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Geotechnical Investigation Report

Proposed Residential Development at 185 Fifth Ave, Austral NSW

Prepared for

GM Architects Pty Ltd

Report No. P2017-014-G217 Rev 0

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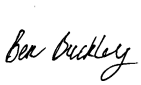
Author		Benjamin Buckley	8/6/2017

Executive Summary

Benviron Group carried out a geotechnical investigation at No 185 Fifth Avenue, Austral in May 2017 to assess the site surface and subsurface conditions in regard to the proposed residential development.

It is understood the proposed development involves demolition of all the existing structures in this site and the construction of a four 5-storeys residential building with a 2 level basement carpark adjoining Fifth Avenue in Austral. The investigation comprised drilling of four boreholes within accessible parts of the site. In general, the site is gently sloping from a southeast to a northwest direction across the site, which is at approximately RL+73.5m AHD at the southeast corner of the site adjoining Fifth Avenue, and at approximately RL+70.2m AHD at the northwestern corner of the site. The boreholes were drilled down to a depth of 9.7m (BH1), 8.9m (BH2), 7.3m (BH3) and 7.4m (BH4) below the existing ground level from an average level of RL+71.5m AHD. Rock coring was undertaken in two of the boreholes (BH1 and BH2) to investigate the bedrock stratigraphy commencing at approximately 7.6m (BH1) and 6.0m (BH2) below existing ground level upon TC bit refusal. Ground water seepage was observed around 6.0m below the ground level at BH1, which translated to be at approximately RL +64.2 mAHD during the investigation.

This report presents and interprets the findings of this geotechnical investigation that was carried out to date. Based on the findings, geotechnical and assessment and recommendations are presented.

The proposed development is feasible based on the findings of this investigation subjected to the recommendations provided in this report.

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1.0 INTRODUCTION

Benviron Group ('BG') was engaged to undertake a geotechnical investigation at 185 Fifth Avenue, Austral ('the site'). The purpose of this investigation is to assess the site's surface and subsurface conditions and to provide geotechnical recommendations for the design and construction of the proposed residential development in preparation on the submission for Development Approval

The proposed development involves demolition of all the existing structures and the construction a four 5-storeys residential buildings with a 2 level basement carpark. The proposed development is facing Fifth Avenue, Austral.

This report presents and interprets the findings of the geotechnical investigation that was carried out at the site on the 18-19 May 2017 as follows:

- Method of investigation,
- Site description, including surface and sub-surface conditions,
- Site plan, showing investigation locations and footprint of the proposed development,
- Groundwater conditions and management,
- Recommendations on the excavation conditions, temporary slope batters, and vibration considerations
- Provision of soil parameters for design of retaining systems, and
- Recommendations on footings and serviceability bearing pressures.

2.0 AVAILABLE INFORMATION

At the time of writing this report, a set of architectural Drawings prepared by C M Architects dated April 2017 with reference No. J6826 were provided to us as listed below:

- a101 Survey
- a102 Site Plan
- a103 Site Analysis
- a200 Basement 1
- a201 Basement 2

- a202 Ground Floor
- a203 Level 1
- a204 Level 2
- a205 Level 3
- a206 Level 4
- a207 Roof Level
- a208 Adaptable units
- a300 Elevations
- a301 Elevations
- a400 Sections
- a500 Shadow Diagrams – 21 June (9am, 10 am, 11 am, + 12 pm)-.
- a**501** Shadow Diagrams – 21 Jun (1pm, 2pm. 3pm)
- a600 Solar and Cross Ventilation

3.0 SITE LOCATION AND DESCRIPTION

The site is in the suburb of Austral, approximately 50 Km west of the Sydney CBD (Figure 1). The site is predominantly rectangular in shape and bounded by neighboring buildings and structures in the north, east and west, and immediately adjacent to Fifth Avenue in the south (Figure 2). The site is gently sloping from the southeast corner adjoining Fifth Avenue towards a northwesterly direction. Along the southern site boundary adjoining Fifth Avenue, it is at approximately RL +73.5m AHD at the eastern boundary of the site and slopes westward and at the westernmost boundary this is at approximately RL +71.0m AHD.

4.0 PROPOSED DEVELOPMENT

The proposed development is four 5-storeys residential buildings (Buildings A, B, C and D) with 2 levels of basement carpark. The 2 level basement carpark is joined between Buildings A & B and between buildings C & D at basement 1 level. Buildings A & D are located on the higher eastern part of the site where the proposed vehicular entrance from the future road to the basement carparks are situated as shown in Figure 3. The lower Basement 2 carpark level (Basement 2) is at approximately RL+66.4m AHD for Buildings A & D and at approximately RL +65.6 m AHD for Buildings B & C (Figure 3). The proposed basement wall

has a minimum set-back of 6.0m from the northern and southern boundary, and a minimum set-back of 4.7m from the eastern and the western site boundary as shown in Figure 3.

5.0 REGIONAL GEOLOGY

Reference to the Penrith 1: 1:100,000 Geological Series Sheet 9029-9130 Edition 1, 1983, indicates the site to be underlain by Bringelly Shale of Middle Triassic Age Bringelly Shale is typically consisted of combination of shale, carbonaceous claystone, claystone, laminite and fine to medium grained sandstone.

6.0 FIELDWORK

Fieldwork for the geotechnical investigation was carried on the 18-19 May 2017 and supervised by a geotechnical engineer. This investigation was carried out from accessible parts of site and the fieldworks comprised the following works:

- A detailed walk-over inspection of the site and surrounding environment to capture any significant geological features.
- Drilling of four (4) boreholes, BH1 , BH2, BH3 and BH4 using a 5 tonne truck-mounted drilling rig equipped with TC-bit attached to a solid flight auger and NMLC diamond rock corer. The boreholes were drilled down to a total depth of 9.7m (BH1), 8.9m (BH2), 7.3m (BH3) and 7.4m (BH4) below existing ground level.
- Standard Penetration Tests (SPT) was undertaken at regular intervals within the soil profile to assess the in-situ strength of subsoil properties.

The approximate locations of the investigation locations are shown in Figure 2 with respect to the current site layout, and in Figure 3 with respect to the future proposed basement footprints. A typical section of the proposed carpark basements and development above together with the investigation holes is shown in Figure 4. The Engineering Logs are presented in Appendix B, the Core logs are presented in Appendix C and the Core Photographs are presented in Appendix D.

