GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System Quality ISO 9001 SAI GLOBAL

Job No: 7508/119
Our Ref: 7508/119-AB Statement of Compliance
30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs - Stages 4A & 4B**
Penrith City Council DA 12/0897
Statement of Compliance

Geotech Testing Pty Ltd was engaged by Maryland Development Company Pty Ltd to carry out geotechnical site compliance of Stages 4A & 4B at Jordan Springs, in accordance with Penrith City Council DA Consent No. 12/0897. The following conditions of consent have been satisfied as a result of the services carried out.

- **Condition No 26** – *No fill material is to be imported to the site without the prior approval of Penrith City Council in accordance with the Sydney Regional Environmental Plan No. 20 (Hawkesbury Nepean River) (No.2-1997). No recycling of material for use as fill material shall be carried out on the site without the prior approval of Council.*
- **Condition No. 57 -** *All filling shall be undertaken in accordance with AS3798 and Penrith City Council's Design Guidelines and Construction Specification for Civil Works. The level of testing shall be determined by the Geotechnical Testing Authority/Superintendent in consultation with the Principal Certifying Authority.*
- **Condition No. 58 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings".*
- **Condition No. 65(f) -** *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*
  - *Compaction reports for road pavement construction.*
  - *Compaction reports for bulk earthworks and lot regrading.*
  - *Soil classification for all residential lots.*
  - *Statement of Compliance.*
- **Condition No. 75 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings". A copy of the report, including a plan showing the lot classification over the subdivision is to be submitted to Penrith City Council prior to issue of a Subdivision Certificate.*

Head Office:
34 Borec Road, Penrith NSW 2750
P O Box 880 Penrith NSW 2751
Telephone: (02) 4722 2744 Facsimile: (02) 4722 2777
email: info@geotech.com.au www.geotech.com.au

Prestons Laboratory:
Unit 4, 18-20 Whyalla Place, Prestons NSW 2170
Telephone: (02) 9607 6111 Facsimile: (02) 9607 6200

This report consists of the following appendices, which provide the relevant compliance information (including test results and plans) for the works carried out to satisfy the above condition requirements.

- **Appendix A –** Summary of Site Fill Testing
- **Appendix B –** Summary of Field Density Testing for Road Works
- **Appendix C –** Summary of Pipeline Backfill Testing
- **Appendix D –** Soil Classification of Residential Lots

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

APPENDIX A

SUMMARY OF SITE FILL TESTING

Report 7508/119-AA

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

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Job No: 7508/119
Our Ref: 7508/119-AAR1
9 September 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs - Stages 4A & 4B**
Penrith City Council DA 12/0897 – Condition Nos 26, 57 & 65(f)
Summary of Site Fill Testing

As requested tests have been carried out in filled areas at the above project to satisfy the following Penrith City Council (PCC) requirements under DA 12/0897.

Condition No 26 – *No fill material is to be imported to the site without the prior approval of Penrith City Council in accordance with the Sydney Regional Environmental Plan No. 20 (Hawkesbury Nepean River) (No.2-1997). No recycling of material for use as fill material shall be carried out on the site without the prior approval of Council*.

Condition No. 57 - *All filling shall be undertaken in accordance with AS3798 and Penrith City Council's Design Guidelines and Construction Specification for Civil Works.*

Condition No. 65(f) - *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*

- *Compaction reports for road pavement construction*
- *Compaction reports for bulk earthworks and lot regrading.*
- *Soil classification for all residential lots*
- *Statement of Compliance*

The scope of our services in which the works were carried out is set out in Attachment A.

The tests were undertaken within the terms of our NATA accreditation, at the dates and to the procedures shown on the test attached results sheets as attached. One hundred and two compaction control tests were completed and the results are attached. The test locations are indicated on the attached Drawings 7508/119-1 & 7508/119-2.

The majority of the fill comprised on-site materials gained from excavation (cut to fill) and minor fill comprising materials excavated from the Woolworths Site (Corner of Jordan Springs & Lakeside Parade, Jordan Springs) comprising about 4,600m^3. The imported fill was tested by CSTS Pty Ltd (Report ENV AB dated 17 January 2013) and reviewed by Geotech Testing Pty Ltd (Report 7508/29-AN dated 12 April 2013). The imported material was assessed as ENM.

Based on the fill quantities/survey data provided by the Client, the frequency of field density and compaction tests was generally in accordance with the provisions set down in Australian Standard AS3798 “Guidelines on Earthworks for Commercial & Residential Development”. We certify that all locations tested the compacted fill and attained the wet density ratio shown on the test results sheets.

Based on site observations and testing, it is our professional opinion that the fill placed at Stages 4A & 4B is classified as "Controlled" fill (Level 1) as defined in Australian Standard AS3870 and Council’s Design Guidelines and Construction specifications.

This report does not represent a geotechnical investigation of this site. We are able to provide guidance to designers as an additional service, if required.

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

Attached: Attachment A
Drawings 7508/119-1 & 7508/119-2
Compaction Control Test Nos 1 to 102

ATTACHMENT "A"

SCOPE OF TESTING SERVICES

The following work was undertaken:

STRIPPING & SURFACE PREPARATION
Observation of the stripped surface prior to fill placement. At the time of observation, the stripped area was free of significant fill, vegetation and highly organic topsoil. The surface was "proof rolled" and all soft or yielding areas were removed.

TESTING OF FILL COMPACTION
Level 1 site supervision with field density tests (and associated laboratory compaction tests) carried out at locations selected by our Geotechnician.

PLAN OF EXTENT OF FILL
Measurement of the extent of fill was not part of our commission. It is understood that this information will be supplied by the Project Surveyor.

LOCATIONS OF FIELD TESTS
In selection of field density test locations, no attempt was made to select "good" or "bad" locations. It should be noted that there may be no visual difference between areas of poorly compacted fill and well compacted fill.

The plan positions of the field density tests are indicated on Drawing Nos 7508/119-1 & 7508/119-2. The reduced levels of the field density tests are indicated on the field density test results sheets. It should be noted that the accuracy of location and level corresponds to the measurement method used and that discrepancies may result when positions are compared with detailed surveys. The surveyed method used was GPS supplied by the earthmoving contractor.

FILL ACCEPTANCE CRITERIA
It is understood that the criteria for fill acceptance indicated to us by the client was a minimum wet (Hilf) density ratio of at least 95% Standard (AS1289 5.4.1).

We do not warrant that the acceptance criteria set out above are appropriate to all or any of the work.

BURIED SERVICES
At the time of field density testing, it was not known whether all underground services had been installed.

Consideration must be given to the possible disruption of fill by subsequent service installation.

BUILDING ON FILLED AREAS
Prior to construction of any building on the filled areas, consideration should be given by the user to:

- the possibility of additional fill having been placed after the date of the last field density test.
- the presence of topsoil placed after completion of filling. The final contours on the as constructed drawings may include placed topsoil.
- variations in fill depth.

WARRANTY
The tests presented have been undertaken in accordance with standards ordinarily exercised by members of the profession that practice in the same locality and under similar conditions. There shall be no liability whatsoever in respect to any failure to exercise a degree or level of care beyond such reasonable care. No other warrant, express or implied is given, save where necessarily incorporated by statute.

LEGEND

● Density Test

GEOTECH TESTING PTY LTD®
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ABN 71 076 676 321

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Fx: 02 4722 2777
www.geotech.com.au
e-mail:info@geotech.com.au

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

Maryland Development Company Pty Ltd
Stages 4A & 4B
Jordan Springs

Location of Field Density Tests

Drawing No: 7508/119-1
Job No: 7508/119
Drawn By: MH
Date: 14 May 2013
Checked By: AK

File No: 7508-119
Layers: 0, Lay1

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Maryland Development Company Pty Ltd
Stages 4A & 4B
Jordan Springs

Location of Field Density Tests

Drawing No: 7508/119-2
Job No: 7508/119
Drawn By: MH
Date: 31 May 2013
Checked By: AK

File No: 7508-119
Layers: 0, Lay2

GEOTECH TESTING PTY LTD®
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

			1	2	3	4	5	6	7	8
TEST NUMBER										
DATE TESTED			11/04/2013							
RESULTS										
Hilf Density Ratio	**Standard**	%	**100.5**	**99**	**99**	**100**	**100**	**102**	**98.5**	**100.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 2.0**	**- 2.0**	**+ 0.5**	**- 1.0**	**+ 0.5**	**- 0.5**	**- 1.5**	**- 0.5**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	34.18	34.32	34.82	35.01	34.15	34.58	34.41	34.60
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.05	2.03	2.03	2.02	2.06	2.08	2.01	2.05
Field Moisture Content		%	17.5	15.5	19.5	19.5	20.0	18.5	18.0	22.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			1	2	3	4	5	6	7	8
Peak Converted Wet Density		t/m³	2.04	2.05	2.05	2.02	2.06	2.04	2.04	2.04
Apparent Optimum Moisture Content			19.5	17.0	19.0	20.5	19.0	19.0	19.5	23.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	3

Notes

1: Assigned Values have been obtained from our Penrith laboratory – Accreditation No 2734
2: Assigned Values have been obtained from our Prestons laboratory – Accreditation No 14234
3. Results have been calculated using infinite decimal places. Therefore, calculated values may vary from those shown
4: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.3.1, 5.4.1
5: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.3.1, 5.4.1
6: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
8: AS 1289 1.2.1 clause 6.4 (b), 2.1.1., 5.5.1, 5.6.1, 5.8.1
9: Full details of Test Procedure 5.8.1 available on request
10: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.5.1, 5.6.1
11: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.7.1
12. AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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NATA
ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation Number 2734
Corporate Site Number 2727

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A Kench 15/05/2013
Approved Signatory

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			9	10	11	12	13	14	15	16
DATE TESTED			11/04/2013	12/04/2013					15/04/2013	
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**100**	**99**	**98**	**96**	**96.5**	**99**	**96.5**	**97.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**+ 0.5**	**- 2.0**	**- 1.5**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	34.69	34.67	32.58	32.67	32.57	33.78	33.86	33.32
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.07	2.09	2.05	2.05	2.06	2.08	2.00	1.98
Field Moisture Content		%	20.5	20.0	18.0	14.0	14.0	13.5	14.0	13.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			9	10	11	12	13	14	15	16
Peak Converted Wet Density		t/m³	2.07	2.11	2.09	2.14	2.13	2.10	2.07	2.03
Apparent Optimum Moisture Content			20.0	20.0	18.0	14.0	13.5	13.0	16.0	15.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2-3	2-3	2	2	2	2	2	2

Notes

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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			17	18	19	20	21	22	23	
DATE TESTED			15/04/2013			16/04/2013				
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**99**	**98**	**98.5**	**99.5**	**98.5**	**99**	**98.5**	
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 1.5**	**+ 0.5**	**0.0**	**- 2.5**	**- 2.0**	**- 2.5**	**- 1.5**	
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	
Reduced Level		m	33.78	34.38	34.67	35.00	35.00	35.16	34.06	
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.01	2.09	2.04	2.03	2.03	2.02	2.02	
Field Moisture Content		%	14.0	16.5	16.5	15.5	15.5	16.0	15.5	
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	
Lab Compaction result from test number			17	18	19	20	21	22	23	
Peak Converted Wet Density		t/m³	2.03	2.13	2.07	2.04	2.06	2.04	2.05	
Apparent Optimum Moisture Content			15.5	16.5	16.5	17.5	17.5	18.0	17.0	
Number of Compaction Points			3	3	3	3	3	3	3	
Test Procedures - See Note Number			12	12	12	12	12	12	12	
Material Description - see below			2	2	2	2	2	2	2	

Notes

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17. RTA T120, T164, T173

Material Description

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9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R 020 Version 08 04/13 - issued by ER

NATA
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Accreditation Number 2734
Corporate Site Number 2727

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ISO 9001
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			24	25	26	27	28	29	30	31
DATE TESTED			23/04/2013							
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**104**	**101**	**99**	**99**	**97**	**95.5**	**97**	**97.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 1.5**	**+ 0.5**	**+ 1.0**	**+ 0.5**	**+ 0.5**	**0.0**	**0.0**	**0.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	34.06	34.75	35.54	35.02	32.25	32.70	33.29	32.71
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.07	2.08	2.07	2.03	2.04	1.99	2.00	2.01
Field Moisture Content		%	18.5	19.0	20.0	18.0	17.5	17.5	17.5	1.0
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			24	25	26	27	28	29	30	31
Peak Converted Wet Density		t/m³	1.99	2.06	2.09	2.05	2.10	2.08	2.06	2.06
Apparent Optimum Moisture Content			20.0	18.5	19.0	17.5	17.0	17.5	17.5	0.5
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2-3	2	2	2	2	2	2	2

Notes

1: Assigned Values have been obtained from our Penrith laboratory – Accreditation No 2734
2: Assigned Values have been obtained from our Prestons laboratory – Accreditation No 14234
3. Results have been calculated using infinite decimal places. Therefore, calculated values may vary from those shown
4: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.3.1, 5.4.1
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6: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
8: AS 1289 1.2.1 clause 6.4 (b), 2.1.1., 5.5.1, 5.6.1, 5.8.1
9: Full details of Test Procedure 5.8.1 available on request
10: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.5.1, 5.6.1
11: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.7.1
12. AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R 020 Version 08 04/13 - issued by ER

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Accreditation Number 2734
Corporate Site Number 2727

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			32	33	34	35	36	37	38	39
DATE TESTED			24/04/2013							
RESULTS										
Hilf Density Ratio	**Standard**	%	**98.5**	**95**	**96**	**98**	**96.5**	**96**	**95.5**	**98**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 0.5**	**+ 1.5**	**+ 1.5**	**+ 0.5**	**0.0**	**0.0**	**+ 0.5**	**0.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	32.84	33.29	33.20	34.21	33.21	33.15	33.63	33.71
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.02	2.04	2.04	2.04	2.02	2.01	2.01	2.04
Field Moisture Content		%	18.5	17.5	18.0	17.0	18.5	17.0	17.5	17.0
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			32	33	34	35	36	37	38	39
Peak Converted Wet Density		t/m³	2.05	2.15	2.13	2.08	2.09	2.09	2.11	2.08
Apparent Optimum Moisture Content			19.0	16.5	16.5	17.0	18.5	17.0	17.0	17.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	2

