



ABN 71 076 676 321

Job No: 7747/26
Our Ref: 7747/26-AA-R1
25 July 2016

North Richmond Joint Venture
P O Box 1918
PENRITH NSW 2750

Attention: Mr A Flaherty

Dear Sir

re: **Redbank Residential Development
Grose Vale Road, North Richmond
Site Classification Report - Mountain View & The Gallery**

Please find herewith the results of a geotechnical investigation for the classification of proposed lots at the above site. A total of one hundred and thirty seven (137) lots are covered in this report (Lots 101 to 237).

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 that reads "Ariful".

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 Mountain View and The Gallery development. The investigation was approved by Mr Ravi Pillay of North Richmond Joint Venture in an email confirmation and carried out in accordance with Geotech Testing fee proposal dated 27 October 2015. A total of one hundred and thirty seven (137) lots are covered in this report (Lots 101 to 237).

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. AS2870 is not suitable for dwellings situated vertically above or below another dwelling, including buildings classified as Class 1 and Class 10a in the Building Code of Australia (BCA). 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 22 and 24 June 2016, under the supervision of a Geotechnical Engineer from the company and consisted of excavating 56 test pits (TP1 to TP56), using an excavator. The test pits were terminated at a depth of 1.5m and their approximate locations are indicated on the attached Drawing No 7747/26-AA1. 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 existing subdivision to the east, residential houses to the north, rural properties to the west and Grose Vale Road to the south. At the time of investigation, earthworks for all lots had been completed and the construction of internal roads was underway. The topography of the site generally slopes towards north and the ground surface was generally covered with a thin layer of topsoil / fill without any 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.

Fill	Silty Clay, low plasticity, grey, with some shale and sandstone fragments Silty Clay, medium plasticity, dark grey, with some shale fragments Crushed Shale
Natural	(CI) Silty CLAY, medium plasticity, red-brown (CI-CH) Silty CLAY, medium to high plasticity, grey and brown (CL) Shaley CLAY, low plasticity, brown, with ironstone fragments
Bedrock	SHALE, brown and grey, very low strength, moderately weathered

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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, 4 undisturbed samples (U_{50}) were recovered for shrink/swell index 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 No	Depth (m)	Material Description	$I_{ss} \% / pF$
TP2	0.5 - 0.8	FILL: Silty Gravelly Clay, low plasticity, grey	1.2
TP10	0.5 - 0.8	(CI) Silty CLAY, medium plasticity, red-brown	2.3
TP12	0.3 - 0.6	(CL) Gravelly CLAY, low plasticity, brown	1.1
TP20	0.3 - 0.6	FILL: Silty gravelly Clay, low plasticity, grey-brown	0.1

5.0 DISCUSSION & RECOMMENDATIONS

5.1 Assessment of Fill

Clayey fill material of considerable depth was encountered in the test pits located at the north-west corner and east of the site. Based on the visual inspection in those test pits and compaction test results (Report Ref: 7747/16), 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.

The classifications presented in Appendix B of this report are applicable to the Lots at the date of conducting the investigation, being 23 July 2016 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.

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APPENDIX A

TABLE A
(Summary of Test Pits)

TEST PIT LOCATION PLAN
(Drawing No 7747/26-AA1)