7.0 FIELD WORK RESULTS

7.1 Subsoil Conditions

The site substrata at BH1 comprised 0.5m of fill, overlying a firm to stiff medium to high plasticity sandy silty CLAY to approximately 2.0m when a very stiff low to medium plasticity silty CLAY was present and continued to approximately 3.5m where an extremely weathered shale was encountered. Below this level, the greenish grey extremely weathered shale is interbedded with the light greyish extremely weathered sandstone as is common in this area. The greenish grey extremely weathered shale continued to a depth of approximately 5.0m, when intruded by a light greyish extremely weather sandstone layer of approximately 2m thick before reverting to the greenish grey extremely weathered shale at approximately 7.0m below ground level. At 7.6m, the sandstone is predominantly a medium to high strength rock with closely spaced joints, which overlies a greenish grey medium to high shale with closely spaced joints at a depth of 8.7m. The shale is consistent with depth until this borehole is terminated at approximately 9.7m below existing ground level (approximately RL +60.5 mAHD).

The subsurface profile at BH2 is similar to BH1 comprised 0.4m of fill, overlying a firm to stiff medium to high plasticity sandy silty CLAY to approximately 2.0m when a very stiff low to medium plasticity silty CLAY was present and continued to approximately 3.5m where an extremely weathered shale was encountered. The greenish grey extremely weathered shale continued to a depth of approximately 5.3m, when intruded by a light greyish extremely weather sandstone layer was encountered and continued to a depth at approximately 6.0m below ground level. At 6.0m, the shale encountered is predominantly a very low to low strength rock with very closely spaced joints, and becoming a medium strength shale with closely spaced joints at a depth of 7.0m. The shale is consistent with depth until 8.5m, where a medium to high strength sandstone was encountered and continued until this borehole is terminated at approximately 8.9m below existing ground level (approximately RL +62.3 mAHD).

Similar to BH1 and BH2, BH3 profile comprised 0.4m of fill, overlying a firm to stiff medium to high plasticity sandy silty CLAY to approximately 2.0m when a very stiff low to medium plasticity silty CLAY was present and continued to approximately 3.2m where an extremely weathered shale was encountered. The greenish grey extremely weathered shale continued to a depth of approximately 5.0m, when intruded by a light greyish extremely weather sandstone layer of approximately 2m thick before reverting to the greenish grey extremely weathered shale at approximately 7.0m below ground level. At 7.0m below ground surface, the extremely weathered shale continued to exhibit similar characteristics and consistency until this borehole is terminated at approximately 7.3m below existing ground level (approximately RL +64.9m AHD).

Consistent with other boreholes, BH4 profile comprised 0.4m of fill, overlying a firm to stiff medium to high plasticity sandy silty CLAY to approximately 2.0m when a very stiff low to medium plasticity silty CLAY was present and continued to approximately 3.2m where an extremely weathered shale was encountered. The greenish grey extremely weathered shale continued to a depth of approximately 5.4m, when intruded by a light greyish extremely weather sandstone layer of approximately 1.6m thick before reverting to the greenish grey extremely weathered shale at approximately 7.0m below ground level. At 7.0m below ground surface, the extremely weathered shale continued to exhibit similar characteristics and consistency until this borehole is terminated at approximately 7.4m below existing ground level (approximately RL +64.2m AHD).

7.2 Ground Water

Groundwater or seepage was encountered at 6.0m below the existing ground level at BH1 during the investigation works. This infers the groundwater table is at approximately RL +64.2m AHD, which is below the lowest proposed basement B2 level for Building B and Building C which is designed at RL +65.6m AHD.

However, it should be noted groundwater levels may be subject to seasonal fluctuations, rainfall, prevailing weather conditions and also future developments of the areas and land forms.

8.0 DISCUSSIONS AND RECOMMENDATIONS

8.1 General

Observation at the boreholes indicate that the site subsurface profile is likely to comprise of fill overlying predominantly a medium to high plasticity firm to stiff silty clay, then a low plasticity stiff to hard silty clay, which overlies an extremely weathered shale, an extremely weathered sandstone, and gradually to a medium to high strength Shale/Sandstone at deeper depths.

8.2 Excavation Conditions and Vibration Control

Based on the available information, formation of the proposed basement excavations will involve up to approximately 6m excavation below the original ground surrounding the site. Therefore, excavation materials is likely to comprise fill, a firm to hard silty Clay layer with depths of up to about 3m followed by an extremely weathered shale to a depth of approximately 5.0m, where an extremely weathered sandstone is likely to be encountered.

Excavation of soils and extremely low to very low strength rocks, if encountered, can be using conventional earthmoving equipment such as backhoes or tracked excavators. However, the excavation of low to medium strength or stronger shale and sandstone may be achieved using rock breaking and saw cutting equipment.

The use of vibratory rock breaking hammer equipment is very common method of excavation works in hard bedrock. In this regard, it is essential to carry out saw cutting along the perimeter of the site using an appropriate excavator mounted rock saw or other approved alternatives prior to excavation to reduce transmission of vibrations to adjoining structures to acceptable levels. Induced vibrations in structures adjacent to the excavation should not exceed a peak particle velocity (PPV) of 10mm/sec for structures in good condition or 2mm/sec for heritage or poor-conditioned structures. We recommend

vibration monitoring is undertaken at critical locations such as along the road edge of Fifth Avenue and along the northern, eastern and western site boundaries next to neighbouring buildings in order to monitor the vibration levels throughout the period of rock excavation.

We also recommend that dilapidation surveys are carried out on all adjoining buildings, roads and civil structures so that an accurate record of the existing conditions of these elements are mapped prior to the commencement of excavation. These records shall be agreed by the respective owner in order to reduce the risk of future owner's dispute on subsequent potential damage claims.

8.3 Groundwater Management

Ground water seepage was observed and assessed to be approximately 6.0m below existing ground level (at approximately RL +64.2m AHD) during the investigation works. It should be noted groundwater conditions of a site might change with climate and development variations. With the excavation anticipated to be down to RL+65.6m AHD, based on the data observed from the investigation, it is likely the groundwater will be below the proposed bulk excavation level and groundwater management system can be nominal.

However, in view of the interbedded weathered sandstone and weathered shale subsoil conditions within the site, water can be trapped at higher levels within the more permeable weathered sandstone layers and may impact on the basement excavation works. Depending on the seepage rates, the encountered groundwater during excavation can be managed by a system of sump pumps or cut offs to ensure the water drawdown does not affect the neighbouring properties. It is recommended that a geotechnical engineer be engaged to review the groundwater monitoring system with respect to the chosen construction methodology for the foundation and basement works.