Notes

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16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			40	41	42	43	44	45	46	
DATE TESTED			29/04/2013							
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**97**	**96.5**	**96.5**	**99**	**100.5**	**104.5**	**101.5**	
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**0.0**	**+ 0.5**	**+ 0.5**	**+ 0.5**	**- 3.0**	**- 2.5**	**- 2.5**	
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	
Reduced Level		m	34.70	35.44	34.91	35.46	34.92	34.50	34.38	
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.05	2.02	2.06	2.07	2.03	2.07	2.05	
Field Moisture Content		%	15.5	15.0	18.0	17.0	14.5	16.0	15.5	
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	
Lab Compaction result from test number			40	41	42	43	44	45	46	
Peak Converted Wet Density		t/m³	2.11	2.09	2.13	2.09	2.02	1.98	2.02	
Apparent Optimum Moisture Content			15.5	14.5	17.5	16.5	17.5	18.5	18.0	
Number of Compaction Points			3	3	3	3	3	3	3	
Test Procedures - See Note Number			12	12	12	12	12	12	12	
Material Description - see below			2	2	2	2	2	2	2	

Notes

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5. SM-Silty sands, sand-silt mixtures
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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			47	48	49	50	51	52		
DATE TESTED			30/04/2013			02/05/2013				
RESULTS										
Hilf Density Ratio	**Standard**	%	**97**	**101**	**98**	**99**	**96.5**	**95.5**		
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**0.0**	**- 1.0**	**- 0.5**	**+ 0.5**	**- 2.0**	**0.0**		
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-		
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-		
Reduced Level		m	34.23	34.02	34.17	33.47	34.06	33.62		
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.04	2.07	2.04	2.02	2.06	2.06		
Field Moisture Content		%	16.0	16.5	17.0	13.5	13.5	13.5		
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%		
Lab Compaction result from test number			47	48	49	50	51	52		
Peak Converted Wet Density		t/m³	2.10	2.05	2.08	2.04	2.13	2.16		
Apparent Optimum Moisture Content			16.5	17.5	17.0	13.0	15.5	13.5		
Number of Compaction Points			3	3	3	3	3	3		
Test Procedures - See Note Number			12	12	12	12	12	12		
Material Description - see below			2	2	2	2	2	2		

Notes

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17. RTA T120, T164, T173

Material Description

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14. RC - Recycled Concrete
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* Cement Stabilised
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Job No: 7508/119
Date: 15/05/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			53	54	55	56	57	58	59	60
DATE TESTED			03/05/2013							
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**96.5**	**97**	**100.5**	**97.5**	**100.5**	**98**	**101.5**	**100**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 0.5**	**+ 0.5**	**+ 0.5**	**- 0.5**	**0.0**	**0.0**	**0.0**	**0.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-1							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	33.05	32.44	32.79	33.60	34.18	33.86	33.39	33.16
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.01	2.03	2.05	2.01	2.10	2.06	2.13	2.07
Field Moisture Content		%	21.0	14.5	14.0	15.0	12.5	12.0	11.5	11.0
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			53	54	55	56	57	58	59	60
Peak Converted Wet Density		t/m³	2.08	2.09	2.04	2.06	2.09	2.10	2.10	2.07
Apparent Optimum Moisture Content			20.5	14.0	13.5	15.5	12.5	11.5	11.5	11.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2-3	2	2	2	1	1	1	1

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14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R 020 Version 08 04/13 - issued by ER

NATA
ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation Number 2734
Corporate Site Number 2727

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A Kench 15/05/2013
Approved Signatory

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GEOTECH TESTING PTY LTD®
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119

Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			61	62	63	64	65	66	67	68
DATE TESTED			6/5/2013				7/5/2013			
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**100**	**101.5**	**99.5**	**105**	**103.5**	**96.5**	**97**	**96**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 2.5**	**- 1.5**	**- 0.5**	**- 2.0**	**0.0**	**+ 0.5**	**0.0**	**0.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage			-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-2							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	33.87	32.85	35.98	35.87	35.88	35.14	36.17	36.49
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.05	2.06	2.03	2.05	2.22	2.07	2.12	2.05
Field Moisture Content		%	18.0	16.5	22.5	21.0	16.5	16.5	19.0	17.0
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			61	62	63	64	65	66	67	68
Peak Converted Wet Density		t/m³	2.05	2.03	2.04	1.95	2.15	2.15	2.18	2.13
Apparent Optimum Moisture Content			20.5	18.0	23.0	22.5	16.5	16.0	19.0	17.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	3	3	2	2	2	2

Notes

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2. Assigned Values have been obtained from our Prestons laboratory – Accreditation No 14234
3. Results have been calculated using infinite decimal places. Therefore, calculated values may vary from those shown
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8. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.5.1, 5.6.1, 5.8.1
9. Full details of Test Procedure 5.8.1available on request
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12. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13. RTA T 111, T 119, T 120, T 166
14. RTA T 111, T 120, T 166, T 173
15. RTA T 120, T 119, T 162
16. RTA T 120, T 162, T 173
17. RTA T 120, T 164, T 173

Material Description

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E van Niekerk 7/6/2013
Approved Signatory

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119

Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			69	70	71	72	73	74	75	76
DATE TESTED			7/5/2013				8/5/2013	9/5/2013		
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**102.5**	**96**	**99.5**	**94**	**90**	**101**	**101.5**	**101**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 2.5**	**+ 0.5**	**0.0**	**+ 0.5**	**0.0**	**0.0**	**0.0**	**- 1.5**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage			-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-2							
Retested by Test			-	-	-	82	83	-	-	-
Reduced Level		m	36.42	36.60	35.79	36.08	31.99	35.53	36.50	36.93
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.03	2.08	2.13	2.02	2.05	2.15	2.17	2.11
Field Moisture Content		%	15.0	16.0	17.5	17.5	17.5	18.5	16.5	15.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			69	70	71	72	73	74	75	76
Peak Converted Wet Density		t/m³	1.98	2.17	2.14	2.15	2.28	2.13	2.14	2.09
Apparent Optimum Moisture Content			17.5	15.5	17.5	17.5	17.5	18.5	16.5	17.0
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	2

Notes

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13. RTA T 111, T 119, T 120, T 166
14. RTA T 111, T 120, T 166, T 173
15. RTA T 120, T 119, T 162
16. RTA T 120, T 162, T 173
17. RTA T 120, T 164, T 173

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119
Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			77	78	79	80	81	82	83	84
DATE TESTED			9/5/2013					16/5/2013		
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**107.5**	**101.5**	**103**	**102**	**104**	**100**	**95.5**	**93.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 4.5**	**+ 0.5**	**0.0**	**- 0.5**	**- 1.5**	**- 2.0**	**+ 0.5**	**+ 0.5**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage			-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-2							
Retested by Test			84	-	-	-	-	-	-	101
Reduced Level		m	36.57	35.17	36.09	36.06	35.36	36.08	31.96	36.57
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.09	2.15	2.23	2.19	2.22	2.10	2.08	2.01
Field Moisture Content		%	14.0	16.5	15.0	13.0	13.5	14.5	15.0	15.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			77	78	79	80	81	82	83	84
Peak Converted Wet Density		t/m³	1.94	2.12	2.16	2.15	2.13	2.10	2.18	2.15
Apparent Optimum Moisture Content			18.5	16.0	15.0	13.5	15.0	16.5	14.5	15.5
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	2

Notes

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14. RTA T111, T120, T166, T173
15. RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
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ST MARYS NSW 1790

Job No: 7508/119

Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			85	86	87	88	89	90	91	92
DATE TESTED			20/5/2013							
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**94**	**96**	**96**	**97.5**	**100.5**	**98.5**	**100.5**	**98**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 2.0**	**0.0**	**- 1.5**	**- 1.5**	**- 2.0**	**0.0**	**0.0**	**0.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage			-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-2							
Retested by Test			102	-	-	-	-	-	-	-
Reduced Level		m	36.52	36.67	37.12	37.44	37.50	37.28	38.83	35.49
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.01	2.03	1.99	1.99	2.08	2.09	2.08	2.08
Field Moisture Content		%	16.0	16.5	15.5	14.5	17.0	17.0	17.5	17.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			85	86	87	88	89	90	91	92
Peak Converted Wet Density		t/m³	2.14	2.11	2.07	2.04	2.07	2.12	2.07	2.12
Apparent Optimum Moisture Content			14.0	16.5	17.0	16.0	19.5	17.5	17.5	17.5
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	2

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14. RTA T 111, T 120, T 166, T 173
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MARYLAND DEVELOPMENT COMPANY PTY LTD
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ST MARYS NSW 1790

Job No: 7508/119

Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER			93	94	95	96	97	98	99	100
DATE TESTED			21/6/2013							
RESULTS										
Hilf Density Ratio	**Standard**	**%**	**98**	**98**	**99**	**99.5**	**98**	**97**	**98.5**	**100**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 0.5**	**+ 0.5**	**+ 0.5**	**- 2.0**	**- 0.5**	**0.0**	**0.0**	**- 1.0**
Specification	**Density Ratio (Standard)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage			-	-	-	-	-	-	-	-
Shown on Drawing No			7508/119-2							
Retested by Test			-	-	-	-	-	-	-	-
Reduced Level		m	35.91	36.15	36.21	34.99	35.78	35.47	35.76	36.16
FIELD & LABORATORY DATA										
Field Wet Density		t/m³	2.01	2.00	2.06	2.03	2.09	2.07	2.09	2.08
Field Moisture Content		%	16.0	15.5	15.5	15.5	15.5	15.0	15.0	14.5
Material retained on	19mm Sieve (wet)	%	<5%	<5%	<5%	<5%	<5%	<5%	<5%	<5%
Lab Compaction result from test number			93	94	95	96	97	98	99	100
Peak Converted Wet Density		t/m³	2.05	2.04	2.08	2.04	2.13	2.13	2.12	2.08
Apparent Optimum Moisture Content			16.5	15.0	15.0	18.0	16.0	15.0	15.0	15.5
Number of Compaction Points			3	3	3	3	3	3	3	3
Test Procedures - See Note Number			12	12	12	12	12	12	12	12
Material Description - see below			2	2	2	2	2	2	2	2

Notes

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14. RTA T 111, T 120, T 166, T 173
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16. RTA T 120, T 162, T 173
17. RTA T 120, T 164, T 173

Material Description

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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R 020 Version 08 04/13 - issued by ER

NATA
ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation Number 2734
Corporate Site Number 2727

E van Niekerk 7/6/2013
Approved Signatory

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GEOTECH TESTING PTY LTD®
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/119

Date: 7/6/2013

PROJECT: SITE FILL TESTING
STAGES 4A & 4B, JORDAN SPRINGS

TEST NUMBER		101	102						
DATE TESTED		31/5/2013							
RESULTS									
Hilf Density Ratio Standard	%	**102**	**99.5**						
Moisture Variation from OMC (-Drier/+Wetter)	%	**- 1.5**	**- 2.0**						
Specification Density Ratio (Standard)		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION									
Chainage		-	-						
Shown on Drawing No		7508/119-2							
Retest of Test		84	85						
Reduced Level	m	36.62	36.49						
FIELD & LABORATORY DATA									
Field Wet Density	t/m³	2.09	2.10						
Field Moisture Content	%	15.5	14.5						
Material retained on 19mm Sieve (wet)	%	<5%	<5%						
Lab Compaction result from test number		101	102						
Peak Converted Wet Density	t/m³	2.05	2.11						
Apparent Optimum Moisture Content		17.0	17.0						
Number of Compaction Points		3	3						
Test Procedures - See Note Number		12	12						
Material Description - see below		2	2						

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Form No R 020 Version 08 04/13 - issued by ER

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E van Niekerk 7/6/2013
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APPENDIX B

SUMMARY OF FIELD DENSITY TESTING FOR ROADWORKS

Report 7508/121-AA
Report 7508/125-AA

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System
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ISO 9001
SAI GLOBAL

Job No: 7508/121
Our Ref: 7508/121-AA
30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 1870
PENRITH NSW 2751

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs - Stage 4A**
Penrith City Council DA 12/0897 - Condition No. 65(f)
Summary of Field Density Testing for Road Works

Geotech Testing Pty Ltd carried out field density tests and associated laboratory compaction tests at the above project to satisfy the following Penrith City Council (PCC) requirement under DA 12/0897.

Condition No. 65(f) - *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*

- *Compaction reports for road pavement construction*
- *Compaction reports for bulk earthworks and lot regrading.*
- *Soil classification for all residential lots*
- *Statement of Compliance*

The tests carried out assessed the degree of compaction in the subgrade and road pavement materials at the above site. All testing was undertaken within the terms of our NATA accreditation, at the dates and to the procedures shown on the attached test results certificates.

Field density tests were generally carried out at approximately 50 metre intervals. At the time of testing, there was no visible indication in the area surrounding each test that the area had been compacted in a manner different from that at the test location. Our observations did not include roller testing of any of the layers.

Laboratory compaction tests were carried out in accordance with AS1289 5.1.1 (Standard Compaction) and AS1289 5.2.1 (Modified Compaction). Where the density test results failed to indicate that the specified minimum dry density ratios (AS1289 5.4.1) had been achieved, the contractor was so advised. After the contractor advised that re-working had been carried out, the failed areas were retested. This process was repeated until the test results met the specification requirements.

7508/121-AA
Stage 4A – Jordan Springs
Summary of Field Density Testing for Road Works

We understand that the specification requirements for this project set by Penrith City Council are as follows.

Basecourse	98%	Modified
Sub-basecourse	95%	Modified
Subgrade	100%	Standard

The test numbers corresponding to the different locations/pavement layers tested are shown below.