TABLE A

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP1	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP2	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP3	0.0-0.4	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.4-0.5		SHALE, brown and grey, very low strength, moderately weathered
TP4	0.0-1.0	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	1.0-1.1		SHALE, brown and grey, very low strength, moderately weathered
TP5	0.0-0.2	23/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP6	0.0-0.7	23/06/2016	FILL: Silty Clay, medium plasticity, dark grey, with some shale fragments, well compacted
	0.7-0.8		SHALE, brown and grey, very low strength, moderately weathered
TP7	0.0-0.1	23/06/2016	(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP8	0.0-0.2	23/06/2016	FILL: Silty Clay, medium plasticity, dark grey, with some shale fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP9	0.0-0.2	23/06/2016	(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP10	0.0-1.0	23/06/2016	(CI) Silty CLAY, medium plasticity, red-brown, M<PL, St
	1.0-1.5		(CI-CH) Silty CLAY, medium to high plasticity, grey and brown, M<PL, St
TP11	0.0-1.2	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	1.2-1.5		(CI) Silty CLAY, medium plasticity, red-brown, M<PL, St
TP12	0.0-1.3	23/06/2016	(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	1.3-1.5		SHALE, brown and grey, very low strength, moderately weathered
TP13	0.0-0.4	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.4-0.5		SHALE, brown and grey, very low strength, moderately weathered
TP14	0.0-0.2	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.5		(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	0.5-0.6		SHALE, brown and grey, very low strength, moderately weathered
TP15	0.0-0.3	23/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP16	0.0-0.3	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		SHALE, brown and grey, very low strength, moderately weathered
TP17	0.0-0.1	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP18	0.0-0.1	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP19	0.0-0.2	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP20	0.0-0.9	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.9-1.0		SHALE, brown and grey, very low strength, moderately weathered
TP21	0.0-1.0	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	1.0-1.5		FILL: Crushed Shale, well compacted
TP22	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP23	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP24	0.0-1.0	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	1.0-1.1		SHALE, brown and grey, very low strength, moderately weathered
TP25	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP26	0.0-1.0	23/06/2016	(CI) Silty CLAY, medium plasticity, red-brown, M<PL, St
	1.0-1.3		(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	1.3-1.5		SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP27	0.0-0.8	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.8-0.9		SHALE, brown and grey, very low strength, moderately weathered
TP28	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP29	0.0-1.5	23/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP30	0.0-0.2	24/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP31	0.0-0.4	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.4-0.5		SHALE, brown and grey, very low strength, moderately weathered
TP32	0.0-0.3	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		SHALE, brown and grey, very low strength, moderately weathered
TP33	0.0-0.2	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP34	0.0-0.2	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP35	0.0-0.1	24/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP36	0.0-0.1	24/06/2016	SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP37	0.0-0.1	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP38	0.0-0.2	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP39	0.0-0.5	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.5-0.6		SHALE, brown and grey, very low strength, moderately weathered
TP40	0.0-0.5	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.5-0.6		SHALE, brown and grey, very low strength, moderately weathered
TP41	0.0-0.1	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP42	0.0-0.5	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.5-0.8		(CL) Shaley CLAY, low plasticity, brown, with ironstone fragments, M<PL, St
	0.8-0.9		SHALE, brown and grey, very low strength, moderately weathered
TP43	0.0-0.1	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP44	0.0-0.2	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP45	0.0-0.3	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		(CI) Silty CLAY, medium plasticity, red-brown, M<PL, St
	0.4-0.5		SHALE, brown and grey, very low strength, moderately weathered
TP46	0.0-0.3	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		SHALE, brown and grey, very low strength, moderately weathered
TP47	0.0-1.5	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
TP48	0.0-0.2	24/06/2016	FILL: Silty Clay, medium plasticity, dark grey, with some shale fragments, well compacted
	0.2-0.3		SHALE, brown and grey, very low strength, moderately weathered
TP49	0.0-0.3	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		SHALE, brown and grey, very low strength, moderately weathered
TP50	0.0-0.2	24/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP51	0.0-0.2	24/06/2016	SHALE, brown and grey, very low strength, moderately weathered
TP52	0.0-0.1	24/06/2016	FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered

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TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP53	0.0-0.1		FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP54	0.0-0.1		FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.1-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP55	0.0-0.2		SHALE, brown and grey, very low strength, moderately weathered
TP56	0.0-0.3		FILL: Silty Clay, low plasticity, grey, with some shale and sandstone fragments, well compacted
	0.3-0.4		SHALE, brown and grey, very low strength, moderately weathered



LEGEND

■ Test Pit



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NOTES

1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

J Wyndham Prince Pty Ltd
Proposed Development - Mountain View
Grose Vale Road
North Richmond

