



Job No: 7747/34
Our Ref: 7747/34-AA
8 February 2018

Redbank Communities
P O Box 1918
PENRITH NSW 2750

Attention: Mr R Pillay / Mr A Flaherty

Dear Sirs

re: **Proposed Development- Belmont Precinct
Grose Vale Road, North Richmond
Site Classification Report**

Please find herewith the results of a geotechnical investigation for the classification of proposed lots at the above site. A total of seventy three (73) lots are covered in this report (Lots 1 to 59 & B1 to B14).

This report contains information on surface and sub-surface conditions encountered at the site, together with the assessment of the site classifications in accordance with Australian Standard AS2870-2011 "Residential Slabs & Footings".

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECH TESTING PTY LTD

A handwritten signature in blue ink, appearing to read "Ariful", is written over the typed name.

DR MD ARIFUL ISLAM
Senior Geotechnical Engineer

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1.0 INTRODUCTION

This report provides results of a geotechnical investigation for the classification of proposed lots at Belmont Precinct development. The investigation was commissioned by Mr R Pillay of Redbank Communities. A total of seventy three (73) lots are covered in this report (Lots 1 to 59 & B1 to B14).

Site classification in accordance with AS2870-2011 is only applicable for design of footing systems for a single dwelling, house, townhouse or similar structure that would be detached or separated by a party wall or common wall including buildings classified as Class 1 and Class 10a in the Building Code of Australia (BCA). AS2870 is not suitable for dwellings situated vertically above or below another dwelling. Therefore, a geotechnical investigation would be required for other dwellings to be classified in accordance with the BCA.

It is understood that the proposed dwellings are to be of brick veneer construction and that wall loadings are expected to be in the range of 15kN/m to 50kN/m. The maximum working load (safe bearing pressure) would be in the order of 50kPa for ground supported floor slabs and 100kPa for strip and pad footings (AS2870-2011).

2.0 FIELD WORK

The site investigation was carried out between 16 and 18 January 2018, under the supervision of a Geotechnical Engineer from the company and consisted of excavating thirty one test pits (TP1 to TP31), using an excavator. The approximate test pit locations are indicated on the attached Drawing No 7747/34-AA1. The test pits were terminated at depth of 1.5m or refusal on bedrock. The brief descriptions of materials encountered in the test pits are provided in the attached Table A.

3.0 SITE CONDITIONS

3.1 Site Description

The site is bounded by Redbank Creek to the north, Grose Vale Road to the south, other stages of the subdivision to the east and existing rural houses to the west. At the time of investigation, earthworks for the lots had been completed and the construction of internal roads was underway. The topography of the site is undulating with a general slope towards north / north-east direction and the ground surface was generally void of vegetation.

3.2 Sub-Surface Conditions

The following table summarises the prevailing subsurface conditions at the site, more details are given in the test pits logs in the attached Table A.

Topsoil	Silty Clay, low to medium plasticity, brown, with root fibres
Fill	Silty Clay, low to medium plasticity, brown Silty Clay, medium to high plasticity, brown, with gravel and root fibres Silty Clay, high plasticity, mottled grey, brown and red, with gravel
Natural	Silty CLAY, medium to high plasticity, red/ brown Silty CLAY, high plasticity, grey, with ironstone gravel and shale fragments
Bedrock	SHALE, grey, extremely weathered, low strength SHALE, grey, distinctly weathered, medium strength

Groundwater was not observed in the test pits during the short time that they remained open. It must be noted that fluctuations in the level of groundwater might occur due to variations in rainfall, temperature, and/or other factors not evident during investigation.

4.0 LABORATORY TESTING

During the site investigation, seven (7) undisturbed samples (U_{50}) and two (2) disturbed samples were recovered for shrink/swell index and Atterberg limit tests aimed at assessing soil reactivity at moisture changes. The tests were conducted as per relevant Australian Standards and the results are summarised below and detailed in the attached test certificates.

