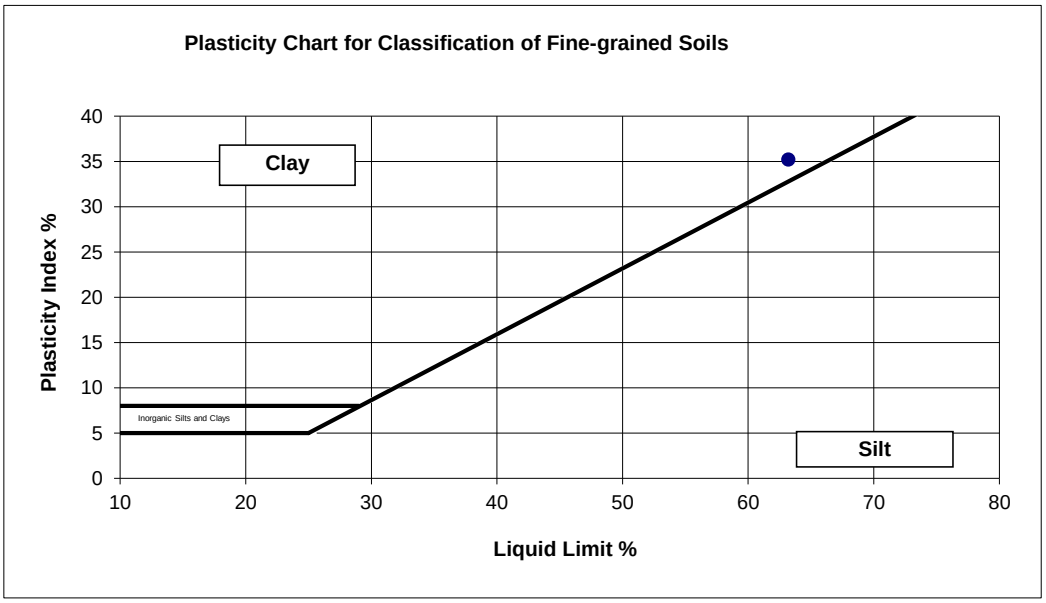
Client:	Environmental Investigations	**Source:**	BH3 1.5 - 1.95m
Address:	Suite 6.01, 55 Miller Street, Pyrmont, NSW 2009	**Sample Description:**	silty CLAY
Project:	Trafalgar & Regent St, Petersham NSW (E22913)	**Report No:**	S9739-PI
Job No:	S16101	**Lab No:**	S9739

Test Procedure:

- ☑ AS1289 2.1.1 Soil moisture content tests (Oven drying method)
- ☑ AS1289 3.1.1 Soil classification tests - Determination of the liquid limit of a soil - Four point casagrande method
- ☐ AS1289 3.1.2 Soil classification tests - Determination of the liquid limit if a soil - One point Casagrande method (subsidiary method)
- ☑ AS1289 3.2.1 Soil classification tests - Determination of the plastic limit of a soil - Standard method
- ☑ AS1289 3.3.1 Soil classification tests - Calculation of the plasticity Index of a soil
- ☑ AS1289 3.4.1 Soil classification tests - Determination of the linear shrinkage of a soil - Standard method

Sampling:	Sampled by Client	**Date Sampled:**	4-11/3/16
Preparation:	Prepared in accordance with the test method		

Liquid Limit (%):	63	**Linear Shrinkage (%):**	14.0
Plastic Limit (%):	28	**Field Moisture Content (%):**	25.5
Plastic Index:	35		



Soil Preparation Method: Dry Sieved
Soil History: Natural State
Soil Condition: Linear

NATA

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Authorised Signatory:

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6/04/2016

Date:

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Alexandria NSW 2015

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	James Zhao
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
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Email	James. Zhao@eiaustralia.com.au
Project	**E22913 Trafalgar & Regent St, Petersham**
Order Number	**E22913**
Samples	4

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE150099 R0**
Date Received	15/3/2016
Date Reported	22/3/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Miliana Colati
Chemist / 2IC Inorganics

pH in soil (1:5) [AN101] Tested: 17/3/2016

PARAMETER	UOM	LOR	BH7 0.5-0.9m SOIL - 10/3/2016 SE150099.001	BH15M 3.0-3.3m SOIL - 7/3/2016 SE150099.002	BH9M 1.4-1.5m SOIL - 8/3/2016 SE150099.003	BH10M 0.9-1.0m SOIL - 7/3/2016 SE150099.004
pH	pH Units	-	**7.3**	**5.1**	**5.8**	**8.0**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 17/3/2016