8.4 Temporary Batter Slopes

With the proposed basement car park level designed to have 4.7m to 6m set-backs from the site boundaries, it is feasible to adopt and use temporary batter slopes during construction

of the basement. The safe temporary batters are recommended as presented in Table 1.

Table 1: Minimum temporary batter slopes

Materials	Temporary (Horizontal: Vertical)
Fill	2.5:1.0
Firm/Stiff Clay	2.0:1.0
Very Stiff/Hard Clay or Extremely Weathered Shale /Sandstone	1.5:1.0
Extremely/Highly Weathered Shale/Sandstone	1.0:1.0

Temporary surface protection against erosion may be provided by covering the batter with plastic sheeting, and these should be applied for a limited time only and inspected by Geotechnical Engineers after significant events. It should be noted however that the plastic sheeting should extend at least 1.5m behind the crest of the cut face or at least up to the common site boundaries.

8.5 Retaining Structures

The proposed basement cut faces should be supported temporary during construction and in long term using appropriate retaining structures. These retaining structures should be designed to withstand the applied lateral pressures of the soil and rock strata, the existing surcharges in their zone of influence; including existing structures, and construction related activities, and water pressures if exists.

In areas where there is no building structure in close proximity to the excavation, and assuming some wall movement is acceptable, a soldier pile solution with shotcrete infill panels can be considered. In areas where there is a potential risk of damage to nearby structures or buildings (which are sensitive to any ground movements), it is considered a contiguous pile wall system is more appropriate for the basement wall prior to bulk excavation works. Subject to a qualified geotechnical engineer inspection and approval, shotcrete infill panels may be omitted between soldier/contiguous piles where the

exposed bedrock is less likely to be affected by weathering/erosion and is classified as Class III or better. Suitable drainage system should be considered behind the retaining walls in the form the prefabricated strip drains with nominal spacing of 1.5 m c/c and/or peepholes with suitable spacing and details as specified by designer.

The pressure distribution on cantilever retaining structures may be assumed to be triangular and estimated as follows:

$p_h = \gamma kH + qk$

Where,

p_h = Horizontal pressure (kN/m^2)

γ = Wet density (kN/m^3)

k = Coefficient of earth pressure (k_a or k_o)

H = Retained height (m)

q = Surcharge pressure behind retaining wall (kN/m^2)

Rectangular or trapezoidal pressure distribution may be considered for tied-back retaining system, as recommended in related standards and technical literature.

For the design of flexible retaining structures, where some lateral movement is acceptable, an active earth pressure coefficient is recommended. Should it be critical to limit the horizontal deformation of a retaining structure, use of an earth pressure coefficient at rest should be considered. Recommended parameters for the design of retaining structures are presented in the following Table 2.

Table 2: Geotechnical Design Parameters

Materials	Unit Weight (kN/m^3)	Active Earth Pressure coefficient (K_a)	At Rest Earth Pressure Coefficient (K_o)	Passive Earth Pressure coefficient (K_p) or Pressure	Youngs Modulus E (MPa)
Fill	17	0.5	0.63	ignore	10
Residual Soil - Firm to very stiff silty clay	18	0.4	0.55	ignore	20
Residual Soil - Vert stiff to hard silty Clay	18	0.4	0.50	ignore	22

Extremely Weathered Shale/Sandstone	19	0.35	0.45	250	35
Extremely /Highly Weathered Shale/Sandstone (Class V/ IV)	20	0.30	0.40	275	45

The above coefficients assume that ground level behind the retaining structures is horizontal and the retained material is effectively drained. It should be noted that hydrostatic pressures due to ground water table (if present) and surcharge due to nearby structures (within the influence zone) should also be taken into the account in the design of the retaining structures. This is particularly the case for the retaining walls located immediately adjacent to the neighboring buildings.

8.6 Foundations

The foundation level of the proposed development is anticipated to be within the Class III Shale /Class IV Sandstone or better stratum. It is therefore considered that foundations footings founded on this material can be designed for a serviceability end bearing capacity of 1500 kPa with a minimum socket length of 0.5 m into foundation bedrock or better. Based on the information obtained to date, it is likely that this stratum will be at approximately 7m below existing ground level, or approximately 1-2m below the basement B2 level. It is recommended that all footings are to be founded on the same stratum to minimise and avoid potential future differential settlement.

We consider higher bearing capacities may be justified for footings subject to confirmation of additional drilling below the founding level and rock strength testing.

It is recommended that a further exploratory drilling be carried out into the foundation material once excavation to the final basement level has been reached. The footing inspection and assessment requirement can be referred to the guidelines provided in Pells et al.(Reference 3).

A qualified geotechnical engineer should inspect the footing excavations to confirm appropriate founding materials, and to ensure the serviceability bearing pressures could be met. Footing excavations should be cleaned and wet and debris should be removed

prior to the concrete placement.

9.0 CONCLUSIONS

This report presents the findings of the BG geotechnical investigation and recommendations for the proposed residential development at 185 Fifth Avenue, Austral, NSW. It considers that the proposed development is feasible in this site if the recommendations provided in this report are considered in design and construction of this development.

For and on behalf of

Benviron Group

Noriman Mak

Geotechnical Engineer

FIEAust., RPE (Civ, Geo), NPER (Civ, Geo)

Reviewed by

Ben Buckley

Director

LIMITATIONS

The assessment of the sub-surface profile within the proposed development area and the recommendations presented in this report are based on limited information available to date.