Test Pit	Depth (m)	Material Description	I _{ss} (% _{pF})	LL (%)	PI (%)	LS (%)
TP1	0.5 - 0.7	Fill; Silty Clay, low plasticity, brown, trace of fine to medium gravel	1.6	-	-	-
TP2	0.5 - 0.68	Fill; Silty Clay, low plasticity, red-brown & grey, some fine to medium gravel	1.5	-	-	-
TP6	0.5 - 0.7	(CL) Silty CLAY, low plasticity, red-brown	1.5	-	-	-
TP8	0.5 - 0.7	(CL-CI) Silty CLAY, low to medium plasticity, red-brown	2.0	-	-	-
TP10	0.6 - 0.9	(CL-CI) Silty CLAY, low to medium plasticity, grey, some fine to medium gravel	-	40	21	10.5
TP18	0.6 - 0.8	(CL) Silty CLAY, low plasticity, red-brown	1.1	-	-	-
TP24	0.4 - 0.6	(CL) Silty CLAY, low plasticity, red-brown	1.2	-	-	-
TP26	0.6 - 0.8	(CI) Silty CLAY, medium plasticity, red-brown	-	46	24	11.0
TP30	0.3 - 0.5	(CI) Silty CLAY, medium plasticity, red-brown, some fine to medium gravel	1.3	-	-	-

I_{ss}: Shrink/Swell Index, LL: Liquid Limit, PI: Plasticity Index, LS: Linear Shrinkage

5.0 DISCUSSION & RECOMMENDATIONS

5.1 Assessment of Fill

Clayey fill material of considerable depth was encountered in some of the test pits across the site. Geotech testing Pty Ltd conducted sufficient number of compaction tests during fill placement and test results are reported separately. Based on the visual inspection of the material in the test pits and compaction test results, the fill placed on the lots is classified as "Controlled".

5.2 Site Classifications

Based on the above information, site classifications to AS2870-2011 are summarised in Appendix B. It should be noted that lots containing more than 400mm of clay fill (assessed as controlled fill) would originally be classified as Class P in accordance with AS2870-2011. However, based on the results of this investigation, including laboratory testing, the lots would be re-classified as detailed in Appendix B.

It is recommended that footings for the proposed dwellings are founded on the same stratum, below any topsoil, loose or deleterious material, to minimise the potential for differential movement. In the event that bedrock is encountered in any portion of the footing excavations, the remainder of the foundations must be supported on bedrock to ensure even bearing.

7747/34-AA

Belmont Precinct - Grose Vale Road, North Richmond

The classifications presented in Appendix B of this report are applicable to the Lots at the date of conducting the investigation, being 16 January 2018 and are made on the following assumptions:

- The design and construction requirements of AS2870 must be followed.
- The recommendations for foundation performance and site maintenance set out in Appendix B of AS2870 must be followed.
- The proposed dwellings must be in accordance with AS2870. A detailed geotechnical investigation will be required for other dwellings to be classified in accordance with the BCA.

It is recommended that house owners are made aware of recommendations in the CSIRO publication, "Guide to Home Owners on Foundation Maintenance and Footing Performance" and AS2870 Appendix H of AS2871-2011.

GEOTECH TESTING PTY LTD

APPENDIX A

TABLE A
(Summary of Test Pits)

TEST PIT LOCATION PLAN
(Drawing No 7747/34-AA1)

