GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Job No: 7747/49
Our Ref: 7747/49-AA
9 April 2020

Redbank Communities
PO Box 262
NORTH RICHMOND NSW 2754
Email: ravipillay@redbankcommunities.com.au

Attention: Mr R Pillay

Dear Sir

re: **Redbank Development – Ploughmans & Belmont East**
Grose Vale Road, North Richmond
Site Classification Report

This report provides site classifications for the proposed dwellings to be located at the above site. A total of fifty lots (819 to 868) are covered in the report.

This report contains information on surface and sub-surface conditions encountered at the site, together with an 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

ZIAUDDIN AHMED
Senior Associate

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APPENDICES

1.0 INTRODUCTION

This report provides site classification (AS2870-2011 "Residential slabs & footings") of the proposed fifty lots (819 to 868) at the subject development.

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

Field work for the investigation was conducted on 1 April 2020, under the full time supervision of a Geotechnical Engineer and consisted of excavation of twenty (20) test pits (TP1 to TP20) using excavator.

The test pit locations are indicated on the attached Drawing No 7747/49-AA1 (Appendix A).

3.0 SITE CONDITIONS

3.1 Surface Conditions

The following observations were made at the time of conducting the field work:

- Cut and fill, as part of the bulk earthworks, have been completed.
- Installations of services and construction of internal roads are completed.
- The topography of the site is slopes towards the north.
- The site is bounded by Redbank Creek to the north and various stages of Redbank development on other sides.

3.2 Sub-Surface Conditions

Sub-surface conditions encountered at the site are detailed in the attached Table A and summarised below.

Topsoil	Silty Clay, low plasticity, dark brown, with grass roots
Fill	Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel
Natural	Silty CLAY, low to medium plasticity, red
Bedrock	SHALE, grey, low to medium strength, extremely weathered

3.3 Groundwater Condition

Groundwater was not observed in the test pits during the short time 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 course of the investigation, two (2) undisturbed samples (U_{50}) and three (3) disturbed samples were recovered from the test pits for laboratory testing. Undisturbed samples were tested to determine shrink/swell index values (AS1289 7.1.1) and disturbed samples were tested to determine Atterberg limits (AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1). The results are summarised below and detailed in the attached certificates:

Summary of Test Results

TP	Sample Depth (m)	Material Description	I_{ss} %/$_p$F	W_L (%)	W_P (%)	I_P (%)	LS (%)
2	0.4 – 0.5	Silty CLAY, medium to high plasticity, red, brown	-	51	22	29	15.0
3	0.3 – 0.6	Silty CLAY, low plasticity, red, brown	0.7	-	-	-	-
5	0.6 – 0.7	FILL : Silty Clay, medium plasticity, brown, some fine to medium gravel	-	41	17	24	11.0
12	0.4 – 0.7	(CL) Silty CLAY, low plasticity, brown, trace of fine to medium gravel	1.1	-	-	-	-
14	0.5 – 0.6	FILL : Silty Clay, medium plasticity, brown, some fine to medium gravel	-	47	18	29	12.5

I_{ss}: Shrink/Swell Index, W_L : Liquid Limit, W_P : Plastic Limit, I_P : Plasticity Index, LS: Linear Shrinkage

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 Assessment of Fill

Geotech Testing Pty Ltd provided geotechnical inspections and testing during bulk earthworks and conducted sufficient compaction control testing during placement of fill and the results were provided in our report 7747/47-AA dated 27 March 2020. The fill at the site is generally assessed as controlled fill.

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” (i.e. Problematic) in accordance with AS2870-2011. However, based on the results of this investigation, including laboratory testing, the lots are classified as detailed in Appendix B.

It is recommended that footings for the proposed dwellings are founded on the same stratum, below any topsoil or deleterious material, to minimise the potential for differential movement.

The classifications presented in Appendix B of this report are applicable to the lots at the date of conducting the investigation, being 1 April 2020 and have been 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 that would 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.