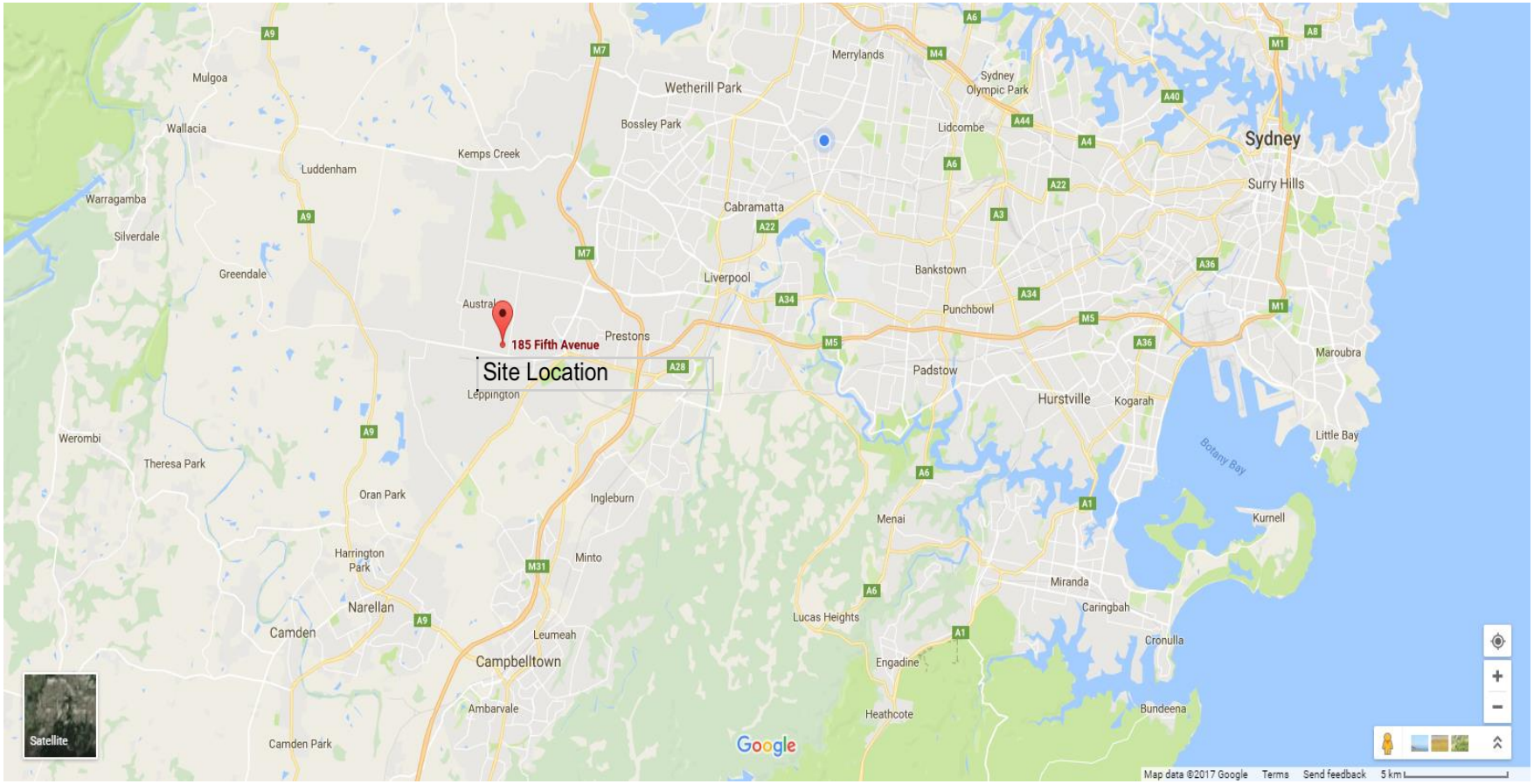
The recommendations and advice presented in this report on soil and rock condition is considered to be indicative only as only very limited areas were assessed on site to date. Site inspection by a consulting Geotechnical Engineer or Engineering Geologist are to be undertake when further investigation works are to be carried out to confirm the condition of founding materials in which this geotechnical assessment recommends.

Anecdotal evidence and Information provided by client is assumed to be relevant and to the best of knowledge be appropriate for its interpretation.

There is a possibility that the actual geotechnical and groundwater conditions across the site could differ from the inferred geotechnical assumptions and derivations on which our recommendations are presented in this report.