ROAD 21							
Ch	**225**	**275**	**325**	**375**	**425**	**460**	
Subgrade	5/8	9	10	97	28	29	
Sub-base 1	20/21	22	23	39	40	53	
Sub-base 2	35/36	37	38	98	99	54	
Base	41/42	43	44	59	60	61	
ROAD 1							
Ch	**25**	**75**	**125**	**175**	**225**	**275**	**325**
Subgrade	30	6	7	1	2	3	4
Sub-base 1	49	24	25	26	27	101	50
Sub-base 2	62/55	63	64	65	66	67	56/68
Base	91	71	45	46	47	48	72
Ch	**375**	**425**	**825**	**875**	**925**	**975**	**1025**
Subgrade	103	102	11	12	13	14	83
Sub-base 1	51	52	75	76	77	78	79
Sub-base 2	57/69	58/70	80	81	82	88	89
Base	73	74	84	85	86	87	90
ROAD 2							
Ch	**15**	**65**	**115**	**165**	**215**		
Subgrade	15	16	17	18	19		
Sub-base	31	32	33	34	100		
Base	92	93	94	95	96		

It is our opinion that the pavement materials have been tested and satisfy the required specifications.

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

Attached Compaction Control Tests Nos 1 to 103

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SAI GLOBAL

FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 11/6/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			1	2	3	4	5	6	7	8
DATE TESTED			01/05/2013				08/05/2013	09/05/2013		13/05/2013
RESULTS										
Density Ratio	**Standard**	%	**106**	**106**	**101.5**	**103**	**105**	**107.5**	**104**	**101.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 3.0**	**- 3.5**	**- 0.5**	**- 2.0**	**- 0.5**	**- 3.0**	**- 1.5**	**- 2.5**
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	175	225	275	325	225	75	125	275
Road Name/Number			Road 1				Road 21	Road 1		Road 21
Retested by test			-	-	-	-	-	-	-	-
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.83	1.78	1.80	1.78	1.98	1.95	1.98	1.96
Field Moisture Content		%	16.0	16.9	16.9	16.6	13.3	12.1	12.8	10.5
Material retained on	19 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Lab compaction result from test number			1	2	3	4	5	6	7	8
Maximum Dry Density		t/m³	1.73	1.68	1.77	1.73	1.89	1.81	1.90	1.93
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	19.0	20.5	17.5	18.5	14.0	15.0	14.5	13.0
Test Procedures - See Notes			6	6	6	6	6	6	6	6
Material Description - see below			2	2	2-3	2	2	2	2	1-2

Notes

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18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
\# Lime Stabilised
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Form No R022 Version 18 03/13 - issued by ER

NATA
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Accreditation Number 2734
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 11/6/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			9	10	11	12	13	14	15	16
DATE TESTED			13/05/2013		15/05/2013				16/05/2013	
RESULTS										
Density Ratio	**Standard**	**%**	**109.5**	**108**	**110**	**108**	**109.5**	**110**	**107.5**	**104.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 6.0**	**- 5.0**	**- 5.5**	**- 3.5**	**- 4.5**	**- 4.0**	**- 4.5**	**- 4.0**
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	325	375	825	875	925	975	15	65
Road Name/Number			Road 21		Road 1				Road 2	
Retested by test			-	-	-	-	-	-	-	-
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.93	1.98	1.87	1.90	1.99	1.98	1.95	1.91
Field Moisture Content		%	10.7	10.4	15.6	14.3	11.4	12.0	11.0	12.2
Material retained on	19 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Lab compaction result from test number			9	10	11	12	13	14	15	16
Maximum Dry Density		t/m³	1.76	1.83	1.70	1.76	1.82	1.80	1.81	1.83
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	16.5	15.5	21.0	18.0	16.0	16.0	15.5	16.0
Test Procedures - See Notes			6	6	6	6	6	6	6	6
Material Description - see below			2	2	3	2	2	2	2	2

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FIELD DENSITY RESULTS

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C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 11/6/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			17	18	19					
DATE TESTED			16/05/2013							
RESULTS										
Density Ratio	**Standard**	**%**	**105.5**	**106**	**107**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 4.0**	**- 3.5**	**- 2.5**					
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	115	165	215					
Road Name/Number			Road 2							
Retested by test			-	-	-					
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.91	1.93	1.95					
Field Moisture Content		%	11.9	11.9	13.0					
Material retained on	19 mm Sieve	%	<5	<5	<5					
Lab compaction result from test number			17	18	19					
Maximum Dry Density		t/m³	1.81	1.82	1.82					
Number of Compaction Points			4	4	4					
Optimum Moisture Content		%	16.0	15.5	15.5					
Test Procedures - See Notes			6	6	6					
Material Description - see below			2	2	2					

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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
\# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 03/13 - issued by ER

NATA
ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation Number 2734
Corporate Site Number 2727

E van Niekerk 11/6/2013
Approved Signatory

Head Office:
34 Borec Road, Penrith NSW 2750
P O Box 880 Penrith NSW 2751
Telephone: (02) 4722 2744 Facsimile: (02) 4722 2777
email: info@geotech.com.au www.geotech.com.au

Prestons Laboratory:
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GEOTECH TESTING PTY LTD®
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 11/6/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			20	21	22	23	24	25	26	27
DATE TESTED			16/05/2013				21/05/2013			
RESULTS										
Density Ratio	**Modified**	%	**100**	**97**	**99.5**	**97**	**99**	**97.5**	**100**	**98**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 1.0**	**- 1.0**	**- 1.5**	**- 1.0**	**+ 0.5**	**- 0.5**	**- 1.0**	**+ 1.0**
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	225 L	275 R	325	375	75	125	175	225
Road Name/Number			Road 21				Road 1			
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1				Sub-base			
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.18	2.11	2.17	2.12	2.16	2.13	2.18	2.14
Field Moisture Content		%	5.4	5.6	5.2	5.7	7.1	5.9	5.3	7.3
Material retained on	37.5 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-35							
Maximum Dry Density		t/m³	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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6. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
8. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.5.1, 5.6.1, 5.8.1
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12. AS 1289 1.2.1clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13. RTA T 111, T 119, T 120, T 166
14. RTA T 111, T 120, T 166, T 173
15. RTA T 120, T 119, T 162
16. RTA T 120, T 162, T 173
17. RTA T 120, T 164, T 173

Material Description

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2. Cl-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
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* Cement Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 11/6/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			28	29					
DATE TESTED			27/05/2013						
RESULTS									
Density Ratio	**Standard**	%	**102**	**105.5**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**+ 1.5**	**- 1.0**					
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	225 R	375					
Road Name/Number			Road 21	Road 1					
Retested by test			-	-					
Level			Subgrade						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	1.82	1.85					
Field Moisture Content		%	17.3	16.4					
Material retained on	19 mm Sieve	%	<5	<5					
Lab compaction result from test number			28	29					
Maximum Dry Density		t/m³	1.78	1.75					
Number of Compaction Points			4	4					
Optimum Moisture Content		%	16.0	17.5					
Test Procedures - See Notes			6	6					
Material Description - see below			2	2					

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6: AS 1289 12.1clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7: AS 1289 12.1clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
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12: AS 1289 12.1clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13: RTA T 111, T 119, T 120, T 166
14: RTA T 111, T 120, T 166, T 173
15: RTA T 120, T 119, T 162
16: RTA T 120, T 162, T 173
17: RTA T 120, T 164, T 173

Material Description

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7. SP-Sand, crushed dust, filling sand, washed sand
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9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
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18. RSS - Ripped Sandstone
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# Lime Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 03/07/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			30							
DATE TESTED			30/05/2013							
RESULTS										
Density Ratio	**Standard**	**%**	**106**							
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 2.0**							
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	25							
Road Name/Number			Road 1							
Retested by test			-							
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.90							
Field Moisture Content		%	14.0							
Material retained on	19 mm Sieve	%	<5							
Lab compaction result from test number			30							
Maximum Dry Density		t/m³	1.79							
Number of Compaction Points			4							
Optimum Moisture Content		%	16.0							
Test Procedures - See Notes			6							
Material Description - see below			2							

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9: Full details of Test Procedure 5.8.1 available on request
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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
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18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
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$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
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Corporate Site Number 2727

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A Kench 03/07/2013

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 03/07/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			31	32	33	34	35	36	37	38
DATE TESTED			31/05/2013							
RESULTS										
Density Ratio	**Modified**	**%**	**98**	**97**	**97.5**	**98.5**	**100.5**	**101**	**99.5**	**99**
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 1.0**	**+ 1.0**	**+ 0.5**	**+ 0.5**	**0.0**	**- 0.5**	**0.0**	**- 1.0**
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	15	65	115	165	225 L	225 R	275	325
Road Name/Number			Road 2				Road 21			
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1				Sub-base Layer 2			
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.20	2.17	2.18	2.21	2.19	2.20	2.17	2.16
Field Moisture Content		%	6.8	6.6	6.3	6.3	6.7	6.2	6.5	5.4
Material retained on	37.5 mm Sieve	%	16	15	15	15	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-35							
Corrected Maximum Dry Density		t/m³	2.24	2.24	2.24	2.24	2.18	2.18	2.18	2.18
Number of Compaction Points			4	4	4	4	4	4	4	4
Corrected Optimum Moisture Content		%	5.5	5.5	5.5	5.5	6.50	6.50	6.50	6.50
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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11: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.7.1
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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
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16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
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MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 03/07/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			39	40						
DATE TESTED			04/06/2013							
RESULTS										
Density Ratio	**Modified**	**%**	**100**	**100**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 1.0**	**- 0.5**						
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	375	425						
Road Name/Number			Road 21							
Retested by test			-	-						
Level			Sub-base Layer 1							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.18	2.18						
Field Moisture Content		%	5.7	6.2						
Material retained on	37.5 mm Sieve	%	<5	<5						
Assigned Value Number			HQW75CSS-35							
Maximum Dry Density		t/m³	2.18	2.18						
Number of Compaction Points			4	4						
Optimum Moisture Content		%	6.5	6.5						
Test Procedures - See Notes			7	7						
Material Description - see below			17	17						

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9: Full details of Test Procedure 5.8.1 available on request
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11: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.7.1
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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/121
Date: 03/07/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			41	42	43	44			
DATE TESTED			21/06/2013						
RESULTS									
Density Ratio	**Modified**	**%**	**100**	**98**	**100**	**98**			
Moisture Variation from OMC (-Drier/+Wetter)		**%**	**- 1.0**	**- 0.5**	**- 1.5**	**- 1.0**			
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	225 L	225 R	275	325			
Road Name/Number			Road 21						
Retested by test			-	-	-	-			
Level			Basecourse						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.25	2.22	2.27	2.26			
Field Moisture Content		%	4.4	5.8	4.7	4.7			
Material retained on	19 mm Sieve	%	<5	<5	<5	<5			
Lab compaction result from test number			41	42	43	44			
Maximum Dry Density		t/m³	2.25	2.27	2.27	2.31			
Number of Compaction Points			4	4	4	4			
Optimum Moisture Content		%	5.5	6.5	6.0	5.5			
Test Procedures - See Notes			7	7	7	7			
Material Description - see below			8	8	8	8			

Notes

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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 03/07/2013

Approved Signatory

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			45	46	47	48			
DATE TESTED			02/07/2013						
RESULTS									
Density Ratio	**Modified**	%	**99**	**99**	**99.5**	**98**			
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**+ 0.5**	**+ 0.5**	**- 0.5**	**0.0**			
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	75	125	175	225			
Road Name/Number			Road 1						
Retested by test			-	-	-	-			
Level			Basecourse						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.21	2.21	2.22	2.19			
Field Moisture Content		%	6.3	6.3	5.5	6.2			
Material retained on	19 mm Sieve	%	<5	<5	<5	<5			
Assigned Value Number			MDGB20-16						
Maximum Dry Density		t/m³	2.23	2.23	2.23	2.23			
Number of Compaction Points			4	4	4	4			
Optimum Moisture Content		%	6.0	6.0	6.0	6.0			
Test Procedures - See Notes			7	7	7	7			
Material Description - see below			8	8	8	8			

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14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			49	50	51	52	53	54	55	56
DATE TESTED			03/07/2013							
RESULTS										
Density Ratio	**Modified**	%	**95.5**	**96.5**	**96**	**97.5**	**97**	**96**	**96.5**	**95**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**+ 1.0**	**0.0**	**+ 0.5**	**- 1.0**	**+ 1.0**	**- 1.0**	**0.0**	**+ 1.5**
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	25	325	375	425	460	460	25	325
Road Name/Number			Road 1				Road 21		Road 2	
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1				Sub-base Layer 2			
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.09	2.11	2.10	2.13	2.12	2.10	2.11	2.08
Field Moisture Content		%	7.3	6.6	6.8	5.7	7.3	5.7	6.7	8.1
Material retained on	37.5 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-36							
Maximum Dry Density		t/m³	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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17. RTA T120, T164, T173

Material Description

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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

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C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			57	58						
DATE TESTED			03/07/2013							
RESULTS										
Density Ratio	**Modified**	**%**	**97.5**	**96**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 1.0**	**0.0**						
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	375	425						
Road Name/Number			Road 2							
Retested by test			-	-						
Level			Sub-base Layer 2							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.13	2.10						
Field Moisture Content		%	5.4	6.6						
Material retained on	37.5 mm Sieve	%	<5	<5						
Assigned Value Number			HQW75CSS-36							
Maximum Dry Density		t/m³	2.19	2.19						
Number of Compaction Points			4	4						
Optimum Moisture Content		%	6.5	6.5						
Test Procedures - See Notes			7	7						
Material Description - see below			17	17						

Notes

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Material Description

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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