TABLE A

Job No: 7747/34
Our Ref: 7747/34-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP1	0-1.5	U50 0.5-0.7	FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, VSt, well compacted
TP2	0-1.5	U50 0.5-0.68	FILL: Silty Clay, high plasticity, mottled grey, brown and red, with gravel, M<PL, VSt, well compacted
TP3	0-0.5		FILL: Silty Clay, low to medium plasticity, brown, M<PL, F, poorly compacted
	0.5-1.2	U50 0.5-0.7	(CH) Silty CLAY, high plasticity, red, M<PL, St
	1.2-1.4		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, VSt
	1.4-1.5		SHALE, grey, extremely weathered, low strength
TP4	0-0.6		FILL: Silty Clay, low to medium plasticity, brown, with root fibres, M<PL, F
	0.6-1.4		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, St-VSt
	1.4-1.5		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, VSt
TP5	0-0.7		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, St-VSt
	0.7-0.8		SHALE, grey, distinctly weathered, medium strength
TP6	0-1.5	U50 0.5-0.7	FILL: Silty Clay, high plasticity, red-brown, M<PL, St-VSt
TP7	0-0.7		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, St
	0.7-1.2		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, VSt
	1.2-1.5		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel and shale fragments, M<PL, VSt-H

TABLE A

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP8	0-0.5	U50 0.5-0.71	FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, F-St
	0.5-1.5		(CI) Silty CLAY, medium plasticity, red, M≤PL, VSt
TP9	0-0.15		TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres
	0.15-0.5		(CI-CH) Silty CLAY, medium to high plasticity, brown, M<PL, St
	0.5-1.4		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, St-VSt
	1.4-1.5		SHALE, grey, extremely weathered, low strength
TP10	0-0.5	U50 0.6-0.9	FILL: Silty Clay, medium to high plasticity, brown, with gravel and root fibres, M<PL, F-St
	0.5-1.4		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, St-VSt
	1.4-1.5		SHALE, grey, extremely weathered, low strength
TP11	0-0.2		FILL: Silty Clay, medium to high plasticity, brown, with gravel
	0.2-0.35		TOPSOIL: Silty Clay, low to medium plasticity, brown, with root fibres
	0.35-1.3		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, St-VSt
	1.3-1.5		SHALE, grey, extremely weathered, low strength
TP12	0-0.4		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, F
	0.4-1.3		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, St-VSt
	1.3-1.5		SHALE, grey, extremely weathered, low strength

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP13	0-0.3		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, F
	0.3-0.8		(CH) Silty CLAY, high plasticity, red, M<PL, St
	0.8-0.9		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, St-VSt
	0.9-1.0		SHALE, grey, distinctly weathered, medium strength
TP14	0-0.5		FILL: Silty Clay, medium to high plasticity, brown, with gravel, M<PL, St
	0.5-1.1		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel, M<PL, VSt
	1.1-1.3		SHALE, grey, distinctly weathered, medium strength
TP15	0-0.7		FILL: Silty Clay, low to medium plasticity, brown
	0.7-1.5		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
TP16	0-0.8		FILL: Silty Clay, low to medium plasticity, brown
	0.8-1.2		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.2-1.5		SHALE, grey, extremely weathered, low strength
TP17	0-1.3		FILL: Silty Clay, low to medium plasticity, brown
	1.3-1.4		SHALE, grey, distinctly weathered, medium strength
TP18	0-0.6		FILL: Silty Clay, low to medium plasticity, brown
	0.6-1.4	0.6-0.8	(CH) Silty CLAY, high plasticity, red
	1.4-1.5		SHALE, grey, distinctly weathered, medium strength
TP19	0-0.3		FILL: Silty Clay, low to medium plasticity, brown
	0.3-0.8		FILL: Silty Clay, high plasticity, mottled grey, brown and red, with gravel
	0.8-1.2		(CH) Silty CLAY, high plasticity, red
	1.3-1.4		SHALE, grey, extremely weathered, low strength

