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**Geotechnical Report
Level One Inspection and Testing**

**Riverwalk Estate Stage 12
Werribee VIC**

Prepared for:

**Excell Gray Bruni
12 Allied Drive
Tullamarine VIC**

PROJECT No 9059

21 April 2017.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing Riverwalk Estate Stage 12

1. Introduction

Terra Firma Laboratories was engaged by *Excell Gray Bruni* as the geotechnical inspection and testing authority to provide Level 1 supervision and testing works on the earthworks component for Riverwalk Estate Stage 12. This work was conducted over the period of 18/08/2016 to 14/02/2017.

This report presents that the allotment earthworks was carried out in accordance with *AS3798-2007 Guidelines for Earthworks for Commercial and Residential Development* and in compliance with the compaction control specifications established by the contractor.

2. Scope of Works

2.1. Areas of work

The areas of work included lot numbers 413-421, 424-433, 437-453 and 455-462. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1) based on drawings prepared by SMEC and provided by *Excell Gray Bruni*.

The supervision work by *Terra Firma Laboratories* involved both inspection of sub grade preparation work and full time inspection and testing of fill placement.

2.2. Specification

The placement of fill on the areas of work was to be carried out in accordance with *AS3798-2007 Guidelines for Earthworks for Commercial and Residential Development*, as directed by *Excell Gray Bruni*. At all times during placement of fill materials Terra Firma Laboratories maintained a Geotechnical Technician on site to perform the supervision and testing as required by AS3798-2007.

As referenced from AS3798-2007 (Section 5.2) establishes a specification requirement for a minimum density ratio of not less than 95% noting that soils containing more than 20% of particles coarser than 37.5mm cannot be tested for relative compaction using the procedures of AS1289.

Field density testing shall be undertaken at a frequency of not less than 3 tests per visit.

Test Rolling is required for all layers of structural fill and materials within 150mm of permanent subgrade level so as to withstand test rolling without visible deformation or springing. Corrective action is required where unstable areas exceed 20% of the area being considered by test rolling.

3. Inspection and Testing

3.1. Sub-Grade Preparation

Subgrade preparation involved stripping the site down of topsoil and organic matter to a depth of approximately 200mm below existing levels detailed on the site plans. The sub-grade area was then proof-rolled to determine soft or otherwise unsuitable zones and such zones rectified as necessary. The sub-grade was watered and scarified prior to fill placement to aid layer bonding.

3.2. Fill materials

The materials used as fill were locally sourced and observed to generally consist of Silty Clay, sourced from stockpiled materials on site. No particles greater than 150mm were observed. The fill was nominated as clean fill by the contractor.

3.3. Fill Construction

The contractor had the following plant available on-site during the construction period for use in the fill placement:

- *Dump Trucks*
- *Grader*
- *Compactor*
- *Pad Foot Roller*
- *Water Cart*
- *Excavator*

All fill was placed in layers of thicknesses not exceeding 300mm. *The work area was typically a 2 or 3 lot area on any one particular day.* At the completion of a placed layer, compaction testing was performed to confirm appropriate compaction had been achieved and supported the observations made.

It was observed that finished levels were in accordance with levels marked on site by survey. These levels are shown on site plans attached in Appendix 1.

The final 300mm of fill placed across the site was placed as a topsoil layer/ growing medium and should be considered as non-structural, as it was placed in an uncontrolled manner, as allowed by specifications.

4. Compaction Control Testing

Testing comprised of a total of 84 in-situ density tests, with a summary of results included in Appendix 2. Test Reports are referenced in Appendix 3.

Test numbers 4, 5 and 54 originally failed to meet specification. *Excell Gray Bruni* were Notified and asked to rework the area appropriately. Upon adequate reworking *Terra Firma Laboratories* would perform a re-test.; this process would continue until a minimum compaction effort of 95% was achieved.

It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed. Each lot does not necessarily require a compaction test to comply. The compaction control testing indicated that the engineered fill on all lots complied with the technical specification.

5. Uncontrolled Works

Terra Firma Laboratories cannot verify any works completed by others after the final date specified in the introduction. Uncontrolled works may include, but not limited to trenching for services, cut and fill works for slab preparation or subsequent removal of vegetation and back fill of holes.

6. Clean Fill

Terra Firma Laboratories cannot guarantee that the material used as a filling medium is free from chemical or other contamination.