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ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			59	60	61					
DATE TESTED			05/07/2013							
RESULTS										
Density Ratio	**Modified**	**%**	**101**	**101**	**101**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 0.5**	**+ 1.5**	**+ 0.5**					
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	375	425	460					
Road Name/Number			Road 21							
Retested by test			-	-	-					
Level			Basecourse							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.25	2.25	2.25					
Field Moisture Content		%	6.5	7.4	6.6					
Material retained on	19 mm Sieve	%	<5	<5	<5					
Assigned Value Number			MDGB20-16							
Maximum Dry Density		t/m³	2.23	2.23	2.23					
Number of Compaction Points			4	4	4					
Optimum Moisture Content		%	6.0	6.0	6.0					
Test Procedures - See Notes			7	7	7					
Material Description - see below			8	8	8					

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ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			62	63	64	65	66	67	68	69
DATE TESTED			15/07/2013				16/07/2013			
RESULTS										
Density Ratio	**Modified**	%	**97**	**98.5**	**98**	**96**	**95.5**	**97**	**97**	**97**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**+ 1.5**	**0.0**	**- 0.5**	**+ 1.0**	**+ 1.0**	**+ 0.5**	**0.0**	**+ 1.0**
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	25	75	125	175	225	275	325	375
Road Name/Number			Road 1							
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 2							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.12	2.15	2.14	2.09	2.08	2.11	2.12	2.11
Field Moisture Content		%	8.1	6.5	6.1	7.7	7.5	7.1	6.7	7.6
Material retained on	37.5 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-37							
Maximum Dry Density		t/m³	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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5. SM-Silty sands, sand-silt mixtures
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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
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12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 06/08/2013

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			70						
DATE TESTED			16/07/2013						
RESULTS									
Density Ratio	**Modified**	**%**	**97**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 1.0**						
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	425						
Road Name/Number			Road 1						
Retested by test			-						
Level			Sub-base Layer 2						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.11						
Field Moisture Content		%	7.6						
Material retained on	37.5 mm Sieve	%	<5						
Assigned Value Number			HQW75CSS-37						
Maximum Dry Density		t/m³	2.18						
Number of Compaction Points			4						
Optimum Moisture Content		%	6.5						
Test Procedures - See Notes			7						
Material Description - see below			17						

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# Lime Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			71	72	73	74			
DATE TESTED			16/07/2013						
RESULTS									
Density Ratio	**Modified**	%	**102**	**102**	**98**	**98**			
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**0.0**	**- 0.5**	**- 0.5**	**- 1.0**			
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	25	325	375	425			
Road Name/Number			Road 1						
Retested by test			-	-	-	-			
Level			Basecourse						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.27	2.28	2.18	2.19			
Field Moisture Content		%	5.9	5.4	5.5	5.0			
Material retained on	19 mm Sieve	%	<5	<5	<5	<5			
Assigned Value Number			MDGB20-16						
Maximum Dry Density		t/m³	2.23	2.23	2.23	2.23			
Number of Compaction Points			4	4	4	4			
Optimum Moisture Content		%	6.0	6.0	6.0	6.0			
Test Procedures - See Notes			7	7	7	7			
Material Description - see below			8	8	8	8			

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9. DGB40
10. DGS20
11. DGS40
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13. FCR40
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15. Recycled Roadbase
16. RSB - Recycled Sub-base
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FIELD DENSITY RESULTS

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C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			75	76	77	78	79	80	81	82
DATE TESTED			19/07/2013							
RESULTS										
Density Ratio	**Modified**	%	**97.5**	**96**	**96**	**97.5**	**97.5**	**97**	**98**	**96.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**+ 1.0**	**0.0**	**+ 1.0**	**+ 1.0**	**+ 1.0**	**0.0**	**+ 0.5**	**- 0.5**
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	825	875	925	975	1025	825	875	925
Road Name/Number			Road 1							
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1					Sub-base Layer 2		
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.13	2.09	2.09	2.13	2.13	2.11	2.14	2.10
Field Moisture Content		%	7.3	6.5	7.4	7.4	7.5	6.4	6.9	6.2
Material retained on	37.5 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-37							
Maximum Dry Density		t/m³	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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Material Description

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8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
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FIELD DENSITY RESULTS

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C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER		83							
DATE TESTED		26/07/2013							
RESULTS									
Density Ratio	**Standard**	**%**	**107.5**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 8.0**						
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	1025						
Road Name/Number			Road 1						
Retested by test			-						
Level			Subgrade						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	1.87						
Field Moisture Content		%	7.3						
Material retained on	19 mm Sieve	%	<5						
Lab compaction result from test number			83						
Maximum Dry Density		t/m³	1.74						
Number of Compaction Points			4						
Optimum Moisture Content		%	15.5						
Test Procedures - See Notes			6						
Material Description - see below			2						

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ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			84	85	86	87			
DATE TESTED			26/07/2013						
RESULTS									
Density Ratio	**Modified**	%	**101.5**	**102**	**99.5**	**99**			
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 0.5**	**- 1.0**	**- 1.5**	**0.0**			
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	825	875	925	975			
Road Name/Number			Road 1						
Retested by test			-	-	-	-			
Level			Basecourse						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.26	2.27	2.22	2.21			
Field Moisture Content		%	5.5	5.0	4.7	5.9			
Material retained on	19 mm Sieve	%	<5	<5	<5	<5			
Assigned Value Number			MDGB20-16						
Maximum Dry Density		t/m³	2.23	2.23	2.23	2.23			
Number of Compaction Points			4	4	4	4			
Optimum Moisture Content		%	6.0	6.0	6.0	6.0			
Test Procedures - See Notes			7	7	7	7			
Material Description - see below			8	8	8	8			

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9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 06/08/2013

Approved Signatory

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GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System
Quality
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			88	89	90					
DATE TESTED			31/07/2013							
RESULTS										
Density Ratio	**Modified**	%	**98**	**100**	**102**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**0.0**	**0.0**	**- 1.0**					
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	925	975	1025					
Road Name/Number			Road 1							
Retested by test			-	-	-					
Level			Sub-base Layer 1	Sub-base Layer 2						
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.14	2.18	2.22					
Field Moisture Content		%	6.7	6.3	5.3					
Material retained on	37.5 mm Sieve	%	<5	<5	<5					
Assigned Value Number			HQW75CSS-37							
Maximum Dry Density		t/m³	2.18	2.18	2.18					
Number of Compaction Points			4	4	4					
Optimum Moisture Content		%	6.5	6.5	6.5					
Test Procedures - See Notes			7	7	7					
Material Description - see below			17	17	17					

Notes

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14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 29/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			91	92	93	94	95	96		
DATE TESTED			06/08/2013							
RESULTS										
Density Ratio	**Modified**	%	**100**	**101**	**101**	**99.5**	**100.5**	**102.5**		
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**0.0**	**+ 1.0**	**0.0**	**+ 2.0**	**0.0**	**- 1.5**		
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	1025	15	65	115	165	215		
Road Name/Number			Road 1	Road 2						
Retested by test			-	-	-	-	-	-		
Level			Basecourse							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.23	2.25	2.25	2.22	2.24	2.29		
Field Moisture Content		%	6.2	6.8	5.9	7.8	5.8	4.4		
Material retained on	19 mm Sieve	%	<5	<5	<5	<5	<5	<5		
Assigned Value Number			MDGB20-16							
Maximum Dry Density		t/m³	2.23	2.23	2.23	2.23	2.23	2.23		
Number of Compaction Points			4	4	4	4	4	4		
Optimum Moisture Content		%	6.0	6.0	6.0	6.0	6.0	6.0		
Test Procedures - See Notes			7	7	7	7	7	7		
Material Description - see below			8	8	8	8	8	8		

Notes

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14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 29/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			97						
DATE TESTED			07/08/2013						
RESULTS									
Density Ratio	**Standard**	**%**	**106.5**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 2.5**						
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	375						
Road Name/Number			Road 21						
Retested by test			-						
Level			Subgrade						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	1.84						
Field Moisture Content		%	16.3						
Material retained on	19 mm Sieve	%	<5						
Lab compaction result from test number			97						
Maximum Dry Density		t/m³	1.73						
Number of Compaction Points			4						
Optimum Moisture Content		%	19.0						
Test Procedures - See Notes			6						
Material Description - see below			2						

Notes

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16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 29/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			98	99	100	101	102			
DATE TESTED			07/08/2013							
RESULTS										
Density Ratio	**Modified**	%	**96.5**	**95.5**	**97.5**	**96**	**95.5**			
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**0.0**	**+ 0.5**	**+ 0.5**	**+ 1.5**	**+ 2.0**			
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	375	425	215	275	425			
Road Name/Number			Road 21		Road 2	Road 1				
Retested by test			-	-	-	-	-			
Level			Sub-base Layer 2		Sub-base Layer 1					
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.10	2.08	2.13	2.09	2.08			
Field Moisture Content		%	6.7	6.8	7.1	7.8	8.3			
Material retained on	37.5 mm Sieve	%	<5	<5	<5	<5	<5			
Assigned Value Number			HQW75CSS-37							
Maximum Dry Density		t/m³	2.18	2.18	2.18	2.18	2.18			
Number of Compaction Points			4	4	4	4	4			
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5			
Test Procedures - See Notes			7	7	7	7	7			
Material Description - see below			17	17	17	17	17			

Notes

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14: RTA T111, T120, T166, T173
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Material Description

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2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
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17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
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# Lime Stabilised
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ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/121
Date: 29/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			103						
DATE TESTED			07/08/2013						
RESULTS									
Density Ratio	**Standard**	%	**104.5**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 1.0**						
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	375						
Road Name/Number			Road 1						
Retested by test			-						
Level			Subgrade						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	1.85						
Field Moisture Content		%	16.3						
Material retained on	19 mm Sieve	%	<5						
Lab compaction result from test number			103						
Maximum Dry Density		t/m³	1.77						
Number of Compaction Points			4						
Optimum Moisture Content		%	17.5						
Test Procedures - See Notes			6						
Material Description - see below			2						

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Job No: 7508/125
Our Ref: 7508/125-AA
30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 1870
PENRITH NSW 2751

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs - Stage 4B**
Penrith City Council DA 12/0897 - Condition No. 65(f)
Summary of Field Density Testing for Road Works

Geotech Testing Pty Ltd carried out field density tests and associated laboratory compaction tests at the above project to satisfy the following Penrith City Council (PCC) requirement under DA 12/0897.

Condition No. 65(f) - *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*

- *Compaction reports for road pavement construction*
- *Compaction reports for bulk earthworks and lot regrading.*
- *Soil classification for all residential lots*
- *Statement of Compliance*

The tests carried out assessed the degree of compaction in the subgrade and road pavement materials at the above site. All testing was undertaken within the terms of our NATA accreditation, at the dates and to the procedures shown on the attached test results certificates.

Field density tests were generally carried out at approximately 50 metre intervals. At the time of testing, there was no visible indication in the area surrounding each test that the area had been compacted in a manner different from that at the test location. Our observations did not include roller testing of any of the layers.

Laboratory compaction tests were carried out in accordance with AS1289 5.1.1 (Standard Compaction) and AS1289 5.2.1 (Modified Compaction). Where the density test results failed to indicate that the specified minimum dry density ratios (AS1289 5.4.1) had been achieved, the contractor was so advised. After the contractor advised that re-working had been carried out, the failed areas were retested. This process was repeated until the test results met the specification requirements.

7508/125-AA
Stage 4B – Jordan Springs
Summary of Field Density Testing for Road Works

We understand that the specification requirements for this project set out by Penrith City Council are as follows.

Basecourse	98%	Modified
Sub-basecourse	95%	Modified
Subgrade	100%	Standard

The test numbers corresponding to the different locations/pavement layers tested are shown below.

ROAD 1							
Ch	**475**	**525**	**575**	**625**	**675**	**725**	**775**
Subgrade	1	2	3	4	5	6	7
Sub-base 1	12	13	14	15	16	17	18
Sub-base 2	23	24	25	26	27	28	29
Base	35	36	37	38	39	40	41

ROAD 3				
Ch	**15**	**65**	**115**	**165**
Subgrade	8	9	10	11
Sub-base 1	19	20	21	22
Base	31	32	33	34

ROAD 4	
Ch	**15**
Subgrade	30
Sub-base 1	42
Base	43

It is our opinion that the pavement materials have been tested and satisfy the required specifications.