TABLE A

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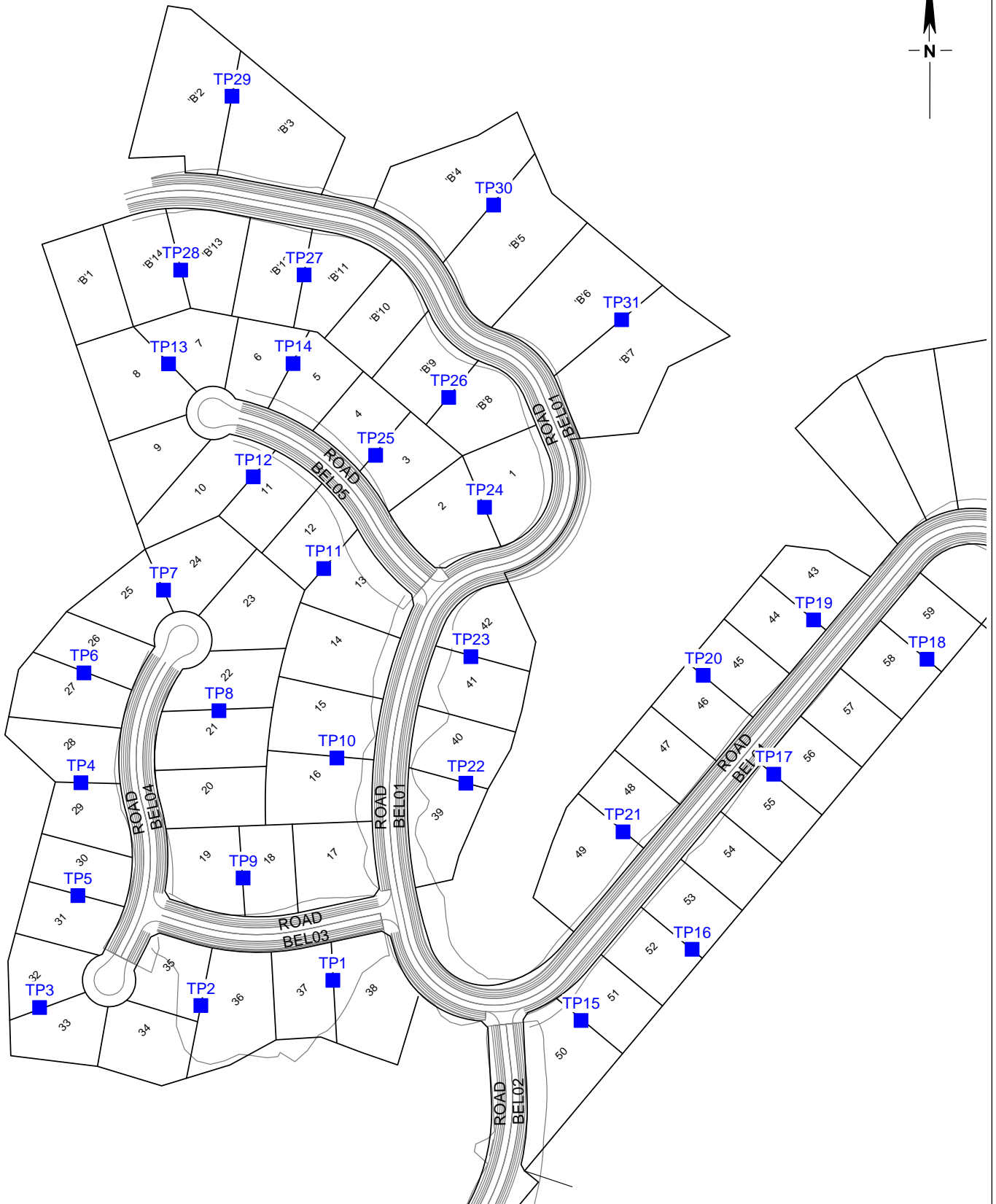
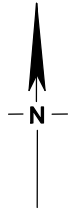
TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP20	0-0.8		FILL: Silty Clay, low to medium plasticity, brown
	0.8-1.1		(CH) Silty CLAY, high plasticity, red
	1.1-1.5		SHALE, grey, extremely weathered, low strength
TP21	0-1.4		FILL: Silty Clay, low to medium plasticity, brown
	1.4-1.5		SHALE, grey, extremely weathered, low strength
TP22	0-1.3		FILL: Silty Clay, low to medium plasticity, brown
	1.3-1.5		SHALE, grey, extremely weathered, low strength
TP23	0-1.5		FILL: Silty Clay, low to medium plasticity, brown
TP24	0-0.4		FILL: Silty Clay, low to medium plasticity, brown
	0.4-1.0	0.4-0.6	(CH) Silty CLAY, high plasticity, red
	1.0-1.3		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.3-1.4		SHALE, grey, extremely weathered, low strength
TP25	0-1.0		FILL: Silty Clay, low to medium plasticity, brown
	1.0-1.4		(CH) Silty CLAY, high plasticity, red
	1.4-1.5		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
TP26	0-0.6		FILL: Silty Clay, low to medium plasticity, brown
	0.6-0.8	0.6-0.8	(CH) Silty CLAY, high plasticity, red
	0.8-1.3		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.3-1.4		SHALE, grey, extremely weathered, low strength