5.3 Conclusion

The above investigation and fill testing at the site were conducted as per relevant Australian Standards. Based on the investigation and site fill testing results we confirm that the lots at the site are acceptable for residential building construction.

GEOTECH TESTING PTY LTD

APPENDIX A

TABLE A
(Test Pit Summary)

TEST PIT LOCATION PLAN
(Drawing No 7747/49-AA1)

TABLE A

Job No: 7747/49
Our Ref: 7747/49-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP1	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-0.6		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	0.6-1.5		(CL-CI) Silty CLAY, low to medium plasticity, red, St-VSt, M<PL
TP2	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-0.4		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	0.4-0.7	0.4-0.5 (DS)	(CL-CI) Silty CLAY, low to medium plasticity, red, St-VSt, M<PL
	0.7-1.2		SHALE, grey, low to medium strength, extremely weathered
TP3	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5	0.3-0.6 (U_{50})	(CL-CI) Silty CLAY, low to medium plasticity, red, St, M<PL
TP4	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
TP5	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5	0.6-0.7 (DS)	FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
TP6	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.4		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	1.4-1.5		SHALE, grey, low to medium strength, extremely weathered

TABLE A

Job No: 7747/49
Our Ref: 7747/49-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP7	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-0.8		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	0.8-1.1		SHALE, grey, low to medium strength, extremely weathered
TP8	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0 0.2-0.5		FILL: Clayey Silt, low plasticity, pale brown, M<OMC
	0.5-1.3		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	1.3-1.5		(CI-CH) Silty CLAY, medium to high plasticity, red/orange
TP9	0.0-1.2		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	1.2-1.5		(CI-CH) Silty CLAY, medium to high plasticity, red/orange, St, M<PL
TP10	0.0-1.2		FILL: Silty Clay, low plasticity, pale brown, M<OMC
	1.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, WC, M<OMC
TP11	0.0-1.0		FILL: Silty Clay, low plasticity, pale brown, WC, M<OMC
	1.0-1.5		(CL-CI) Silty CLAY, low to medium plasticity, red, St-VSt, M<PL
TP12	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5	0.4-0.7 (U_{50})	(CL-CI) Silty CLAY, low to medium plasticity, brown, traces of ironstone, VSt, M<PL