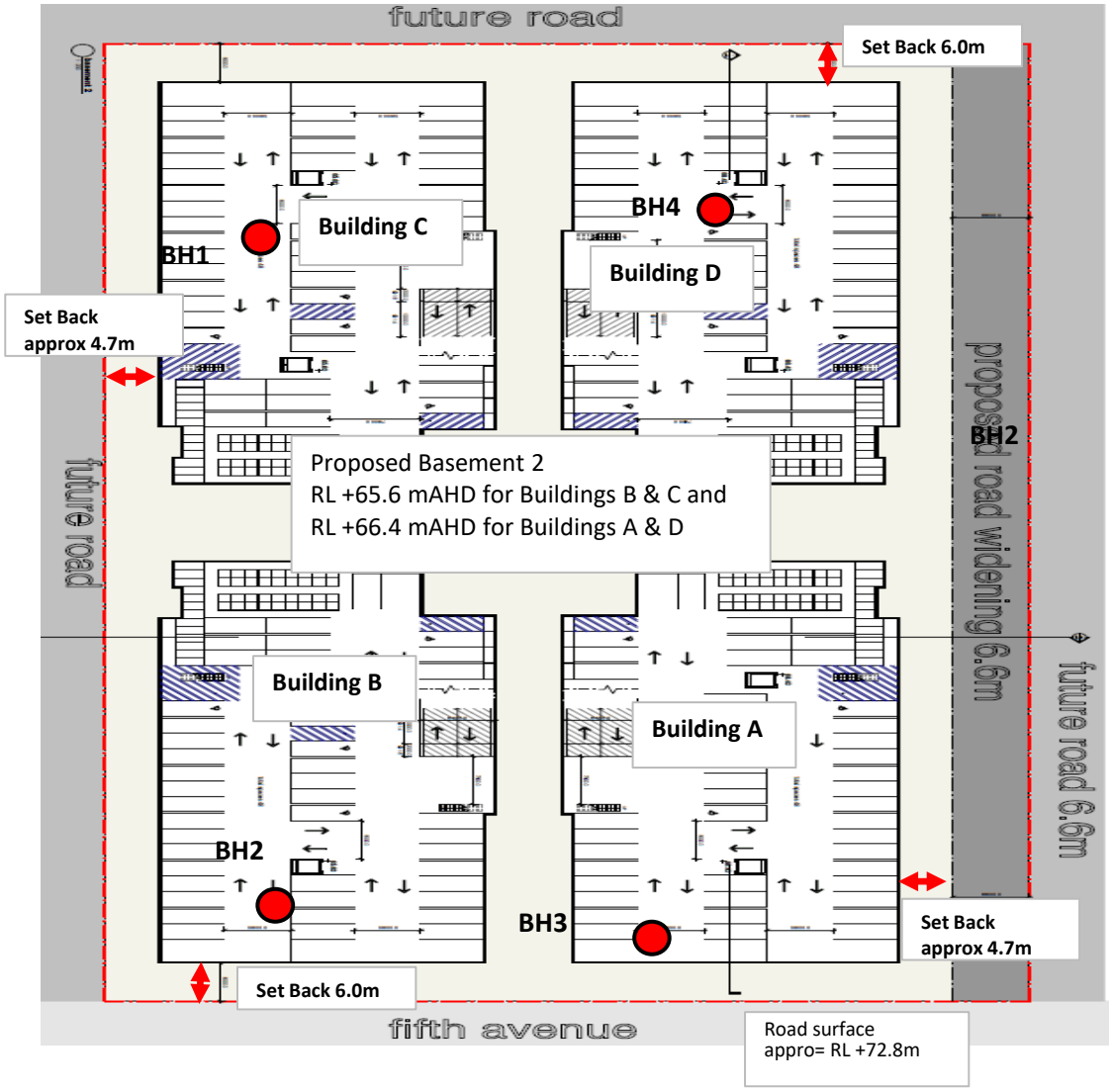
REFERENCES

1. Australian Standard AS1726-1993 'Geotechnical Site Investigation'; and
2. Pells, P.J.N, Mostyn, E and Walker , B F – Foundations on Sandstone and Shale in the Sydney Region, Australian Geomechanics Journal, Dec 1998
3. Pells, P.J.N, Douglas D.J, Rodway, B, Thorne C, McManon B.K – Design Loadings for Foundations on Shale and Sandstone in the Sydney Region. Australian Geomechanics Journal, 1978



Key Site Location	Benviron group simple sustainable solutions	**DRAWN** RL	SITE LOCATION
		FIGURE 1	GM Architects
		Job # G217	185 Fifth Avenue, Austral

Key Site Boundary Geotechnical Investigation holes	Benviron group simple sustainable solutions	**DRAWN** RL	**Site Features and Borehole Location Plan**
		FIGURE 2	GM Architects
		Job # G217	185 Fifth Avenue, Austral



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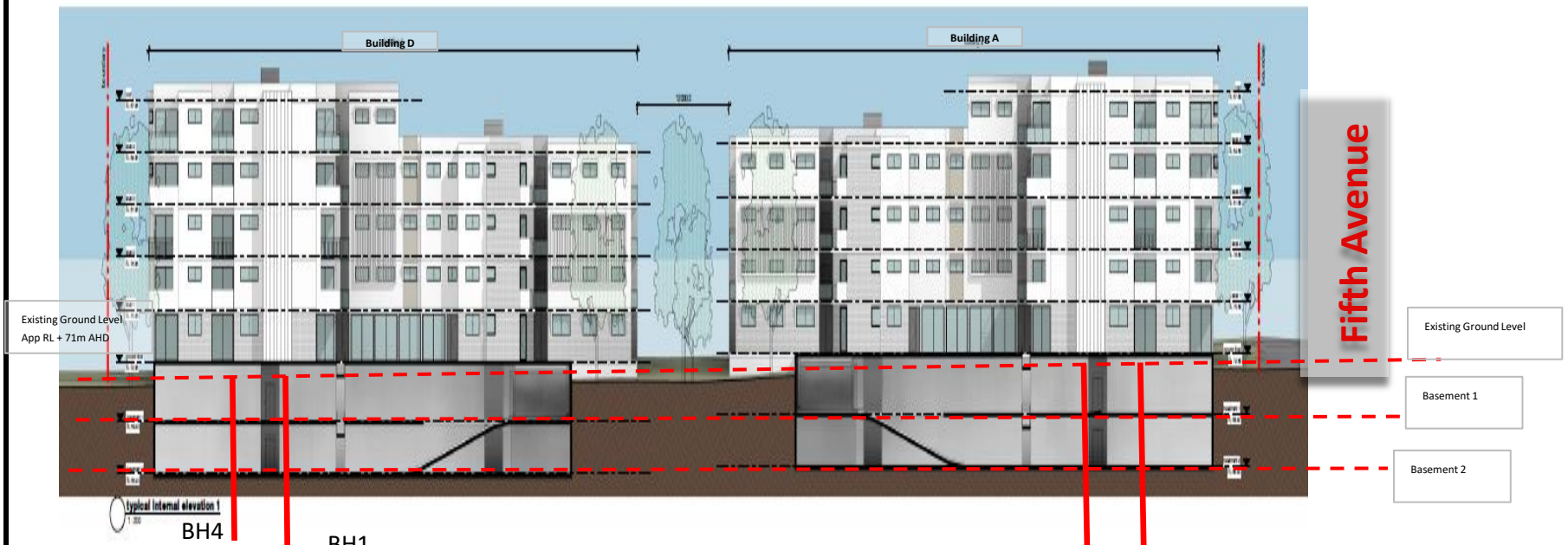
Key

Geotechnical Investigation holes

Benviron group
simple sustainable solutions

DRAWN RL	Investigation Holes and Basement Outline
FIGURE 3	GM Architects
Job # G217	185 Fifth Avenue, Austral



Key

Geotechnical Investigation holes

Benviron group
simple sustainable solutions

DRAWN RL	Investigation Locations Along Section
FIGURE 4	GM Architects
Job # G217	185 Fifth Avenue, Austral

Job No:	G217
Hole No:	BH1
Sheet	1 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location:	Refer to Figure 2, 3 & 4
Project:	Geotechnical Investigation	Test Method:	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 18.05.2017	Logged by: RL
		Surface Level:	approx RL70.2 mAHD

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		0.1			Fill: Silty CLAY, low to medium plasticity, brown	M	S	Low TC bit resistance	0.1
		0.2			with grass roots				0.2
		0.3							0.3
		0.4							0.4
		0.5							0.5
	SPT 2,4,6 N=10	0.6			Silty CLAY, medium to high plasticity, brown/orange	M	St	Low TC bit resistance	0.6
		0.7							0.7
		0.8							0.8
		0.9							0.9
		1.0			becoming light brown/grey from about 1.0m				1.0
		1.1							1.1
		1.2							1.2
		1.3							1.3
		1.4							1.4
		1.5							1.5
		1.6							1.6
		1.7							1.7
		1.8							1.8
		1.9							1.9
		2.0							2.0
	SPT 4,7,8 N=15	2.1			Silty CLAY, low to medium plasticity, orange/grey	M	VSt	Low TC bit resistance	2.1
		2.2							2.2
		2.3							2.3
		2.4							2.4
		2.5							2.5
		2.6							2.6
		2.7							2.7
		2.8							2.8
		2.9							2.9
		3.0							3.0
		3.1			Shale fragements noted between 3.0m and 3.5m	M	VSt to H	Low to Medium TC bit resistance	3.1
		3.2							3.2
		3.3							3.3
		3.4							3.4
		3.5			Continue in Sheet 2 of 3				3.5