Test Pit Locations

Drawing No: 7747/26-AA1
Job No: 7747/26
Drawn By: MH
Date: 27 June 2016
Checked By: AI

File No: 7747-26
Layers: 0, AA1

APPENDIX B

**TABLE B
SUMMARY OF SITE CLASSIFICATIONS**

Job No: 7747/26
Our Ref: 7747/26-AA-R1

**TABLE B
SUMMARY OF SITE CLASSIFICATIONS**

**Mountain View & The Gallery
Grose Vale Road, North Richmond**

Lot	Site Classification	Lot	Site Classification	Lot	Site Classification
101	M	147	S	193	A
102	M	148	S	194	A
103	M	149	S	195	A
104	M	150	S	196	A
105	M	151	S	197	A
106	M	152	S	198	A
107	M	153	S	199	A
108	M	154	S	200	A
109	M	155	M	201	A
110	M	156	M	202	S
111	M	157	M	203	A
112	S	158	M	204	A
113	S	159	M	205	A
114	M	160	M	206	S
115	M	161	M	207	S
116	M	162	M	208	S
117	S	163	M	209	S
118	S	164	M	210	S
119	S	165	M	211	S
120	S	166	M	212	S
121	S	167	M	213	S
122	S	168	M	214	A
123	S	169	M	215	A
124	S	170	M	216	A
125	S	171	M	217	A
126	S	172	M	218	A
127	M	173	M	219	A
128	M	174	M	220	A
129	M	175	M	221	A
130	M	176	M	222	A
131	M	177	M	223	A
132	M	178	M	224	A
133	M	179	M	225	S
134	M	180	M	226	S
135	M	181	S	227	S
136	M	182	S	228	S
137	S	183	S	229	S
138	S	184	S	230	M
139	S	185	S	231	M
140	S	186	S	232	S
141	S	187	S	233	S
142	S	188	S	234	S
143	S	189	A	235	S
144	S	190	A	236	M
145	S	191	A	237	M
146	S	192	A		

A : Non Reactive; no free surface movement
S : Slightly Reactive; free surface movement between 0mm and 20mm
M : Moderately Reactive; free surface movement between 20mm and 40mm

APPENDIX C

LABORATORY TEST RESULTS

NORTH RICHMOND JOINT VENTURE
PO BOX 1918
PENRITH NSW 2750

Job No: 7747/26
Tested By: JM
Checked By: AK
Date Tested: 29/06/2016
Laboratory: Penrith

SITE CLASSIFICATION

PROPOSED DEVELOPMENT, MOUNTAIN VIEW & THE GALLERY, GROSE VALE ROAD, NORTH RICHMOND

TEST RESULTS - SHRINK / SWELL INDEX

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Test Procedure: AS 1289 7.1.1				
Sample Identification	Test Pit 2	Test Pit 10	Test Pit 12	Test Pit 20
Depth (m)	0.5 - 0.8	0.5 - 0.8	0.3 - 0.6	0.3 - 0.6
Laboratory Number	7747/26-1	7747/26-2	7747/26-3	7747/26-4
Test Description				
Moisture Content				
Initial %	16.2	22.7	10.3	14.3
Final %	21.0	27.5	19.2	19.1
Swell %	Nil	3.3	2.1	0.3
Shrinkage %	2.2	2.5	0.8	Nil
Shrink/Swell Index % _{pF}	1.2	2.3	1.1	0.1
Material Description	FILL: Silty gravelly Clay, low plasticity, grey	(CI) Silty CLAY, medium plasticity, red-brown	(CL) Gravelly CLAY, low plasticity, brown	FILL: Silty gravelly Clay, low plasticity, grey-brown

Form No R007 Version 12 06/13

Accredited for compliance with ISO/IEC 17025.

A Kench

01/07/2016



NATA Accreditation Number 2734
Corporate Site Number 2727

Approved Signatory

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