TABLE A

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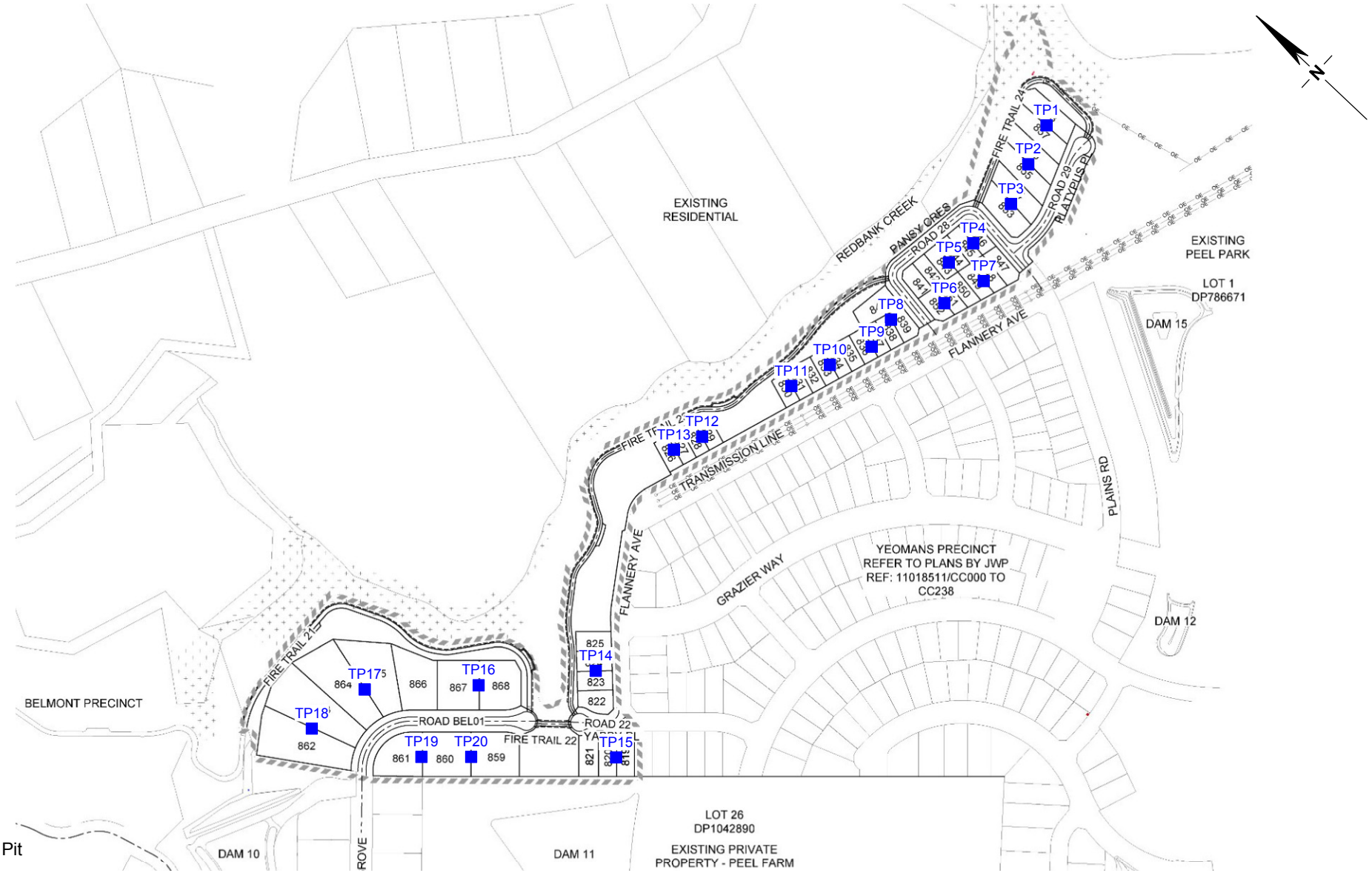
Our Ref: 7747/49-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP13	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.3		(CL-CI) Silty CLAY, low to medium plasticity, brown, traces of ironstone, St, M<PL
	1.3-1.5		(CI-CH) Silty CLAY, medium to high plasticity, red/orange, St-VSt, M<PL
TP14	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5	0.5-0.6 (DS)	FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
TP15	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-0.4		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
	0.4-0.7		FILL: Silty Clay, low plasticity, pale brown, M<OMC
	0.7-0.9		SHALE, grey, low to medium strength, extremely weathered
TP16	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, with siltstone fragments, M<OMC
TP17	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
TP18	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC

TABLE A

Job No: 7747/49
Our Ref: 7747/49-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP19	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.5		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, M<OMC
TP20	0.0-0.2		TOPSOIL: Silty Clay, low plasticity, dark brown, with grass roots
	0.2-1.0		FILL: Silty Clay, medium plasticity, brown, with sandstone fragments and mixed gravel, WC, M<OMC
	1.0-1.5		(CL-CI) Silty CLAY, low to medium plasticity, brown, traces of ironstone, St, M<PL



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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

Redbank Communities
Proposed Development
Ploughmans and Belmont East
Grose Vale Road, North Richmond

Test Pit Locations

Drawing No: 7747/49-AA1
Job No: 7747/49
Drawn By: MH
Date: 2 April 2020
Checked By: RR