TABLE A

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP27	0-0.7		FILL: Silty Clay, low to medium plasticity, brown
	0.7-1.0		(CH) Silty CLAY, high plasticity, red
	1.0-1.1		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.1-1.2		SHALE, grey, distinctly weathered, medium strength
TP28	0-0.4		FILL: Silty Clay, low to medium plasticity, brown
	0.4-0.9		(CH) Silty CLAY, high plasticity, red
	0.9-1.2		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.2-1.3		SHALE, grey, extremely weathered, low strength
TP29	0-0.4		FILL: Silty Clay, low to medium plasticity, brown
	0.4-1.1		(CH) Silty CLAY, high plasticity, red
	1.1-1.3		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
	1.3-1.4		SHALE, grey, extremely weathered, low strength
TP30	0-0.3		FILL: Silty Clay, low to medium plasticity, brown
	0.3-1.3	0.3-0.5	(CH) Silty CLAY, high plasticity, red
	1.3-1.5		(CH) Silty CLAY, high plasticity, grey, with ironstone gravel
TP31	0-1.5		FILL: Silty Clay, low to medium plasticity, brown



LEGEND

■ Test Pit

PREPARED BY:



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North Richmond Joint Venture
Proposed Development
Belmont
Grose Vale Road, North Richmond

Test Pit Locations

Drawing No: 7747/34-1
Job No: 7747/34
Drawn By: MH
Date: 22 January 2017
Checked By: AK

File No: 7747-34
Layers: 0, AA1

APPENDIX B

**TABLE B
SUMMARY OF SITE CLASSIFICATIONS**

Job No: 7747/34
 Our Ref: 7747/34-AA

SUMMARY OF SITE CLASSIFICATIONS

**Proposed Development- Belmont Precinct
 Grose Vale Road, North Richmond**

Site Classification Report

Lot	Site Classification	Lot	Site Classification
1	M	38	M
2	M	39	M
3	M	40	M
4	M	41	M
5	M	42	M
6	M	43	M
7	M	44	M
8	M	45	M
9	M	46	M
10	M	47	M
11	M	48	M
12	M	49	M
13	M	50	M
14	M	51	M
15	M	52	M
16	M	53	M
17	M	54	M
18	M	55	M
19	M	56	M
20	M	57	M
21	M	58	M
22	M	59	M
23	M	B1	M
24	M	B2	M
25	M	B3	M
26	M	B4	M
27	M	B5	M
28	M	B6	M
29	M	B7	M
30	M	B8	M
31	M	B9	M
32	M	B10	M
33	M	B11	M
34	M	B12	M
35	M	B13	M
36	M	B14	M
37	M		

M : Moderately Reactive; Free surface movement between 20 and 40mm

APPENDIX C

LABORATORY TEST RESULTS

REDBANK COMMUNITIES
PO BOX 1918
PENRITH NSW 2750

SITE CLASSIFICATION
PROPOSED DEVELOPMENT, GROSE VALE ROAD, NORTH RICHMOND, STAGE BELMONT

TEST RESULTS - ATTERBERG LIMITS
Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Page 1 of 1