PARAMETER	UOM	LOR	BH7 0.5-0.9m SOIL - 10/3/2016 SE150099.001	BH15M 3.0-3.3m SOIL - 7/3/2016 SE150099.002	BH9M 1.4-1.5m SOIL - 8/3/2016 SE150099.003	BH10M 0.9-1.0m SOIL - 7/3/2016 SE150099.004
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	500	110	270	360
Resistivity of extract (1:5 Dry sample basis)*	ohm m	0.1	20	95	37	28

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 17/3/2016

PARAMETER	UOM	LOR	BH7 0.5-0.9m SOIL - 10/3/2016 SE150099.001	BH15M 3.0-3.3m SOIL - 7/3/2016 SE150099.002	BH9M 1.4-1.5m SOIL - 8/3/2016 SE150099.003	BH10M 0.9-1.0m SOIL - 7/3/2016 SE150099.004
Chloride	mg/kg	0.25	**63**	**16**	**19**	**11**
Sulphate	mg/kg	5	**300**	**110**	**360**	**64**

Moisture Content [AN002] Tested: 16/3/2016

PARAMETER	UOM	LOR	BH7 0.5-0.9m SOIL - 10/3/2016 SE150099.001	BH15M 3.0-3.3m SOIL - 7/3/2016 SE150099.002	BH9M 1.4-1.5m SOIL - 8/3/2016 SE150099.003	BH10M 0.9-1.0m SOIL - 7/3/2016 SE150099.004
% Moisture	%w/w	0.5	**17**	**24**	**16**	**6.7**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Client	Environmental Investigations
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Project	**E22913 - Fisher & Regent St, Petersham**
Order Number	**E22913**
Samples	3

LABORATORY DETAILS

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SGS Reference	**SE150968 R0**
Date Received	11/4/2016
Date Reported	2/5/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

Required analyses can't be performed on samples #1 and 2 due to matrix interference- acidified samples were provided.

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Ly Kim Ha
Organic Section Head

Miliana Colati
Chemist / 2IC Inorganics

pH in soil (1:5) [AN101] Tested: 12/4/2016

PARAMETER	UOM	LOR	BH8M 0.8-0.95 SOIL - 5/4/2016 SE150968.003
pH	pH Units	-	**4.7**

Conductivity and TDS by Calculation - Soil [AN106] Tested: 12/4/2016

PARAMETER	UOM	LOR	BH8M 0.8-0.95 SOIL - 5/4/2016 SE150968.003
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	**49**

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 12/4/2016

PARAMETER	UOM	LOR	BH8M 0.8-0.95 SOIL - 5/4/2016 SE150968.003
Chloride	mg/kg	0.25	**3.7**
Sulphate	mg/kg	5	**67**

Moisture Content [AN002] Tested: 13/4/2016

PARAMETER	UOM	LOR	BH8M 0.8-0.95 SOIL - 5/4/2016 SE150968.003
% Moisture	%w/w	0.5	**9.1**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

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Samples analysed as received.
Solid samples expressed on a dry weight basis.

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Project	**E22913 - Trafalgar and Regent St**
Order Number	**E22913**
Samples	3

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SGS Reference	**SE151676 R0**
Date Received	29/4/2016
Date Reported	5/5/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

pH in water [AN101] Tested: 2/5/2016

PARAMETER	UOM	LOR	BH15M WATER - 29/4/2016 SE151676.001	BH8M WATER - 29/4/2016 SE151676.002	BH10M WATER - 29/4/2016 SE151676.003
pH**	No unit	-	**6.5**	**6.1**	**5.3**

Conductivity and TDS by Calculation - Water [AN106] Tested: 2/5/2016

PARAMETER	UOM	LOR	BH15M WATER - 29/4/2016 SE151676.001	BH8M WATER - 29/4/2016 SE151676.002	BH10M WATER - 29/4/2016 SE151676.003
Conductivity @ 25 C	µS/cm	2	1000	610	1200

Anions by Ion Chromatography in Water [AN245] Tested: 2/5/2016

PARAMETER	UOM	LOR	BH15M WATER - 29/4/2016 SE151676.001	BH8M WATER - 29/4/2016 SE151676.002	BH10M WATER - 29/4/2016 SE151676.003
Chloride	mg/L	0.05	**110**	**49**	**140**
Sulphate, SO4	mg/L	1	**190**	**140**	**270**

METHOD	METHODOLOGY SUMMARY
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

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APPENDIX C

VIBRATION LIMITS

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

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

It should be noted that peak vibration velocities higher than the minimum figures in **Table A** for low frequencies may be quite 'safe', depending on the frequency content of the vibration and the actual conditions of the structures.

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

Table A DIN 4150 – Structural Damage – Safe Limits for Building Vibration

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

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

APPENDIX D

IMPORTANT INFORMATION

Important Information

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client And Environmental Investigations Pty Ltd ("EI"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

EI has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. EI has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, EI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to EI.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. EI should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that EI be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. EI assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of EI or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

EI will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.