File No: 7747-49
Layers: 0, AA1

APPENDIX B

SUMMARY OF SITE CLASSIFICATIONS

Job No: 7747/49
Our Ref: 7747/49-AA

TABLE B

Summary of Site Classifications
Redbank Development – Ploughmans & Belmont East

Lot No	Classification	Lot No	Classification
819	Class “M”	844	Class “M”
820	Class “M”	845	Class “M”
821	Class “M”	846	Class “M”
822	Class “M”	847	Class “M”
823	Class “M”	848	Class “M”
824	Class “M”	849	Class “M”
825	Class “M”	850	Class “M”
826	Class “M”	851	Class “M”
827	Class “M”	852	Class “M”
828	Class “M”	853	Class “M”
829	Class “M”	854	Class “M”
830	Class “M”	855	Class “M”
831	Class “M”	856	Class “M”
832	Class “M”	857	Class “M”
833	Class “M”	858	Class “M”
834	Class “M”	859	Class “M”
835	Class “M”	860	Class “M”
836	Class “M”	861	Class “M”
837	Class “M”	862	Class “M”
838	Class “M”	863	Class “M”
839	Class “M”	864	Class “M”
840	Class “M”	865	Class “M”
841	Class “M”	866	Class “M”
842	Class “M”	867	Class “M”
843	Class “M”	868	Class “M”

Class “M” : Moderately Reactive (20 to 40mm)
Class “H1” : Highly Reactive (40 to 60mm)

APPENDIX C

LABORATORY TEST RESULTS

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ABN 71 076 676 321

REDBANK COMMUNITIES
PO BOX 1918
PENRITH NSW 2750

SITE CLASSIFICATION
PROPOSED DEVELOPMENT, GROSE VALE ROAD, NORTH RICHMOND, PLOUGHMANS AND BELMONT EAST

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.1, 3.2.1, 3.3.1, 3.4.1

Job No:	7747/49	Tested By:	BG & BN
Laboratory	Penrith	Checked By:	AK
Date Tested	06/04/2020		

Sample Identification	Test Pit 2	Test Pit 5	Test Pit 14
Laboratory Number	7747/49-1	7747/49-3	7747/49-5
Depth (m)	0.4 - 0.5	0.6 - 0.7	0.5 - 0.6
Test Description			
Liquid Limit (W_L)	51%	41%	47%
Plastic Limit (W_P)	22%	17%	18%
Plastic Index (I_P)	29%	24%	29%
Linear Shrinkage (LS)	15.0%	11.0%	12.5%
Mould Length (mm)	127	127	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI-CH) Silty CLAY, medium to high plasticity, red-brown	FILL: Silty Clay, medium plasticity, brown, some fine to medium gravel	FILL: Silty Clay, medium plasticity, brown, some fine to medium gravel

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

A Kench 9/04/2020
Approved Signatory

NATA
Accredited for compliance with ISO/IEC 17025 - Testing.

Nata Accreditation Number 2734
Corporate Site Number 2727

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GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

REDBANK COMMUNITIES
PO BOX 1918
PENRITH NSW 2750

Job No:	7747/49
Tested By:	SS
Checked By:	AK
Date Tested:	03/04/2020
Laboratory	Penrith

SITE CLASSIFICATION
PROPOSED DEVELOPMENT, GROSE VALE ROAD, NORTH RICHMOND, PLOUGHMANS AND BELMONT EAST

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 3	Test Pit 12		
Depth (m)	0.3 - 0.6	0.4 - 0.7		
Laboratory Number	7747/49-2	7747/49-4		
Test Description				
Moisture Content				
Initial %	17.4	14.5		
Final %	19.0	15.8		
Swell %	Nil	Nil		
Shrinkage %	1.3	2.0		
Shrink/Swell Index $\%/_pF$	0.7	1.1		
Material Description	(CL) Silty CLAY, low plasticity, red-brown	(CL) Silty CLAY, low plasticity, brown, trace of 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 03/04/2020
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