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

Attached Compaction Control Tests Nos 1 to 43

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/125
Date: 28/05/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			1	2	3	4	5	6	7	8
DATE TESTED			10/05/2013				14/05/2013			
RESULTS										
Density Ratio	**Standard**	%	**105.5**	**103.5**	**105**	**102**	**107.5**	**105.5**	**104.5**	**102.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 2.5**	**- 2.5**	**- 2.0**	**+ 1.0**	**- 2.0**	**- 1.5**	**- 2.0**	**0.0**
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	475	525	575	625	675	725	775	15
Road Name/Number			Road 1							Road 3
Retested by test			-	-	-	-	-	-	-	-
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.99	1.99	1.97	1.94	1.91	1.96	1.96	1.96
Field Moisture Content		%	11.9	13.5	13.0	13.4	14.6	12.3	12.1	14.5
Material retained on	19 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Lab compaction result from test number			1	2	3	4	5	6	7	8
Maximum Dry Density		t/m³	1.89	1.92	1.88	1.90	1.78	1.86	1.88	1.91
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	14.5	16.0	15.0	12.5	16.5	14.0	14.0	14.5
Test Procedures - See Notes			6	6	6	6	6	6	6	6
Material Description - see below			2	2	2	1	2	2	2	2

Notes

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17. RTA T120, T164, T173

Material Description

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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 03/13 - issued by ER

NATA
ACCREDITED FOR TECHNICAL COMPETENCE
Accreditation Number 2734
Corporate Site Number 2727

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A Kench 28/05/2013
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/125
Date: 28/05/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			9							
DATE TESTED			14/05/2013							
RESULTS										
Density Ratio	**Standard**	**%**	**100.5**							
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 0.5**							
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	65							
Road Name/Number			Road 3							
Retested by test			-							
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.94							
Field Moisture Content		%	13.4							
Material retained on	19 mm Sieve	%	<5							
Lab compaction result from test number			9							
Maximum Dry Density		t/m³	1.93							
Number of Compaction Points			4							
Optimum Moisture Content		%	14.0							
Test Procedures - See Notes			6							
Material Description - see below			2							

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17. RTA T120, T164, T173

Material Description

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7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
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16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			10	11						
DATE TESTED			27/05/2013							
RESULTS										
Density Ratio	**Standard**	%	**103.5**	**100.5**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 1.0**	**+ 1.5**						
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	119	165						
Road Name/Number			Road 3	Road 3						
Retested by test			-	-						
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.85	1.80						
Field Moisture Content		%	15.8	16.9						
Material retained on	19 mm Sieve	%	<5	<5						
Test Number			10	11						
Maximum Dry Density		t/m³	1.79	1.79						
Number of Compaction Points			4	4						
Optimum Moisture Content		%	17.0	15.5						
Test Procedures - See Notes			6	6						
Material Description - see below			2	2						

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16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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9. DGB40
10. DGS20
11. DGS40
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13. FCR40
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18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
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Form No R022 Version 18 06/13 - issued by ER

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			12	13	14	15	16	17	18	19
DATE TESTED			20/06/2013							
RESULTS										
Density Ratio	Modified	%	97	97	95	97.5	98	99	97	97.5
Moisture Variation from OMC	(-Drier/+Wetter)	%	+ 0.5	+ 1.0	+ 1.5	0.0	0.0	- 0.5	- 0.5	0.0
Specification	Density Ratio (Modified)		≥95%	Specification Moisture Variance from OMC						N/A%
TEST LOCATION										
Chainage	(Carriageway L/R)	m	475	525	575	625	675	725	775	15
Road Name/Number			Road 1							Road 3
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.12	2.12	2.08	2.13	2.15	2.17	2.12	2.14
Field Moisture Content		%	7.0	7.5	8.0	6.4	6.6	5.8	5.8	6.4
Material retained on	37.5mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-36							
Maximum Dry Density		t/m³	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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8. DGB20
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12. FCR20
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			20	21	22	23	24	25	26	27
DATE TESTED			20/06/2013			22/07/2013				
RESULTS										
Density Ratio	Modified	%	100.5	99	98.5	97.5	96.5	95.5	97	97
Moisture Variation from OMC	(-Drier/+Wetter)	%	- 1.5	- 1.0	- 1.0	+ 1.0	+ 2.0	+ 1.5	+ 1.0	+ 1.0
Specification	Density Ratio (Modified)		≥95%	Specification Moisture Variance from OMC						N/A%
TEST LOCATION										
Chainage	(Carriageway L/R)	m	65	115	165	475	525	575	625	675
Road Name/Number			Road 3			Road 1				
Retested by test			-	-	-	-	-	-	-	-
Level			Sub-base Layer 1			Sub-base Layer 2				
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.20	2.17	2.16	2.13	2.10	2.08	2.12	2.12
Field Moisture Content		%	4.8	5.3	5.7	7.4	8.6	8.1	7.4	7.4
Material retained on	37.5mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			HQW75CSS-36			HQW75CSS-37				
Maximum Dry Density		t/m³	2.19	2.19	2.19	2.18	2.18	2.18	2.18	2.18
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			17	17	17	17	17	17	17	17

Notes

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12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 06/08/2013

Approved Signatory

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			28	29					
DATE TESTED			22/07/2013						
RESULTS									
Density Ratio	**Modified**	**%**	**98.5**	**96.5**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 0.5**	**0.0**					
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	725	775					
Road Name/Number			Road 1						
Retested by test			-	-					
Level			Sub-base Layer 2						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.15	2.10					
Field Moisture Content		%	7.1	6.7					
Material retained on	37.5mm Sieve	%	<5	<5					
Assigned Value Number			HQW75CSS-37						
Maximum Dry Density		t/m³	2.18	2.18					
Number of Compaction Points			4	4					
Optimum Moisture Content		%	6.5	6.5					
Test Procedures - See Notes			7	7					
Material Description - see below			17	17					

Notes

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6: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
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9: Full details of Test Procedure 5.8.1 available on request
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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			30							
DATE TESTED			26/07/2013							
RESULTS										
Density Ratio	**Standard**	**%**	**108.5**							
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 4.5**							
Specification	**Density Ratio (Standard)**		**≥100%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	20							
Road Name/Number			Road 4							
Retested by test			-							
Level			Subgrade							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.93							
Field Moisture Content		%	9.3							
Material retained on	19 mm Sieve	%	<5							
Test Number			30							
Maximum Dry Density		t/m³	1.78							
Number of Compaction Points			4							
Optimum Moisture Content		%	14.0							
Test Procedures - See Notes			6							
Material Description - see below			1-2							

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15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			31	32	33	34	35	36	37	38
DATE TESTED			26/07/2013							
RESULTS										
Density Ratio	**Modified**	%	**101.5**	**100**	**100**	**102.5**	**99.5**	**102**	**102.5**	**101.5**
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 0.5**	**- 0.5**	**- 1.0**	**- 1.0**	**- 0.5**	**- 2.0**	**- 1.5**	**- 1.5**
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	15	65	115	165	475	525	575	625
Road Name/Number			Road 3				Road 1			
Retested by test			-	-	-	-	-	-	-	-
Level			Basecourse							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.26	2.23	2.23	2.29	2.22	2.27	2.29	2.26
Field Moisture Content		%	5.4	5.4	4.8	5.0	5.5	4.2	4.6	4.6
Material retained on	19 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			MDGB20-16							
Maximum Dry Density		t/m³	2.23	2.23	2.23	2.23	2.23	2.23	2.23	2.23
Number of Compaction Points			4	4	4	4	4	4	4	4
Optimum Moisture Content		%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Test Procedures - See Notes			7	7	7	7	7	7	7	7
Material Description - see below			8	8	8	8	8	8	8	8

Notes

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16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			39	40	41					
DATE TESTED			29/07/2013							
RESULTS										
Density Ratio	**Modified**	%	**102**	**100.5**	**102.5**					
Moisture Variation from OMC	**(-Drier/+Wetter)**	%	**- 0.5**	**- 0.5**	**- 1.5**					
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	675	725	775					
Road Name/Number			Road 1							
Retested by test			-	-	-					
Level			Basecourse							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.27	2.24	2.29					
Field Moisture Content		%	5.4	5.6	4.5					
Material retained on	19 mm Sieve	%	<5	<5	<5					
Assigned Value Number			MDGB20-16							
Maximum Dry Density		t/m³	2.23	2.23	2.23					
Number of Compaction Points			4	4	4					
Optimum Moisture Content		%	6.0	6.0	6.0					
Test Procedures - See Notes			7	7	7					
Material Description - see below			8	8	8					

Notes

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9: Full details of Test Procedure 5.8.1 available on request
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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
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FIELD DENSITY RESULTS

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ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 06/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			42						
DATE TESTED			31/07/2013						
RESULTS									
Density Ratio	**Modified**	**%**	**97**						
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**+ 1.0**						
Specification	**Density Ratio (Modified)**		**≥95%**	**Specification Moisture Variance from OMC**					**N/A%**
TEST LOCATION									
Chainage	(Carriageway L/R)	m	20						
Road Name/Number			Road 4						
Retested by test			-						
Level			Sub-base						
FIELD & LABORATORY DATA									
Field Dry Density		t/m³	2.12						
Field Moisture Content		%	7.4						
Material retained on	37.5mm Sieve	%	<5						
Assigned Value Number			HQW75CSS-37						
Maximum Dry Density		t/m³	2.18						
Number of Compaction Points			4						
Optimum Moisture Content		%	6.5						
Test Procedures - See Notes			7						
Material Description - see below			17						

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/125
Date: 29/08/2013

PROJECT: PAVEMENT TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER			43							
DATE TESTED			06/08/2013							
RESULTS										
Density Ratio	**Modified**	**%**	**102**							
Moisture Variation from OMC	**(-Drier/+Wetter)**	**%**	**- 0.5**							
Specification	**Density Ratio (Modified)**		**≥98%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	20							
Road Name/Number			Road 4							
Retested by test			-							
Level			Basecourse							
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	2.27							
Field Moisture Content		%	5.7							
Material retained on	19 mm Sieve	%	<5							
Assigned Value Number			MDGB20-16							
Maximum Dry Density		t/m³	2.23							
Number of Compaction Points			4							
Optimum Moisture Content		%	6.0							
Test Procedures - See Notes			7							
Material Description - see below			8							

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13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
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4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 29/08/2013

Approved Signatory

Head Office:
34 Borec Road, Penrith NSW 2750
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email: info@geotech.com.au www.geotech.com.au

APPENDIX C

SUMMARY OF PIPELINE BACKFILL TESTING

Report 7508/122-AA
Report 7508/126-AA

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System
Quality
ISO 9001
SAI GLOBAL

Job No: 7508/122
Our Ref: 7508/122-AA
30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs – Stage 4A**
Penrith City Council DA 12/0897
Summary of Pipeline Backfill Testing

As requested, Geotech Testing Pty Ltd carried out field density tests and associated laboratory compaction tests in order to assess the degree of compaction during backfill operations of open trenches in accordance with Council's Design Guidelines and Construction Specification. All testing was undertaken within the terms of our NATA accreditation, at the dates and to the procedures shown on the test results sheets.

Field density tests were generally carried out at approximately 50m intervals, and individual test results provided on the attached test result sheets.

Laboratory compaction tests were carried out in accordance with AS1289 5.5.1 (Density Index) and the results exceeded the specification requirements.

As at 29 August 2013, backfill operations were completed for Roads 1, 2 & 21.

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

Attached Compaction Control Test Nos 1 to 38

Head Office:
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GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System Quality ISO 9001 SAI GLOBAL

FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/122
Date: 28/6/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER		1	2	3	4	5	6	7	8
DATE TESTED		27/5/2013							
RESULTS									
Density Index	%	**76**	**73**	**84**	**84**	**71**	**76**	**81**	**79**
Moisture Variation from OMC (-Drier/+Wetter)	%	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Specification	**Density Ratio (Density Inde**	**≥70%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION									
Chainage	m	45	95	145	195	245	295	345	395
Road Name/Number		Road No 1							
Retested by test		-	-	-	-	-	-	-	-
Level	m	Bedding							
FIELD & LABORATORY DATA									
Field Dry Density	t/m³	1.55	1.54	1.58	1.58	1.53	1.55	1.57	1.56
Field Moisture Content	%	11.6	9.7	10.9	10.0	10.1	12.9	15.1	11.1
Material retained on 4.75 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number		JSBS10							
Corrected Maximum Dry Density	t/m³	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Mould Size (Litre)		1	1	1	1	1	1	1	1
Minimum Dry Density	t/m3	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Test Procedures - See Notes		8	8	8	8	8	8	8	8
Material Description - see below		7	7	7	7	7	7	7	7

Notes

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18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
\# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

E van Niekerk 28/6/2013

Approved Signatory

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Certified System Quality ISO 9001 SAI GLOBAL

FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/122
Date: 28/6/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER		9	10	11	12	13	14	15	16
DATE TESTED		29/5/2013							
RESULTS									
Density Index	%	**84**	**91**	**76**	**86**	**91**	**100**	**79**	**73**
Moisture Variation from OMC (-Drier/+Wetter)	%	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Specification	**Density Ratio (Density Inde**	**≥70%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION									
Chainage	m	45	95	145	195	245	295	345	395
Road Name/Number		Road No 1							
Retested by test		-	-	-	-	-	-	-	-
Level	m	Top / Overlay							
FIELD & LABORATORY DATA									
Field Dry Density	t/m³	1.58	1.61	1.55	1.59	1.61	1.65	1.56	1.54
Field Moisture Content	%	7.9	7.5	8.7	8.7	8.2	6.5	7.2	9.0
Material retained on 4.75 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number		JSBS							
Corrected Maximum Dry Density	t/m³	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Mould Size (Litre)		1	1	1	1	1	1	1	1
Minimum Dry Density	t/m3	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Test Procedures - See Notes		8	8	8	8	8	8	8	8
Material Description - see below		7							

Notes

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E van Niekerk 28/6/2013

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/122
Date: 28/6/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER		17	18	19	20	21	22	23	24
DATE TESTED		30/5/2013				4/6/2013			
RESULTS									
Density Index	%	**91**	**76**	**73**	**86**	**79**	**102**	**76**	**79**
Moisture Variation from OMC (-Drier/+Wetter)	%	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Specification	**Density Ratio (Density Inde**	**≥70%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION									
Chainage	m	20	70	120	170	220	20	70	120
Road Name/Number		Road No 2							
Retested by test		-	-	-	-	-	-	-	-
Level		Bedding					Top / Overlay		
FIELD & LABORATORY DATA									
Field Dry Density	t/m³	1.61	1.55	1.54	1.59	1.56	1.66	1.55	1.56
Field Moisture Content	%	8.0	9.0	8.5	7.5	8.5	6.4	9.2	9.2
Material retained on 4.75 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number		JSBS10							
Corrected Maximum Dry Density	t/m³	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Mould Size (Litre)		1	1	1	1	1	1	1	1
Minimum Dry Density	t/m3	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Test Procedures - See Notes		8	8	8	8	8	8	8	8
Material Description - see below		7	7	7	7	7	7	7	7