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH1
Sheet	2 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho Truck Mounted Drill Rig	
Project Location:	185 Fifth Avenue, Austral	Date: 18.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
	SPT 10,17,22 N=39	3.6			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.6
		3.7							3.7
		3.8							3.8
		3.9							3.9
		4.0							4.0
		4.1							4.1
		4.2							4.2
		4.3							4.3
		4.4							4.4
		4.5							4.5
		4.6							4.6
		4.7							4.7
		4.8							4.8
		4.9							4.9
		5.0			becoming grey from around 5.0m	D	H		5.0
	SPT NA,NA,NA N>50	5.1							5.1
		5.2							5.2
		5.3							5.3
		5.4							5.4
		5.5							5.5
		5.6							5.6
		5.7							5.7
		5.8							5.8
		5.9							5.9
	◁	6.0						Seepage@ appro 6.0m BGL	6.0
		6.1							6.1
		6.2							6.2
		6.3							6.3
		6.4							6.4
		6.5							6.5
		6.6							6.6
		6.7							6.7
		6.8							6.8
		6.9							6.9
		7.0			Continue in Sheet 3 of 3				7.0

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH1
Sheet	3 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 18.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		7.1			SHALE, extremely weathered, greenish grey	M	H	Medium to high TC bit resistance	7.1
		7.2							7.2
		7.3							7.3
		7.4							7.4
		7.5							7.5
		7.6							7.6
		7.7			Start NMLC Coring At 7.6m			TC Bit refusal at 7.6 m	7.7
		7.8							7.8
		7.9							7.9
		8.0							8.0
		8.1							8.1
		8.2							8.2
		8.3							8.3
		8.4							8.4
		8.5							8.5
		8.6							8.6
		8.7							8.7
		8.8							8.8
		8.9							8.9
		9.0							9.0
		9.1							9.1
		9.2							9.2
		9.3							9.3
		9.4							9.4
		9.5							9.5
		9.6							9.6
		9.7							9.7
		9.8							9.8
		9.9							9.9

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH2
Sheet	1 of 2

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location:	Refer to Figure 2, 3 & 4
Project:	Geotechnical Investigation	Test Method:	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 18.05.2017	Logged by: RL
		Surface Level:	approx RL71.2 mAHD

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		0.1			Fill: Silty CLAY, low to medium plasticity, brown	M	S	Low TC bit resistance	0.1
		0.2			with grass roots				0.2
		0.3							0.3
		0.4							0.4
		0.5			Silty CLAY, medium to high plasticity, brown/orange	M	St	Low TC bit resistance	0.5
	SPT 3,4,5 N>9	0.6							0.6
		0.7							0.7
		0.8							0.8
		0.9							0.9
		1.0			becoming light brown/grey from about 1.0m				1.0
		1.1							1.1
		1.2							1.2
		1.3							1.3
		1.4							1.4
		1.5							1.5
		1.6							1.6
		1.7							1.7
		1.8							1.8
		1.9							1.9
		2.0							2.0
	SPT 14,6,9 N=15	2.1			Silty CLAY, low to medium plasticity, orange/grey	M	VSt	Low TC bit resistance	2.1
		2.2							2.2
		2.3							2.3
		2.4							2.4
		2.5							2.5
		2.6							2.6
		2.7							2.7
		2.8							2.8
		2.9							2.9
		3.0							3.0
		3.1			Shale fragements noted between 3.0m and 3.5m	M	VSt to H	Low to Medium TC bit resistance	3.1
		3.2							3.2
		3.3							3.3
		3.4							3.4
		3.5			Continue in Sheet 2 of 3				3.5

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH2
Sheet	2 of 2

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 18.05.2017	Logged by: RL
		Surface Level: approx RL71.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
	SPT 9,14,23 N=37	3.6			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.6
		3.7							3.7
		3.8							3.8
		3.9							3.9
		4.0							4.0
		4.1							4.1
		4.2							4.2
		4.3							4.3
		4.4							4.4
		4.5							4.5
		4.6							4.6
		4.7							4.7
		4.8							4.8
		4.9							4.9
		5.0							5.0
		5.1							5.1
		5.2							5.2
		5.3							5.3
		5.4			becoming grey from around 5.5m				5.4
		5.5							5.5
		5.6							5.6
		5.7							5.7
		5.8							5.8
		5.9							5.9
		6.0							6.0
		6.1			Start NMLC Coring At 6.0m			TC Bit refusal at 6.0m	6.1
		6.2							6.2
		6.3							6.3
		6.4							6.4
		6.5							6.5
		6.6							6.6
		6.7							6.7
		6.8							6.8
		6.9							6.9
		7.0			Continue in Sheet 3 of 3				7.0

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH3
Sheet	1 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location:	Refer to Figure 2, 3 & 4
Project:	Geotechnical Investigation	Test Method:	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level:	approx RL71.2 mAHD

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		0.1			Fill: Silty CLAY, low to medium plasticity, brown	M	S	Low TC bit resistance	0.1
		0.2			with grass roots				0.2
		0.3							0.3
		0.4							0.4
		0.5			Silty CLAY, medium to high plasticity, brown/orange	M	St	Low TC bit resistance	0.5
		0.6							0.6
		0.7							0.7
		0.8							0.8
		0.9							0.9
		1.0			becoming light brown/grey from about 1.0m				1.0
	SPT 5,6,9 N=15	1.1							1.1
		1.2							1.2
		1.3							1.3
		1.4							1.4
		1.5							1.5
		1.6							1.6
		1.7							1.7
		1.8							1.8
		1.9							1.9
		2.0							2.0
		2.1			becoming low to medium plasticity, orange/grey	M	VSt	Low TC bit resistance	2.1
		2.2							2.2
		2.3							2.3
		2.4							2.4
		2.5							2.5
		2.6							2.6
		2.7							2.7
		2.8							2.8
		2.9							2.9
		3.0							3.0
	SPT 12,25,NA N>50	3.1							3.1
		3.2							3.2
		3.3			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.3
		3.4							3.4
		3.5			Continue in Sheet 2 of 3				3.5