7. Statement of Compliance

Inspections and testing of the fill areas at this site indicate that both sub grade preparation and fill placement have been conducted in accordance with the specification and that the completed fill areas of greater than 300mm, as shown on the site plan attached, and not any preceding the 18/08/2016 or work completed after the 14/02/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,



Tom Seymour
Lab Manager



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APPENDICES

Appendix 1: Site Plans

Appendix 2: Test Summary

Appendix 3: Test Reports





Level One Test Summary

Client: Excell Gray Bruni
Project: Riverwalk Estate Stage 12

Specification: 95%
Project No: 9059

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
18/08/2016	1	L1		101.5	PASS	460	9059-16
18/08/2016	2	L2		100.5	PASS	461	9059-16
18/08/2016	3	L3		102	PASS	462	9059-16
24/08/2016	4	L2		85.5	FAIL	459	9059-22
24/08/2016	5	L1		88	FAIL	449	9059-22
24/08/2016	6	L1		96	PASS	452	9059-22
25/08/2016	7	L2	4	95	PASS	459	9059-25
25/08/2016	8	L1	5	99	PASS	449	9059-25
25/08/2016	9	L3		98	PASS	444	9059-25
25/08/2016	10	L4		99.5	PASS	457	9059-25
25/08/2016	11	L4		98.5	PASS	456	9059-25
26/08/2016	12	L3		96	PASS	427	9059-26
26/08/2016	13	L4		98.5	PASS	430	9059-26
26/08/2016	14	L4		97	PASS	420	9059-26
7/09/2016	15	L2		99.5	PASS	454	9059-37
7/09/2016	16	L2		98.5	PASS	443	9059-37
7/09/2016	17	L2		99	PASS	448	9059-37
8/09/2016	18	L3		99.5	PASS	424	9059-38
8/09/2016	19	L3		99	PASS	445	9059-38
8/09/2016	20	L2		97	PASS	432	9059-38
20/09/2016	21	L1		101.5	PASS	417	9059-39
20/09/2016	22	L2		100	PASS	419	9059-39
20/09/2016	23	L2		101.5	PASS	415	9059-39
22/09/2016	24	L2		101.5	PASS	416	9059-40
22/09/2016	25	L2		101.5	PASS	413	9059-40
22/09/2016	26	L3		104	PASS	421	9059-40
23/09/2016	27	L3		98.5	PASS	425	9059-41
23/09/2016	28	L3		97	PASS	446	9059-41
23/09/2016	29	L2		99.5	PASS	432	9059-41
24/09/2016	30	L3		103	PASS	418	9059-42
24/09/2016	31	L3		103	PASS	426	9059-42
24/09/2016	32	L3		99.5	PASS	430	9059-42
26/09/2016	33	L4		97.5	PASS	414	9059-43
26/09/2016	34	L4		103.5	PASS	428	9059-43
26/09/2016	35	L3		103.5	PASS	447	9059-43
28/09/2016	36	L3		102	PASS	442	9059-44
28/09/2016	37	FSL		102	PASS	450	9059-44
28/09/2016	38	L4		103.5	PASS	458	9059-44
6/10/2016	42	L4		101	PASS	429	9059-45
6/10/2016	43	FSL		96.5	PASS	458	9059-45
6/10/2016	44	L4		98	PASS	454	9059-45



Level One Test Summary

Client: Excell Gray Bruni
Project: Riverwalk Estate Stage 12

Specification: 95%
Project No: 9059

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
7/10/2016	45	L4		95.5	PASS	442	9059-46
7/10/2016	46	FSL		98	PASS	414	9059-46
7/10/2016	47	L4		95.5	PASS	432	9059-46
10/10/2016	48	L4		100.5	PASS	445	9059-47
10/10/2016	49	L4		99	PASS	448	9059-47
10/10/2016	50	FSL		100.5	PASS	420	9059-47
10/10/2016	51	L4		99.5	PASS	416	9059-47
12/12/2016	52	L1		97.5	PASS	432	9059-48
12/12/2016	53	L1		98.5	PASS	431	9059-48
12/12/2016	54	L1		91.5	FAIL	438	9059-48
13/12/2016	55	L1	54	96.5	PASS	438	9059-49
13/12/2016	56	L2		96.5	PASS	432	9059-49
13/12/2016	57	L2		100	PASS	438	9059-49
13/12/2016	58	L3		98	PASS	431	9059-49
14/12/2016	59	L3		97	PASS	438	9059-50
14/12/2016	60	L4		98	PASS	432	9059-50
14/12/2016	61	L4		99.5	PASS	431	9059-50
16/12/2016	62	L5		100	PASS	431	9059-51
16/12/2016	63	L3		99.5	PASS	432	9059-51
16/12/2016	64	L3		100.5	PASS	438	9059-51
31/01/2017	65	L1		97.5	PASS	445	9059-52
31/01/2017	66	L2		95	PASS	458	9059-52
31/01/2017	67	L2		96	PASS	452	9059-52
31/01/2017	68	L3		95.5	PASS	449	9059-52
31/01/2017	69	L3		96.5	PASS	450	9059-52
31/01/2017	70	FSL		96.5	PASS	456	9059-52
1/02/2017	71	L1		95.5	PASS	452	9059-53
1/02/2017	72	L2		96	PASS	451	9059-53
1/02/2017	73	L2		96.5	PASS	450	9059-53
2/02/2017	74	L2		101	PASS	449	9059-54
2/02/2017	75	L3		98.5	PASS	455	9059-54
2/02/2017	76	L3		102	PASS	457	9059-54
7/02/2017	77	L3		96	PASS	450	9059-55
7/02/2017	78	L3		101.5	PASS	449	9059-55
7/02/2017	79	FSL		96	PASS	448	9059-55
7/02/2017	80	L1		100.5	PASS	431	9059-56
7/02/2017	81	L2		102	PASS	432	9059-56
7/02/2017	82	L3		101.5	PASS	431	9059-56
10/02/2017	83	L1		98.5	PASS	431	9059-57
10/02/2017	84	L2		99.5	PASS	432	9059-57
10/02/2017	85	FSL		100.5	PASS	431	9059-57