Notes

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/122
Date: 28/6/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER		25	26	27	28	29	30		
DATE TESTED		4/6/2013		6/6/2013					
RESULTS									
Density Index	%	**88**	**93**	**88**	**95**	**84**	**100**		
Moisture Variation from OMC (-Drier/+Wetter)	%	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		
Specification	**Density Ratio (Density Inde**	**≥70%**	**Specification Moisture Variance from OMC**						**±4%**
TEST LOCATION									
Chainage	m	170	220	825	875	925	975		
Road Name/Number		Road No 2		Road No 1					
Retested by test		-	-	-	-	-	-		
Level		Top / Overlay		Bedding					
FIELD & LABORATORY DATA									
Field Dry Density	t/m³	1.60	1.62	1.60	1.63	1.58	1.65		
Field Moisture Content	%	8.7	7.6	8.1	8.8	8.7	8.1		
Material retained on 4.75 mm Sieve	%	<5	<5	<5	<5	<5	<5		
Assigned Value Number		JSBS10							
Corrected Maximum Dry Density	t/m³	1.65	1.65	1.65	1.65	1.65	1.65		
Mould Size (Litre)		1	1	1	1	1	1		
Minimum Dry Density	t/m3	1.30	1.30	1.30	1.30	1.30	1.30		
Test Procedures - See Notes		8	8	8	8	8	8		
Material Description - see below		7	7	7	7	7	7		

Notes

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\# Lime Stabilised
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FIELD DENSITY RESULTS

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C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Laboratory: Penrith
Job No: 7508/122
Date: 05/08/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4A, JORDAN SPRINGS

TEST NUMBER			31	32	33	34	35	36	37	38
DATE TESTED			21/06/2013							
RESULTS										
Density Index		%	**79**	**>100**	**>100**	**79**	**81**	**93**	**71**	**91**
Moisture Variation from OMC (-Drier/+Wetter)		%	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Specification	**Density Ratio ()**		**≥70%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION										
Chainage	(Carriageway L/R)	m	1025	825	875	925	225	275	325	375
Road Name/Number			Road 1				Road 21			
Retested by test			-	-	-	-	-	-	-	-
Level			Bedding	Top			Bedding			
FIELD & LABORATORY DATA										
Field Dry Density		t/m³	1.56	1.66	1.71	1.56	1.57	1.62	1.53	1.61
Field Moisture Content		%	7.5	5.2	10.2	9.2	14.8	15.9	16.7	10.7
Material retained on	4.75 mm Sieve	%	<5	<5	<5	<5	<5	<5	<5	<5
Assigned Value Number			JSBS-10							
Maximum Dry Density		t/m³	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Mould Size (Litre)			1	1	1	1	1	1	1	1
Minimum Dry Density		t/m3	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Test Procedures - See Notes			8	8	8	8	8	8	8	8
Material Description - see below			7	7	7	7	7	7	7	7

Notes

1: Assigned Values have been obtained from our Penrith laboratory – Accreditation No 2734
2: Assigned Values have been obtained from our Prestons laboratory – Accreditation No 14234
3. Results have been calculated using infinite decimal places. Therefore, calculated values may vary from those shown
4: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.3.1, 5.4.1
5: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.3.1, 5.4.1
6: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.1.1, 5.4.1, 5.8.1
7: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.2.1, 5.4.1, 5.8.1
8: AS 1289 1.2.1 clause 6.4 (b), 2.1.1., 5.5.1, 5.6.1, 5.8.1
9: Full details of Test Procedure 5.8.1 available on request
10: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.5.1, 5.6.1
11: AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.3.1, 5.7.1
12. AS 1289 1.2.1 clause 6.4 (b), 2.1.1, 5.7.1, 5.8.1
13: RTA T111, T119, T120, T166
14: RTA T111, T120, T166, T173
15: RTA T120, T119, T162
16. RTA T120, T162, T173
17. RTA T120, T164, T173

Material Description

1. CL-Clays of low plasticity, gravelly clays, sandy clays, silty clays
2. CI-Clay of medium plasticity, gravelly clays, sandy clays, silty clays
3. CH-Clays of high plasticity
4. SC-Clayey sands, sand-clay mixtures
5. SM-Silty sands, sand-silt mixtures
6. GC-Clayey gravels, gravel-sand-clay mixtures
7. SP-Sand, crushed dust, filling sand, washed sand
8. DGB20
9. DGB40
10. DGS20
11. DGS40
12. FCR20
13. FCR40
14. RC - Recycled Concrete
15. Recycled Roadbase
16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

NATA
Accreditation Number 2734
Corporate Site Number 2727

Accredited for compliance with ISO/IEC 17025.

A Kench 05/08/2013

Approved Signatory

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email: info@geotech.com.au www.geotech.com.au

GEOTECH TESTING PTY LTD®
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ISO 9001
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Job No: 7508/126
Our Ref: 7508/126-AA
30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Jordan Springs – Stage 4B**
Penrith City Council DA 12/0897
Summary of Pipeline Backfill Testing

As requested, Geotech Testing Pty Ltd carried out field density tests and associated laboratory compaction tests in order to assess the degree of compaction during backfill operations of open trenches, in accordance with Council's Design Guidelines and Construction Specification. All testing was undertaken within the terms of our NATA accreditation, at the dates and to the procedures shown on the test results sheets.

Field density tests were generally carried out at approximately 50m intervals and individual test results provided on the attached test result sheets.

Laboratory compaction tests were carried out in accordance with AS1289 5.5.1 (Density Index) and the results exceeded the specification requirements.

As at 29 August 2013 backfill operations for Road No 1 were completed.

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

Attached Compaction Control Test Nos 1 to 4

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FIELD DENSITY RESULTS

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No: 7508/126
Date: 28/6/2013

PROJECT: PIPELINE BACKFILL TESTING
STAGE 4B, JORDAN SPRINGS

TEST NUMBER		1	2	3	4				
DATE TESTED		30/5/2013							
RESULTS									
Density Index	%	**84**	**95**	**91**	**84**				
Moisture Variation from OMC (-Drier/+Wetter)	%	**N/A**	**N/A**	**N/A**	**N/A**				
Specification	**Density Ratio (Density Inde**	**≥70%**	**Specification Moisture Variance from OMC**						**N/A%**
TEST LOCATION									
Chainage	m	475	525	575	625				
Road Name/Number		Road No 1							
Retested by test		-	-	-	-				
Level	m	Bedding							
FIELD & LABORATORY DATA									
Field Dry Density	t/m³	1.58	1.63	1.61	1.58				
Field Moisture Content	%	8.1	6.5	6.0	7.6				
Material retained on 4.75 mm Sieve	%	<5	<5	<5	<5				
Assigned Value Number		JSBS 10							
Corrected Maximum Dry Density	t/m³	1.65	1.65	1.65	1.65				
Mould Size (Litre)		1	1	1	1				
Minimum Dry Density	t/m3	1.30	1.30	1.30	1.30				
Test Procedures - See Notes		8	8	8	8				
Material Description - see below		7	7	7	7				

Notes

1: Assigned Values have been obtained from our Penrith laboratory – Accreditation No 2734
2: Assigned Values have been obtained from our Prestons laboratory – Accreditation No 14234
3. Results have been calculated using infinite decimal places. Therefore, calculated values may vary from those shown
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16. RSB - Recycled Sub-base
17. CSS - Crushed Sandstone
18. RSS - Ripped Sandstone
19. Cowels Brown

* Cement Stabilised
\# Lime Stabilised
$ Gypsum Stabilised

Form No R022 Version 18 06/13 - issued by ER

Accredited for compliance with ISO/IEC 17025.

E van Niekerk 28/6/2013

Approved Signatory

NATA
Accreditation Number 2734
Corporate Site Number 2727

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APPENDIX D

SOIL CLASSIFICATION OF RESIDENTIAL LOTS

Report 7508/123-AA
Report 7508/127-AA

GEOTECH TESTING PTY LTD®
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MARYLAND DEVELOPMENT COMPANY PTY LTD

STAGE 4A
JUBILEE DRIVE, JORDAN SPRINGS

SITE CLASSIFICATION REPORT

REPORT NO 7508/123-AA 30 AUGUST 2013

Head Office:
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GEOTECH TESTING PTY LTD®
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Certified System
Quality
ISO 9001
SAI GLOBAL

Job No: 7508/123
Our Ref: 7508/123-AA
Your Commitment No: 185719

30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Stage 4A – Jubilee Drive, Jordan Springs**
Penrith City Council DA 12/0897 – Condition Nos 58, 65(f) & 75
Site Classification Report (AS2870-2011)

Geotech Testing Pty Ltd was engaged by Maryland Development Company Pty Ltd to carry out geotechnical site compliance of Stages 4A at Jordan Springs, in accordance with Penrith City Council DA Consent No. 12/0897. The following conditions of consent have been satisfied by this Site Classification Report:

- **Condition No. 58 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings".*
- **Condition No. 65(f) -** *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*
  - *Compaction reports for road pavement construction.*
  - *Compaction reports for bulk earthworks and lot regrading.*
  - ***Soil classification for all residential lots.***
  - *Statement of Compliance.*
- **Condition No. 75 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings". A copy of the report, including a plan showing the lot classification over the subdivision is to be submitted to Penrith City Council prior to issue of a Subdivision Certificate.*

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. The report covers seventy lots from Lot 4001 to Lot 4070

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

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This report describes geotechnical investigations for proposed dwellings to be constructed at a subdivision known as Jordan Springs, Stage 4A. The Project Manager Mr A Ali of Lend Lease Development Pty Ltd commissioned the investigation. Lots numbered 4001 to 4070 (70 lots) are covered in this report.

Site classification in accordance with AS2870-2011 is only applicable for the 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 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 was carried out on 2 August 2013 (in conjunction with field work for the adjoining Stage 4B), and consisted of excavation of thirty nine test pits (TP1 to TP39) using a standard rubber tyred backhoe with a 450mm bucket, and taken to depths up to 1.5m. The approximate test pit locations are indicated on Drawing No 7508/123-1 in Appendix A of this report.

3.0 SITE CONDITIONS

3.1 Surface Conditions

Stage 4A is located to the east and north of Jubilee Drive and is bound by East-West Riparian Corridor to the north, and stage 4B to the east. Stage 4A contains Cordyline Loop and Wildflower Circle. At the time of field work, the construction of the roads was completed, the lots were devoid of vegetation, and there were no trees.

3.2 Sub-Surface Conditions

A summary of the field data obtained is presented in Appendix A. The test pit investigation revealed the following generalised sub-surface profile.

Fill	Fill: Clay, medium to high plasticity, red-brown, grey, with fine gravel, underlain by
Residual	Clay, medium to high and high plasticity, grey mottled red

Shale bedrock was not encountered in any of the test pits.

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 course of the investigation, six undisturbed samples (U_{50}) of the fill and residual clay materials were recovered for laboratory testing, aimed at determining the reactivity of the materials to variations in moisture changes.

The test conducted was Shrink/Swell Index Determination (Iss) in accordance with Australian Standard AS1289 7.1.1. The detailed results are included in Appendix D and summarised below.

TP	Depth (m)	I_{ss} (%/pF)	Classification and Summary Description
3	0.3-0.6	3.0	Fill: Clay, high plasticity, red-brown & grey, some fine gravel
9	0.5-0.8	2.9	CH: Clay, high plasticity, red-brown & grey, some fine gravel
14	0.7-1.0	4.3	CH: Clay, high plasticity, red-brown & grey, some fine gravel
17	0.3-0.6	2.9	Fill: Clay, high plasticity, red-brown & grey, some fine gravel
23	0.5-0.8	4.0	CH: Clay, high plasticity, red-brown & grey
30	0.3-0.6	3.7	Fill: Clay, high plasticity, red-brown & grey

One sample from TP35 (0.7-1.0m depth), which was not suitable for shrink swell testing, was tested for plasticity Index and indicated medium plasticity clay. The results are presented in Appendix B.

5.0 DISCUSSION & RECOMMENDATIONS

5.1 Assessment of Fill

Fill materials have been placed at the site and field work revealed that the majority of the lots are filled. The fill was tested during placement and compaction by Geotech Testing Pty Ltd (Site Fill Summary Report 7508/119-AA) and is classified as "Controlled". The depth and extent of fill placed on the Lots will be determined by the Project Surveyor, Whelans Insites Pty Ltd.

5.2 Site Classification

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

It is recommended that footings for 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 C are applicable to the Lots at the date of conducting the investigation, being 2 August 2013, 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.