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH3
Sheet	2 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		3.6			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.6
		3.7							3.7
		3.8							3.8
		3.9							3.9
		4.0							4.0
		4.1							4.1
		4.2							4.2
		4.3							4.3
		4.4							4.4
		4.5							4.5
		4.6							4.6
		4.7							4.7
		4.8							4.8
		4.9							4.9
		5.0			becoming grey from around 5.0m	D	H		5.0
	SPT NA,NA,NA N>50	5.1							5.1
		5.2							5.2
		5.3							5.3
		5.4							5.4
		5.5							5.5
		5.6							5.6
		5.7							5.7
		5.8							5.8
		5.9							5.9
		6.0							6.0
		6.1							6.1
		6.2							6.2
		6.3							6.3
		6.4							6.4
		6.5							6.5
		6.6							6.6
		6.7							6.7
		6.8							6.8
		6.9							6.9
		7.0			Continue in Sheet 3 of 3				7.0

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH3
Sheet	3 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		7.1			SHALE, extremely weathered, grey	M	H	High TC bit resistance	7.1
		7.2							7.2
		7.3							7.3
		7.4							7.4
		7.5			TC Bit refusal at 7.4 m				7.5
		7.6							7.6
		7.7							7.7
		7.8							7.8
		7.9							7.9
		8.0							8.0
		8.1							8.1
		8.2							8.2
		8.3							8.3
		8.4							8.4
		8.5							8.5
		8.6							8.6
		8.7							8.7
		8.8							8.8
		8.9							8.9
		9.0							9.0
		9.1							9.1
		9.2							9.2
		9.3							9.3
		9.4							9.4
		9.5							9.5
		9.6							9.6
		9.7							9.7
		9.8							9.8
		9.9							9.9

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH4
Sheet	1 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Method: Truck Mounted Drill Rig	
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level: approx RL71.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		0.1			Fill: Silty CLAY, low to medium plasticity, brown	M	S	Low TC bit resistance	0.1
		0.2			with grass roots				0.2
		0.3							0.3
		0.4							0.4
		0.5			Silty CLAY, medium to high plasticity, brown/orange	M	St	Low TC bit resistance	0.5
		0.6							0.6
		0.7							0.7
		0.8							0.8
		0.9							0.9
		1.0			becoming light brown/grey from about 1.0m				1.0
		1.1							1.1
		1.2							1.2
		1.3							1.3
		1.4							1.4
		1.5							1.5
		1.6							1.6
		1.7							1.7
		1.8							1.8
		1.9							1.9
		2.0							2.0
		2.1			becoming low to medium plasticity, orange/grey	M	VSt	Low TC bit resistance	2.1
		2.2							2.2
		2.3							2.3
		2.4							2.4
		2.5							2.5
		2.6							2.6
		2.7							2.7
		2.8							2.8
		2.9							2.9
		3.0							3.0
	SPT 11,19,23 N=41	3.1							3.1
		3.2							3.2
		3.3			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.3
		3.4							3.4
		3.5			Continue in Sheet 2 of 3				3.5

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH4
Sheet	2 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		3.6			SHALE, extremely weathered, greenish grey	M	H	Medium TC bit resistance	3.6
		3.7							3.7
		3.8							3.8
		3.9							3.9
		4.0							4.0
		4.1							4.1
		4.2							4.2
		4.3							4.3
		4.4							4.4
		4.5							4.5
		4.6							4.6
		4.7							4.7
		4.8							4.8
		4.9							4.9
		5.0							5.0
	SPT 3,NA,NA N>50	5.1							5.1
		5.2							5.2
		5.3							5.3
		5.4							5.4
		5.5			becoming grey from around 5.4m	D	H		5.5
		5.6							5.6
		5.7							5.7
		5.8							5.8
		5.9							5.9
		6.0							6.0
		6.1							6.1
		6.2							6.2
		6.3							6.3
		6.4							6.4
		6.5							6.5
		6.6							6.6
		6.7							6.7
		6.8							6.8
		6.9							6.9
		7.0			Continue in Sheet 3 of 3				7.0

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

Job No:	G217
Hole No:	BH4
Sheet	3 of 3

ENGINEERING LOG OF DRILLED BOREHOLE

Client:	GM Architect	Test Location: Refer to Figure 2, 3 & 4	
Project:	Geotechnical Investigation	Test Metho	Truck Mounted Drill Rig
Project Location:	185 Fifth Avenue, Austral	Date: 19.05.2017	Logged by: RL
		Surface Level: approx RL70.2 mAHD	

Groundwater	Samples/ Field Tests	Depth (m)	Graphic Log	Unified Classification	Description	Moisture Condition	Consistency/ Rel. Density	Additional Comments	Depth (m)
		7.1			SHALE, extremely weathered, grey	M	H	High TC bit resistance	7.1
		7.2							7.2
		7.3							7.3
		7.4							7.4
		7.5			TC Bit refusal at 7.4 m				7.5
		7.6							7.6
		7.7							7.7
		7.8							7.8
		7.9							7.9
		8.0							8.0
		8.1							8.1
		8.2							8.2
		8.3							8.3
		8.4							8.4
		8.5							8.5
		8.6							8.6
		8.7							8.7
		8.8							8.8
		8.9							8.9
		9.0							9.0
		9.1							9.1
		9.2							9.2
		9.3							9.3
		9.4							9.4
		9.5							9.5
		9.6							9.6
		9.7							9.7
		9.8							9.8
		9.9							9.9

Explanatory Notes:

Consistency		Density Index		Samples		Moisture	
VS	Very Soft	**VL**	Very Loose	**B**	Bulk Sample	**D**	Dry
S	Soft	**L**	Loose	**D**	Disturbed Sample	**M**	Moist
F	Firm	**MD**	Medium Dense	**U50**	Undisturbed Sample	**W**	Wet
St	Stiff	**D**	Dense		(50mm diam.)	**Wp**	Plastic Limit
VSt	Very Stiff	**VD**	Very Dense	**N**	S.P.T. Value	**Wl**	Liquid Limit
H	Hard						

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Job. No G217
Hole No: BH1
Sheet: 1 of 1

ENGINEERING LOG OF CORED HOLE

Driller: BG

Client:	GM Aechitect	Hole Commenced:	18.05.2017
Project:	Proposed Residential Development	Hole Completed:	18.05.2017
Project Location:	185 Fifth Avenue, Austral	Supervised by:	RL
		Checked by:	NM