Job No:	7747/34	Tested By:	BG
Laboratory	Penrith	Checked By:	AK
Date Tested	29/01/2018		
Sample Identification	Test Pit 10	Test Pit 26	
Laboratory Number	7747/34-5	7747/34-8	
Depth (m)	0.6 - 0.9	0.6 - 0.8	
Test Description			
Liquid Limit (W _L)	40%	46%	
Plastic Limit (W _P)	19%	22%	
Plastic Index (I _P)	21%	24%	
Linear Shrinkage (LS)	10.5%	11.0%	
Mould Length (mm)	127	127	
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CL-CI) Silty CLAY, low to medium plasticity, grey, some fine to medium gravel	(CI) Silty CLAY, medium plasticity, red-brown	

Form No R004 Version 12 - 06/13 - Issued by ER



Nata Accreditation Number 2734
Corporate Site Number 2727

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Accredited for compliance with ISO/IEC 17025 - Testing.

A Kench

02/02/2018

Approved Signatory

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REDBANK COMMUNITIES
PO BOX 1918
PENRITH NSW 2750

Job No: 7747/34
Tested By: JM
Checked By: AK
Date Tested: 22/01/2018
Laboratory: Penrith

SITE CLASSIFICATION
PROPOSED DEVELOPMENT, GROSE VALE ROAD, NORTH RICHMOND, STAGE BELMONT

TEST RESULTS - SHRINK / SWELL INDEX

Page 1 of 2

Test Procedure: AS 1289 7.1.1				
Sample Identification	Test Pit 1	Test Pit 2	Test Pit 6	Test Pit 8
Depth (m)	0.5 - 0.7	0.5 - 0.68	0.5 - 0.7	0.5 - 0.7
Laboratory Number	7747/34-1	7747/34-2	7747/34-3	7747/34-4
Test Description				
Moisture Content				
Initial %	15.2	14.7	20.1	26.2
Final %	19.9	17.9	21.9	29.3
Swell %	2.5	2.4	2.4	0.4
Shrinkage %	1.6	1.5	1.4	3.4
Shrink/Swell Index % _p F	1.6	1.5	1.5	2.0
Material Description	Fill; silty Clay, low plasticity, brown, trace of fine to medium gravel	Fill; Silty Clay, low plasticity, red-brown & grey, some fine to medium gravel	(CL) Silty CLAY, low plasticity, red-brown	(CL-CI) Silty CLAY, low to medium plasticity, red-brown

Form No R007 Version 12 06/13



NATA Accreditation Number 2734
Corporate Site Number 2727

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A Kench 02/02/2018
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REDBANK COMMUNITIES
 PO BOX 1918
 PENRITH NSW 2750

Job No: 7747/34
 Tested By: JM
 Checked By: AK
 Date Tested: 22/01/2018
 Laboratory: Penrith

SITE CLASSIFICATION
 PROPOSED DEVELOPMENT, GROSE VALE ROAD, NORTH RICHMOND, STAGE BELMONT

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1				
Sample Identification	Test Pit 18	Test Pit 24	Test Pit 30	
Depth (m)	0.6 - 0.8	0.4 - 0.6	0.3 - 0.5	
Laboratory Number	7747/34-6	7747/34-7	7747/34-9	
Test Description				
Moisture Content				
Initial %	17.9	18.4	28.9	
Final %	26.2	22.8	33.7	
Swell %	2.7	1.1	1.2	
Shrinkage %	0.7	1.6	1.7	
Shrink/Swell Index % _{pF}	1.1	1.2	1.3	
Material Description	(CL) Silty CLAY, low plasticity, red-brown	(CL) Silty CLAY, low plasticity, red-brown	(CI) Silty CLAY, medium plasticity, red-brown, some fine to medium gravel	

Form No R007 Version 12 06/13



NATA Accreditation Number 2734
 Corporate Site Number 2727

Accredited for compliance with
 ISO/IEC 17025 - Testing.

A Kench

02/02/2018

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