GEOTECH TESTING PTY LTD

APPENDIX A

TABLE A: TEST PIT DEATILS

TEST PIT LOCATION PLAN
(Drawing No 7508/123-1)

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
1	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.3-1.5	1.0-1.1	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
2	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.6	0.5-0.6	FILL; Silty CLAY, high plasticity, red-brown, grey with fine to medium gravel
	0.6-1.5		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
3	0.0-0.15	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.15-0.6	U_{50} (0.3-0.6) 0.5-0.6	FILL; Silty CLAY, high plasticity, red-brown, grey with fine to medium gravel
	0.6-1.5		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
4	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.5		FILL; Silty CLAY, high plasticity, red-brown, grey with fine to medium gravel
	0.5-1.0	0.5-0.6	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
	1.0-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
5	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.5		FILL; Silty CLAY, high plasticity, red-brown, grey with fine to medium gravel
	0.5-0.8		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
	0.8-1.5	1.0-1.1	(CH) CLAY, high plasticity, pale grey and yellow-brown

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
6	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.3-1.2	0.5-0.6	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
	1.2-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
7	0.0-0.4	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.4-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
8	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels, root fibre and shale fragments
	0.3-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
9	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels, root fibre and sand
	0.2-1.5	0.5-0.6 U_{50} (0.5-0.8)	(CH) CLAY, high plasticity, pale grey and yellow-brown, with ironstone fragments
10	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-1.5	1.0-1.1	(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment
11	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-1.5	0.5-0.6	(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment
12	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-1.5	0.5-0.6	(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
13	0.0-0.15	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.15-1.5	0.5-0.6	(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment
14	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.8	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
	0.8-1.5	U_{50} (0.7-1.0)	(CH) Shaley CLAY, high plasticity, pale grey mottled red-brown, with ironstone fragment
15	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-1.5	1.0-1.1	(CH) CLAY, high plasticity, pale grey and yellow-brown
16	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-1.0	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
	1.0-1.5		(CH) Shaley CLAY, high plasticity, pale grey mottled red-brown, with ironstone fragment
17	0.0-0.6	0.0-0.1 U_{50} (0.3-0.6)	FILL; Silty Clay, high plasticity, grey, with gravels and root fibre
	0.6-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
18	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1 – 0.6	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	0.6-0.8		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
	0.8-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
19	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.7	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	0.7-1.5		(CH) Silty CLAY, high plasticity, brown and grey
20	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-1.0		FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	1.0-1.5	1.0-1.1	(CH) Silty CLAY, high plasticity, brown and grey
21	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-1.0	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	1.0-1.5		(CH) Silty CLAY, high plasticity, brown and grey
22	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.7	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	0.7-0.9		(CH) Silty CLAY, high plasticity, brown and grey
	0.9-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
23	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.3-0.5		FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	0.5-1.0	0.5-0.6 U_{50} (0.5-0.8)	(CH) Silty CLAY, to high plasticity, brown and grey
	1.0-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
24	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.5		FILL; Silty CLAY, medium to high plasticity, red-brown, grey with fine to medium gravel
	0.5-1.0	0.5-0.6	(CH) Silty CLAY, high plasticity, brown and grey
	1.0-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
25	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-1.0		(CH) Silty CLAY, high plasticity, brown and grey
	1.0-1.5	1.0-1.1	(CH) CLAY, high plasticity, pale grey and yellow-brown
26	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.3-1.2	0.5-0.6	(CH) Silty CLAY, high plasticity, brown and grey
	1.2-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
27	0.0-1.0	0.0-0.1	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	1.0-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
28	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-1.0	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	1.0-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
29	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.9	0.5-0.6	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	0.9-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown

TABLE A

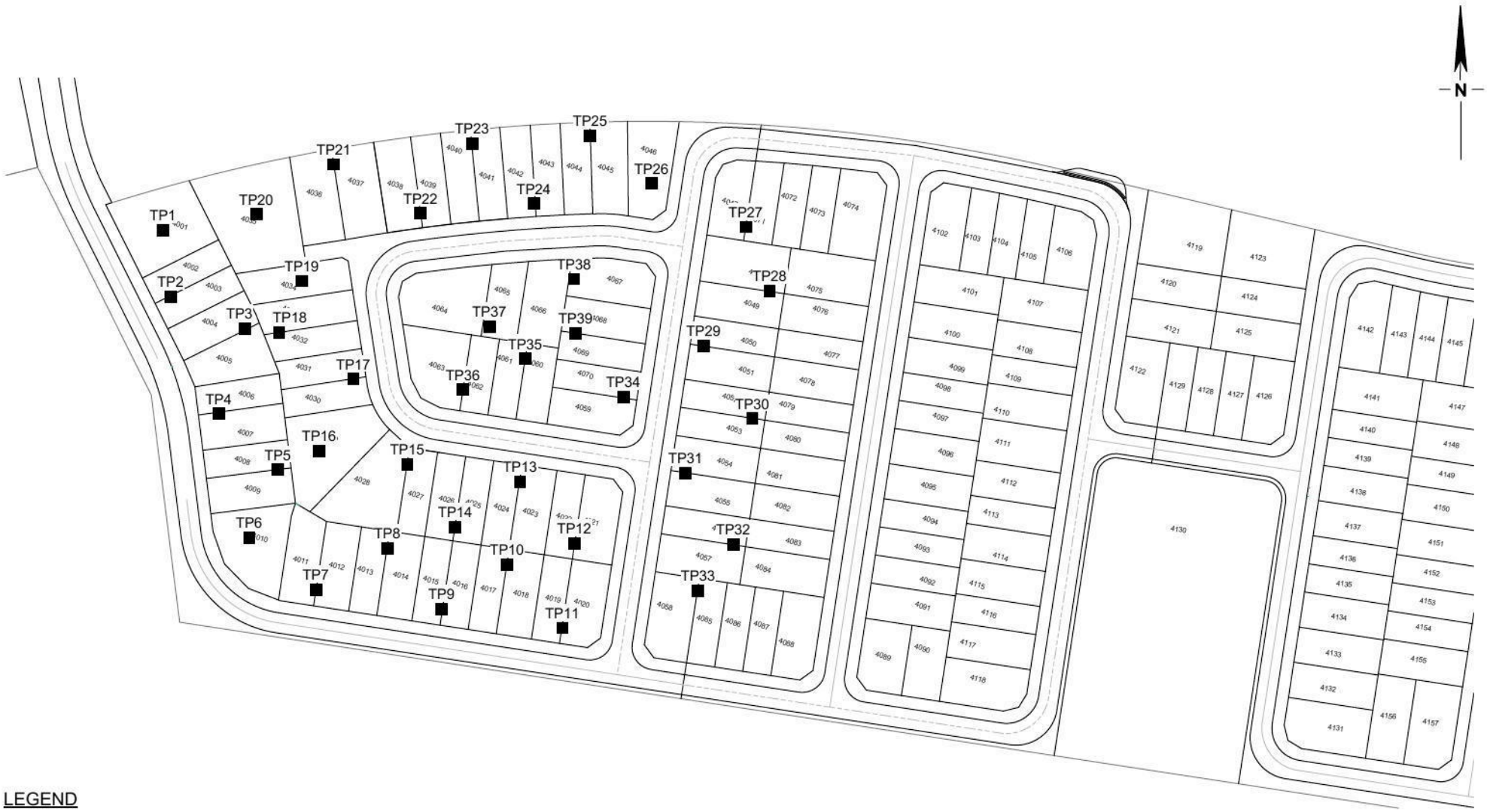
Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
30	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.9	U_{50} (0.3-0.6)	FILL; Silty CLAY, high plasticity, red-brown and grey, with fine to medium gravel
	0.9-1.5	1.0-1.1	(CH) CLAY, high plasticity, pale grey and yellow-brown
31	0.0-0.4	0.0-0.1	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	0.4-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
32	0.0-0.7	0.0-0.1	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	0.7-1.0	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
	1.0-1.5		(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment
33	0.0-0.4	0.0-0.1	FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	0.4-1.0	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
	1.0-1.5		(CI) Shaley CLAY, medium plasticity, pale grey mottled red-brown, with ironstone fragment
34	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
35	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.7		FILL; Silty CLAY, medium to high plasticity, red-brown and grey, with fine to medium gravel
	0.7-1.5	U_{50} (0.7-1.0)	(CI) CLAY, medium plasticity, pale grey and yellow-brown

TABLE A

Job No: 7508/123
Our Ref: 7508/123-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
36	0.0-0.3	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.3-1.0	0.5-0.6	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey
	1.0-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
37	0.0-0.2	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.2-0.9	0.5-0.6	FILL; Silty CLAY, high plasticity, red-brown and grey, with fine to medium gravel
	0.9-1.5		(CH) CLAY, high plasticity, pale grey and yellow-brown
38	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.4		FILL; Silty CLAY, high plasticity, red-brown and grey, with fine to medium gravel
	0.4-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown
39	0.0-0.1	0.0-0.1	FILL; Silty Clay, low to medium plasticity, grey, with gravels and root fibre
	0.1-0.4		FILL; Silty CLAY, high plasticity, red-brown and grey, with fine to medium gravel
	0.4-1.5	0.5-0.6	(CH) CLAY, high plasticity, pale grey and yellow-brown



LEGEND

■ Test Pit

GEOTECH TESTING PTY LTD®
34 Borec Road
Penrith
NSW 2750
ABN 71 076 676 321
Ph: 02 4722 2744
Fx: 02 4722 2777
www.geotech.com.au
e-mail:info@geotech.com.au

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

Maryland Development Company Pty Ltd
Stage 4A
Jordan Springs

Test Pit Locations

Drawing No: 7508/123-1
Job No: 7508/123
Drawn By: MH
Date: 23 July 2013
Checked By: ZA

File No: 7508-123
Layers: 0, Lay1

APPENDIX B

TABLE B
LABORATORY TEST RESULTS

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

Certified System Quality ISO 9001 SAI GLOBAL

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No:	7508/123
Tested By:	AN
Checked By:	AK
Date Tested:	07/08/2013
Laboratory	Penrith

SITE & EXPOSURE CLASSIFICATION
STAGE 4A, JORDAN SPRINGS

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 3	Test Pit 9	Test Pit 14	Test Pit 17
Depth (m)	0.3 - 0.6	0.5 - 0.8	0.7 - 1.0	0.3 - 0.6
Laboratory Number	7508/123-1	7508/123-2	7508/123-3	7508/123-4
Test Description				
Moisture Content				
Initial %	21.0	19.6	21.3	12.5
Final %	23.9	25.2	25.7	20.3
Swell %	2.3	9.4	9.1	6.8
Shrinkage %	4.3	2.3	3.1	1.8
Shrink/Swell Index $\%/_{p}F$	3.0	3.9	4.3	2.9
Material Description	FILL: CLAY, high plasticity, red-brown & grey, some fine to medium gravel	(CH) CLAY, high plasticity, red-brown & grey, some fine to medium gravel	(CH) CLAY, high plasticity, red-brown & grey, some fine to medium gravel	FILL: Clay, high plasticity, red-brown & grey, some fine to medium gravel

Accredited for compliance with ISO/IEC 17025.

A Kench 22/08/2013
Approved Signatory

NATA

NATA Accreditation Number 2734
Corporate Site Number 2727

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34 Borec Road, Penrith NSW 2750
P O Box 880 Penrith NSW 2751
Telephone: (02) 4722 2744 Facsimile: (02) 4722 2777

Prestons Laboratory:
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email: info@geotech.com.au www.geotech.com.au

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MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

SITE & EXPOSURE CLASSIFICATION
STAGE 4A, JORDAN SPRINGS

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.2, 3.2.1, 3.3.1, 3.4.1

Job No:	7508/123	Tested By:	AK
Laboratory	Penrith	Checked By:	AK
Date Tested	15/08/2013		

Sample Identification	Test Pit 35
Laboratory Number	7508/123-7
Depth (m)	0.7 - 1.0
Test Description	
Liquid Limit (W_L)	31%
Plastic Limit (W_P)	17%
Plastic Index (I_P)	14%
Linear Shrinkage (LS)	8.0%
Mould Length (mm)	125
Sample History	Oven Dried Dry Sieved
Material Description	(CI) CLAY, medium plasticity, pale grey & yellow-brown

A Kench 30/08/2013
Approved Signatory

NATA
Accredited for compliance with ISO/IEC 17025.

Nata Accreditation Number 2734
Corporate Site Number 2727

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APPENDIX C

SUMMARY OF SITE CLASSIFICATIONS

TABLE C
SUMMARY OF SITE CLASSIFICATIONS
STAGE 4A
JUBILEE DRIVE, JORDAN SPRINGS

Lot	Class	Lot	Class	Lot	Class
4001	H1	4025	H1	4048	H1
4002	H1	4026	H1	4049	H1
4003	H1	4027	H1	4050	H1
4004	H1	4028	H1	4051	H1
4005	H1	4029	H1	4052	H1
4006	H1	4030	H1	4053	H1
4007	H1	4031	H1	4054	H1
4008	H1	4032	H1	4055	H1
4009	H1	4033	H1	4056	H1
4010	H1	4034	H1	4057	H1
4011	H1	4035	H1	4058	H1
4012	H1	4036	H1	4059	H1
4013	H1	4037	H1	4060	H1
4014	H1	4038	H1	4061	H1
4015	H1	4039	H1	4062	H1
4016	H1	4040	H1	4063	H1
4017	H1	4041	H1	4064	H1
4018	H1	4042	H1	4065	H1
4019	H1	4043	H1	4066	H1
4020	H1	4044	H1	4067	H1
4021	H1	4045	H1	4068	H1
4022	H1	4046	H1	4069	H1
4023	H1	4047	H1	4070	H1
4024	H1				
H1: Highly Reactive (Surface movement within 40mm to 60mm)					

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MARYLAND DEVELOPMENT COMPANY PTY LTD

STAGE 4B
JUBILEE DRIVE, JORDAN SPRINGS

SITE CLASSIFICATION REPORT

REPORT NO 7508/127-AA 30 AUGUST 2013

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Job No: 7508/127
Our Ref: 7508/127-AA
Your Commitment No: 185719

30 August 2013

Maryland Development Company Pty Ltd
c/- Lend Lease Development Pty Ltd
P O Box 4366
PENRITH WESTFIELD NSW 2750

Attention: Mr A Ali

Dear Sir

re: **Stage 4B – Jubilee Drive, Jordan Springs**
Penrith City Council DA 12/0897 – Condition Nos 58, 65(f) & 75
Site Classification Report (AS2870-2011)

Geotech Testing Pty Ltd was engaged by Maryland Development Company Pty Ltd to carry out geotechnical site compliance of Stage 4B at Jordan Springs, in accordance with Penrith City Council DA Consent No. 12/0897. The following conditions of consent have been satisfied by this Site Classification Report:

- **Condition No. 58 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings".*
- **Condition No. 65(f) -** *A Geotechnical Report certifying that all earthworks and road formation have been completed in accordance with AS3798 and Council's Design Guidelines and Construction specifications. The report shall include;*
  - *Compaction reports for road pavement construction.*
  - *Compaction reports for bulk earthworks and lot regrading.*
  - ***Soil classification for all residential lots.***
  - *Statement of Compliance.*
- **Condition No. 75 -** *Soil testing is to be carried out to enable each lot to be classified according to AS2870 "Residential Slabs and Footings". A copy of the report, including a plan showing the lot classification over the subdivision is to be submitted to Penrith City Council prior to issue of a Subdivision Certificate.*

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. The report covers forty eight lots (Lot 4071 to Lot 4118).

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

Yours faithfully
GEOTECH TESTING PTY LTD

EMGED RIZKALLA
Director

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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This report describes geotechnical investigations for proposed dwellings to be constructed at a subdivision known as Jordan Springs, Stage 4B. The Project Manager, Mr A Ali, of Lend Lease Development Pty Ltd commissioned the investigation. Lots numbered 4071 to 4118 (48 lots) are covered in this report.