Drill Model: Drilling Rig (Han-Jin) Slope 90° R.L. Surface: Existing
Barrel Type / Length: NMLC Bearing: - Datum: approx +70.2 m AHD

Drilling Information					Rock Substance											Rock Mass Defects								
Method	Case - Lift	Groundwater	Samples / Field Tests	Depth (m)	Graphic Log	Substance Description	Weathering	Estimated Strength EL	VL	L	M	H	VH	EH	Is(50) MPa	Defect Spacing 30	100	300	1000	3000	Defect Description	Depth (m)
NMLC				7.0																		7.0
				7.1																		7.1
				7.2																		7.2
				7.3																		7.3
				7.4																		7.4
				7.5		Rock coring starts at 7.4m																7.5
				7.6		SANDSTONE, whittish grey, very closely spaced to closely spaced, medium to high strength	DW /SW														7.82 Clean Joints	7.6
				7.7																	7.87 Clean Joints	7.7
				7.8																	7.96 Clean Joints	7.8
				7.9																		7.9
				8.0																	8.03,8.08 Clean Joints	8.0
				8.1																	8.10,8.15 Clean Joints	8.1
				8.2																	8.20 Clean Joints	8.2
				8.3																	8.32,8.34 Clean Joints	8.3
				8.4																	8.49 Clean Joints	8.4
				8.5																	8.52 Clean Joints	8.5
				8.6																	8.60 Clean Joints	8.6
				8.7																		8.7
				8.8		Shale, grey, very closely spaced to closely spaced, medium to high strength															8.74 Clean Joints	8.8
				8.9																	8.93 Clean Joints	8.9
				9.0																	9.05,9.06 Clean Joints	9.0
				9.1																	9.12,9.18 Clean Joints	9.1
				9.2																	9.25-9.27 Clay Seam	9.2
				9.3																	9.31-9.37 Fracture zone	9.3
				9.4																	9.42,9.47 Clean Joints	9.4
				9.5																	9.50-9.54 Fracture zone	9.5
				9.6																	9.59 Clean Joints	9.6
				9.7																		9.7
				9.8		BH1 Terminated at 9.7m																9.8
				9.9																		9.9

Key - Method		Case - lift		Weathering		Strength	Is (50) MPa
AS	Auger Screwing	Casing used		Fr	Fresh	EL Extremely Low	< 0.03
AD	Auger Drilling	Barrel withdrawn	water level	SW	Slightly weathered	VL Very Low	0.03 - 0.1
R	Roller / Tricone		date shown	DW	Distinctly weathered	L Low	0.1 - 0.3
W	Washbore	Water inflow		HW	Highly weathered	M Medium	0.3 - 1.0
NMLC	NMLC Core Drill	Partial drilling water loss		EW	Extremely weathered	H High	1.0 - 3.0
NQ,HQ	Wireline Core Drill	Complete drilling water loss		FZ	Fracture Zone	VH Very High	3.0 - 10.0
				CS	Clay Seam	EH Extremely High	>10.0

Job. No G217
Hole No: BH2
Sheet: 1 of 1

ENGINEERING LOG OF CORED HOLE

Driller: BG

Client:	GM Aechitect	Hole Commenced:	18.05.2017
Project:	Proposed Residential Development	Hole Completed:	19.05.2017
Project Location:	185 Fifth Avenue, Austral	Supervised by:	RL
		Checked by:	NM

Drill Model: Drilling Rig (Han-Jin) Slope: 90° R.L. Surface: Existing
Barrel Type / Length: NMLC Bearing: - Datum: approx +71.2 m AHD

Drilling Information					Rock Substance						Rock Mass Defects		
Method	Case - Lift	Groundwater	Samples / Field Tests	Depth (m)	Graphic Log	Substance Description	Weathering	Estimated Strength EL VL L M H VH EH	Is(50) MPa	Defect Spacing 30 100 300 1000 3000	Defect Description	Depth (m)
NMLC				6.0		Rock coring starts at 6.0m					6.07 Clean Joints	6.0
				6.1		Shale, grey, very closely spaced to closely spaced, low to medium strength					6.29 Clean Joints	6.1
				6.2							6.32 Clean Joints	6.2
				6.3			XW					6.3
				6.4			/DW					6.4
				6.5							6.54 Clean Joints	6.5
				6.6							6.66 Clean Joints	6.6
				6.7							6.71,6.76,6.79 Clean Joints	6.7
				6.8							6.84,6.87 Clean Joints	6.8
				6.9								6.9
				7.0		Shale, greenish grey, very closely spaced to closely spaced,medium to high strength					7.0-7.08 Fracture Zone	7.0
				7.1							7.1 Clean Joints	7.1
				7.2							7.23-7.30 Fracture Zone	7.2
				7.3							7.44 Clean Joints	7.3
				7.4							7.57 Clean Joints	7.4
				7.5							7.67 Clean Joints	7.5
				7.6							7.77 Clean Joints	7.6
				7.7							7.86 Clean Joints	7.7
				7.8								7.8
				7.9								7.9
				8.0							8.15 Clean Joints	8.0
				8.1							8.28 Clean Joints	8.1
				8.2								8.2
				8.3								8.3
				8.4								8.4
				8.5								8.5
				8.6		SANDSTONE, whittish grey, very closely spaced to closely spaced, medium to high strength					8.52 Clean Joints	8.6
				8.7							8.63 Clean Joints	8.7
				8.8							8.73 Clean Joints	8.8
				8.9							8.90 Clean Joints	8.9
				9.0								9.0
				9.1		BH2 Terminated at 9 m						9.1
				9.2								9.2
				9.3								9.3
				9.4								9.4
				9.5								9.5

Key - Method		Case - lift		Weathering		Strength	
AS	Auger Screwing	Casing used		Fr	Fresh	EL Extremely Low	< 0.03
AD	Auger Drilling	Barrel withdrawn	water level	SW	Slightly weathered	VL Very Low	0.03 - 0.1
R	Roller / Tricone		date shown	DW	Distinctly weathered	L Low	0.1 - 0.3
W	Washbore	Water inflow		HW	Highly weathered	M Medium	0.3 - 1.0
NMLC	NMLC Core Drill	Partial drilling water loss		EW	Extremely weathered	H High	1.0 - 3.0
NQ,HQ	Wireline Core Drill	Complete drilling water loss		FZ	Fracture Zone	VH Very High	3.0 - 10.0
				CS	Clay Seam	EH Extremely High	>10.0

Core Photographs