Site classification in accordance with AS2870-2011 is only applicable for the 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 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 was carried out on 6 August 2013 (in conjunction with field work for the adjoining Stage 4A) and consisted of excavation of twenty three test pits (TP40 to TP62) using a standard rubber tyred backhoe with a 450mm bucket, and taken to depths up to 1.5m. The approximate test pit locations are indicated on Drawing No 7508/127-1 in Appendix A of this report.

3.0 SITE CONDITIONS

3.1 Surface Conditions

Stage 4B is located to the north and west of Jubilee Drive and is bound by East-West Riparian Corridor to the north, Stage 4A to the west, and Stage 4C to the east. Stage 4B contains Cordyline Loop and Mulla Avenue. At the time of field work, the construction of the roads was completed, the lots were devoid of vegetation and there were no trees.

3.2 Sub-Surface Conditions

A summary of the field data obtained is presented in Appendix A. The test pit investigation revealed the following generalised sub-surface profile.

Fill	Fill: Clay, medium to high plasticity, red-brown, grey, with fine gravel, underlain by
Residual	Clay, low to medium plasticity, grey mottled red

Shale bedrock was not encountered in any of the test pits.

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 course of the investigation two undisturbed (U_{50}) samples of the fill and residual clay materials were recovered for laboratory testing, aimed at determining the reactivity of the materials to variations in moisture changes.

The test conducted was Shrink/Swell Index Determination (Iss) in accordance with Australian Standard AS1289 7.1.1. The detailed results are included in Appendix D and summarised below.

TP	Depth (m)	I_{ss} (%/pF)	Classification and Summary Description
42	0.3-0.6	2.5	Fill: Silty Clay, medium to high plasticity, brown & grey, some fine gravel
60	0.3-0.6	1.0	Fill: Silty Clay, low plasticity, yellow-brown, some fine gravel

Samples from TP46 (0.7-1.0m depth) & TP53 (0.5-0.8m depth), which were not suitable for shrink swell testing, were tested for plasticity Index and indicated medium plasticity clay. The results are presented in Appendix B.

5.0 DISCUSSION & RECOMMENDATIONS

5.1 Assessment of Fill

Fill materials have been placed at the site and field work revealed that the majority of the lots are filled. The fill was tested during placement and compaction by Geotech Testing Pty Ltd (Site Fill Summary Report 7508/119-AA) and is classified as "Controlled". The depth and extent of fill placed on the Lots will be determined by the Project Surveyor, Whelans Insites Pty Ltd.

5.2 Site Classification

Based on the above information, site classifications to AS2870-2011 are summarised in Appendix C. 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 are classified as detailed in Appendix C.

It is recommended that footings for 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 C are applicable to the Lots at the date of conducting the investigation, being 6 August 2013 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.

GEOTECH TESTING PTY LTD

APPENDIX A

TABLE A: TEST PIT DEATILS

TEST PIT LOCATION PLAN
(Drawing No 7508/127-1)

TABLE A

Job No: 7508/127
Our Ref: 7508/127-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP40	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-0.5		FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.5-1.5	1.0-1.1	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP41	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-0.4		FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.4-1.5	0.5-0.6	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP42	0.0-0.05	0.0-0.05	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.05-0.9	U_{50} (0.3-0.6) 0.5-0.6	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.9-1.5		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP43	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-1.5	0.5-0.6	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP44	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-0.9	0.5-0.6	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.9-1.5		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP45	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-1.5	1.0-1.1	(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt

TABLE A

Job No: 7508/127
Our Ref: 7508/127-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP46	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil) and tree roots
	0.2-1.5	0.5-0.6 U50 (0.7-1.0)	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP47	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-0.4		FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.4-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP48	0.0-0.3	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.3-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP49	0.0-0.3	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.3-0.6	0.5-0.6	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.6-1.5		(CI-CH) Silty CLAY, medium to high plasticity, brown and grey, M>PL, VSt
TP50	0.0-0.4	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.4-1.5	1.0-1.1	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP51	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-0.6	0.5-0.6	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.6-1.5		(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt

TABLE A

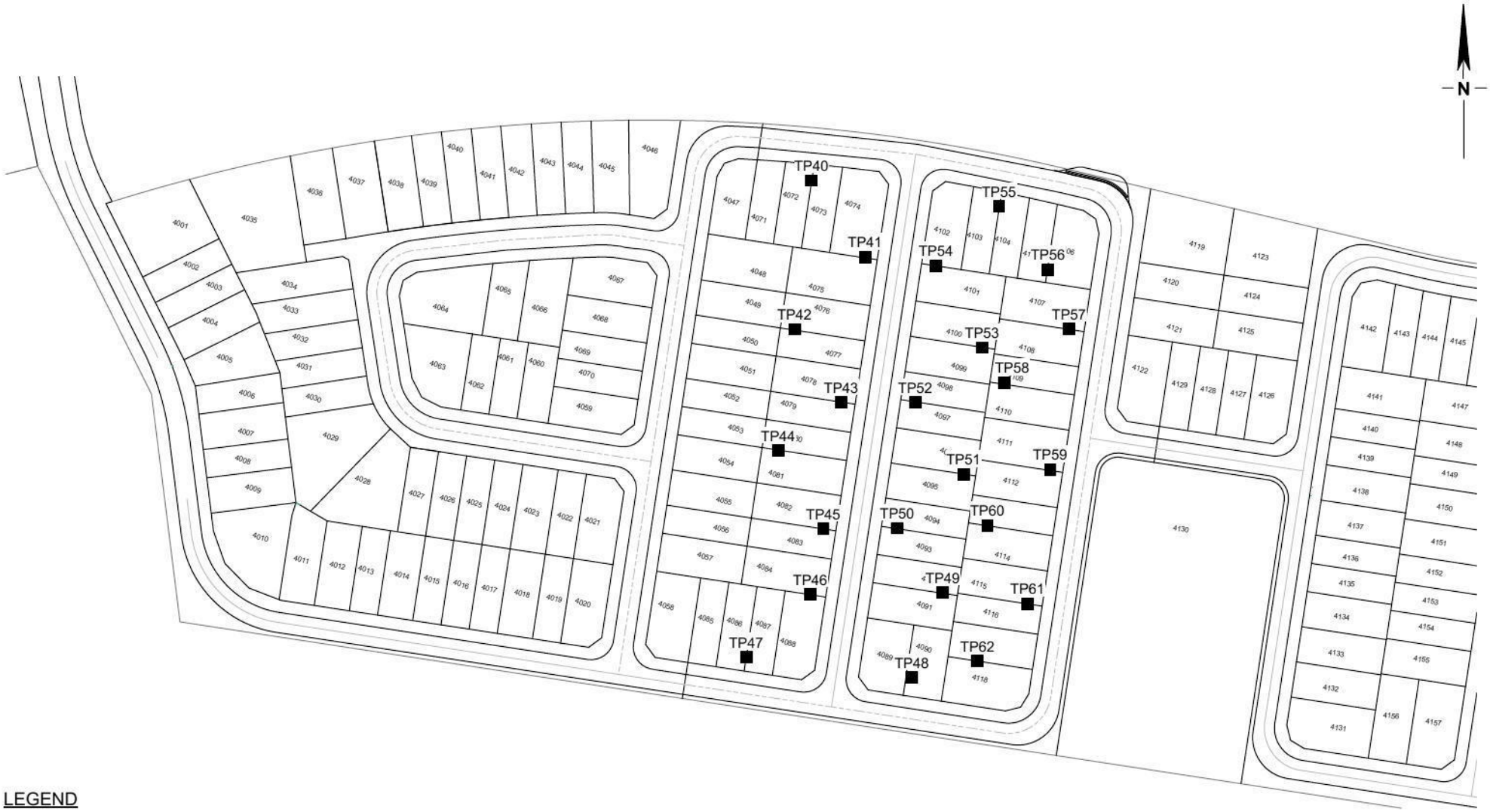
Job No: 7508/127
Our Ref: 7508/127-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP52	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-1.5	0.5-0.6	(CL-CI) Silty CLAY, low to medium plasticity, brown and grey, M>PL, VSt
TP53	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-0.5		FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.5-1.5	0.5-0.6 U_{50} (0.5-0.8)	(CL-CI) Silty CLAY, low to medium plasticity, brown and grey, M>PL, VSt
TP54	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, yellow brown and brown, M≥PL, VSt
TP55	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-1.5	1.0-1.1	(CI) Silty CLAY, medium plasticity, yellow brown and brown, M≥PL, VSt
TP56	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, yellow brown and brown, M≥PL, VSt
TP57	0.0-0.1	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.1-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, yellow brown and brown, M≥PL, VSt
TP58	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-0.5		FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.5-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt

TABLE A

Job No: 7508/127
Our Ref: 7508/127-AA

TEST PIT NUMBER	DEPTH (m)	SAMPLE DEPTH (m)	MATERIAL DESCRIPTION
TP59	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP60	0.0-0.2	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.2-0.6	U_{50} (0.3-0.6)	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel
	0.6-1.5	1.0-1.1	(CI) Silty CLAY, medium plasticity, yellow brown and brown, M≥PL, VSt
TP61	0.0-0.3	0.0-0.1	FILL: Silty Clay, medium plasticity, grey, with gravels and root fibre (topsoil)
	0.3-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt
TP62	0.0-0.4	0.0-0.1	FILL: Silty Clay, low plasticity, grey, with gravels and root fibre (topsoil)
	0.4-1.5	0.5-0.6	(CI) Silty CLAY, medium plasticity, brown and grey, M>PL, VSt



LEGEND

■ Test Pit

GEOTECH TESTING PTY LTD®
34 Borec Road
Penrith
NSW 2750
ABN 71 076 676 321
Ph: 02 4722 2744
Fx: 02 4722 2777
www.geotech.com.au
e-mail:info@geotech.com.au

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

Maryland Development Company Pty Ltd
Stage 4B
Jordan Springs

Test Pit Locations

Drawing No: 7508/127-1
Job No: 7508/127
Drawn By: MH
Date: 23 July 2013
Checked By: ZA

File No: 7508-127
Layers: 0, Lay1

APPENDIX B

TABLE B
LABORATORY TEST RESULTS

GEOTECH TESTING PTY LTD®
ABN 71 076 676 321

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

Job No:	7508/127
Tested By:	TS
Checked By:	AK
Date Tested:	12/08/2013
Laboratory	Penrith

SITE & EXPOSURE CLASSIFICATION
STAGE 4B, JORDAN SPRINGS

TEST RESULTS - SHRINK / SWELL INDEX

Test Procedure: AS 1289 7.1.1

Sample Identification	Test Pit 42	Test Pit 60		
Depth (m)	0.3 - 0.6	0.3 - 0.6		
Laboratory Number	7508/127-1	7508/127-4		
Test Description				
Moisture Content				
Initial %	12.9	12.0		
Final %	18.8	17.7		
Swell %	5.5	3.3		
Shrinkage %	1.7	0.2		
Shrink/Swell Index $\%/_pF$	2.5	1.0		
Material Description	FILL: Silty Clay, medium to high plasticity, brown & grey, trace of fine to medium gravel	FILL: Silty Clay, low plasticity, yellow-brown, trace of fine to medium gravel		

Accredited for compliance with ISO/IEC 17025.

A Kench 22/08/2013
Approved Signatory

NATA

NATA Accreditation Number 2734
Corporate Site Number 2727

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P O Box 880 Penrith NSW 2751
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GEOTECH TESTING PTY LTD ®
ABN 71 076 676 321

MARYLAND DEVELOPMENT COMPANY PTY LTD
C/- LEND LEASE DEVELOPMENT P/L, PO BOX 1124
ST MARYS NSW 1790

SITE & EXPOSURE CLASSIFICATION
STAGE 4B, JORDAN SPRINGS

TEST RESULTS - ATTERBERG LIMITS

Test Procedure AS1289 3.1.2, 3.2.1, 3.3.1, 3.4.1

Job No:	7508/127	Tested By:	HW
Laboratory	Penrith	Checked By:	AK
Date Tested	20/08/2013		

Sample Identification	Test Pit 46	Test Pit 53
Laboratory Number	7508/127-2	7508/127-3
Depth (m)	0.7 - 1.0	0.5 - 0.8
Test Description		
Liquid Limit (W_L)	47%	27%
Plastic Limit (W_P)	18%	16%
Plastic Index (I_P)	29%	11%
Linear Shrinkage (LS)	13.0%	5.5%
Mould Length (mm)	125	127
Sample History	Oven Dried Dry Sieved	Oven Dried Dry Sieved
Material Description	(CI) Silty CLAY, medium plasticity, brown & grey	(CL-CI) Silty CLAY, low to medium plasticity, brown & grey

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

A Kench 30/08/2013
Approved Signatory

NATA

Accredited for compliance with ISO/IEC 17025.

Nata Accreditation Number 2734
Corporate Site Number 2727

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email: info@geotech.com.au www.geotech.com.au

APPENDIX C

SUMMARY OF SITE CLASSIFICATIONS

TABLE C
SUMMARY OF SITE CLASSIFICATIONS
STAGE 4B
JUBILEE DRIVE, JORDAN SPRINGS

Lot	Class	Lot	Class
4071	H1	4095	M
4072	H1	4096	M
4073	H1	4097	M
4074	H1	4098	M
4075	H1	4099	M
4076	H1	4100	M
4077	H1	4101	M
4078	H1	4102	M
4079	H1	4103	M
4080	H1	4104	M
4081	H1	4105	M
4082	H1	4106	M
4083	H1	4107	M
4084	H1	4108	M
4085	H1	4109	M
4086	M	4110	M
4087	M	4111	M
4088	M	4112	M
4089	M	4113	M
4090	M	4114	M
4091	M	4115	M
4092	M	4116	M
4093	M	4117	M
4094	M	4118	M

M: Moderately Reactive (Surface movement within 20-40mm),

H1: Highly Reactive (Surface movement within 40mm to 60mm)