Level One Test Summary

Client: Excell Gray Bruni **Specification:** 95%
Project: Riverwalk Estate Stage 12 **Project No:** 9059

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
14/02/2017	86	FSL		103	PASS	431	9059-58
14/02/2017	87	FSL		105.5	PASS	432	9059-58

Please Note: Test numbers 39-41 do not exist.



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-16
date of issue 22-Aug-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by RS
time All Day
date 18-Aug-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2	3		
location	Lot No	460	461	462		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 2	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.97	1.95	1.99		
field dry density	t/m ³	1.55	1.59	1.61		
field moisture content	%	27.5	22.8	23.7		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	1.94	1.94	1.95		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.5	-3.0	-3.0		
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Moisture ratio	%	93.5	87.0	88.0		
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Hilf density ratio (R _{HD})	%	101.5	100.5	102.0		
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material description

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards requirements.
Accredited for compliance with ISO/IEC 17025

Approved Signature
R Schembri



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-22
date of issue 26-Aug-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 24-Aug-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		4	5	6		
location	Lot No	459	449	452		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 2	Layer 1	Layer 1		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.78	1.80	1.93		
field dry density	t/m ³	1.49	1.53	1.61		
field moisture content	%	19.2	17.8	19.7		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.08	2.05	2.01		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	-1.0	0.5		
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Moisture ratio	%	103.0	95.0	103.0		
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Hilf density ratio (R _{HD})	%	85.5	88.0	96.0		
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material description

Silty CLAY



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COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-25
 date of issue 29-Aug-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time All Day
 date 25-Aug-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		7	8	9	10	11	
location	Lot No	Retest of 4	Retest of 5	444	457	455	
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12	Stage 12	Stage 12	
depth from F.S.L.	m	Layer 2	Layer 1	Layer 3	Layer 4	Layer 4	
measurement depth	mm	275	275	275	275	275	
field wet density	t/m ³	1.86	1.85	1.89	1.93	1.90	
field dry density	t/m ³	1.55	1.56	1.57	1.59	1.58	
field moisture content	%	19.8	18.9	20.8	21.6	20.3	

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard	standard	standard	
oversize material retained on AS sieve	mm	19.0	19.0	19.0	19.0	19.0	
percent of oversize material	wet	4	3	0	0	0	
peak converted wet density	t/m ³	-	-	1.93	1.94	1.93	
adjusted peak converted wet density	t/m ³	1.95	1.87	-	-	-	

moisture variation from OMC (-dry,+wet)%		-1.0	-1.0	-3.0	-1.5	-3.0	
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Moisture ratio	%	96.0	96.0	87.5	92.0	86.0	
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Hilf density ratio (R_{HD})	%	95.0	99.0	98.0	99.5	98.5	
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material description

Silty CLAY



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-26
date of issue 30-Aug-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 26-Aug-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		12	13	14		
location	Lot No	427	430	420		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 4	Layer 4		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.89	1.91	1.88		
field dry density	t/m ³	1.52	1.57	1.55		
field moisture content	%	24.6	22.2	21.8		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	1.97	1.94	1.94		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	-0.5	-1.0		
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Moisture ratio	%	101.5	97.5	96.0		
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Hilf density ratio (R _{HD})	%	96.0	98.5	97.0		
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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards requirements.
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Approved Signature
R Schembri



COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-37
date of issue 14-Sep-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 07-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		15	16	17		
location	Lot No	454	443	448		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 2	Layer 2	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.91	1.93	1.91		
field dry density	t/m ³	1.51	1.47	1.46		
field moisture content	%	26.9	30.8	30.6		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	1.92	1.96	1.93		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	-1.5	-1.0		
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Moisture ratio	%	97.0	95.0	97.0		
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Hilf density ratio (R_{HD})	%	99.5	98.5	99.0		
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COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-38
date of issue 14-Sep-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 08-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		18	19	20		
location	Lot No	424	445	432		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 3	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.90	1.92	1.94		
field dry density	t/m ³	1.51	1.49	1.52		
field moisture content	%	25.9	28.8	27.4		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	1.91	1.94	2		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.5	0.5		
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Moisture ratio	%	96.0	102.0	103.0		
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Hilf density ratio (R _{HD})	%	99.5	99.0	97.0		
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Approved Signature
R Schembri



COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-39
date of issue 23-Sep-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Stage 12
Layer thickness (mm) 300

tested by JN
time ALL DAY
date 20-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		21	22	23		
location	Lot No	417	419	415		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 2	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.04	2.04	2.08		
field dry density	t/m ³	1.66	1.74	1.72		
field moisture content	%	23.0	17.3	21.0		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.01	2.04	2.05		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	-0.5	-1.0		
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Moisture ratio	%	102.5	96.0	96.0		
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Hilf density ratio (R_{HD})	%	101.5	100.0	101.5		
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material description

Silty Clay



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards.
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Accredited for compliance with ISO/IEC 17025

Approved Signature
R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-40
 date of issue 03-Oct-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time All Day
 date 22-Sep-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		24	25	26		
location	Lot No	416	413	421		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 2	Layer 2	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.02	2.04	2.01		
field dry density	t/m ³	1.40	1.43	1.40		
field moisture content	%	44.6	42.8	43.3		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	16		
peak converted wet density	t/m ³	1.99	2.01	2		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.5	1.0		
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Moisture ratio	%	97.5	102.0	103.5		
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Hilf density ratio (R_{HD})	%	101.5	101.5	104.0		
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material description

Silty CLAY





COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-41
date of issue 03-Oct-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 23-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		27	28	29		
location	Lot No	425	446	432		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 3	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.05	2.01	2.06		
field dry density	t/m ³	1.69	1.65	1.67		
field moisture content	%	21.4	21.8	23.0		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.08	2.07	2.07		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		3.5	3.0	3.0		
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Moisture ratio	%	119.5	117.0	114.5		
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Hilf density ratio (R_{HD})	%	98.5	97.0	99.5		
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material description

Silty Clay



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Accredited for compliance with ISO/IEC 17025

Approved Signature
R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-42
 date of issue 03-Oct-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time All Day
 date 24-Sep-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		30	31	32		
location	Lot No	418	426	430		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 3	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.08	2.05	2.06		
field dry density	t/m ³	1.77	1.74	1.78		
field moisture content	%	17.5	18.0	15.7		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.02	1.99	2.07		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.0	-0.5	1.0		
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Moisture ratio	%	98.5	98.0	106.5		
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Hilf density ratio (R_{HD})	%	103.0	103.0	99.5		
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material description

Silty Clay





COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-43
date of issue 03-Oct-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Stage 12
Layer thickness (mm) 300

tested by JN
time All Day
date 26-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No	33	34	35			
location Lot No	414	428	447			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)	Stage 12	Stage 12	Stage 12			
depth from F.S.L. m	Layer 4	Layer 4	Layer 3			
measurement depth mm	275	275	275			
field wet density t/m ³	1.96	1.95	1.93			
field dry density t/m ³	1.60	1.48	1.49			
field moisture content %	22.8	31.8	29.6			

laboratory compaction procedure AS1289 5.7.1

compactive effort	standard	standard	standard			
oversize material retained on AS sieve mm	19.0	19.0	19.0			
percent of oversize material wet	0	0	0			
peak converted wet density t/m ³	2.01	1.88	1.86			
adjusted peak converted wet density t/m ³	-	-	-			

moisture variation from OMC (-dry,+wet)%	0.5	-1.5	-1.5			
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Moisture ratio %	101.5	95.0	94.5			
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Hilf density ratio (R_{HD}) %	97.5	103.5	103.5			
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material description

Silty CLAY



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R Schembri



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-44
date of issue 03-Oct-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time All Day
date 28-Sep-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		36	37	38		
location	Lot No	442	450	458		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	FSL	Layer 4		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.04	2.05	2.07		
field dry density	t/m ³	1.80	1.80	1.80		
field moisture content	%	13.5	14.1	14.5		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2	2.01	2		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-2.0	-1.5	-0.5		
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Moisture ratio	%	87.5	90.5	96.0		
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Hilf density ratio (R _{HD})	%	102.0	102.0	103.5		
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material description

Silty CLAY



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R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-45
 date of issue 11-Oct-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 06-Oct-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		42	43	44		
location	Lot No	429	458	454		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 4	FSL	Layer 4		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.75	1.72	1.71		
field dry density	t/m ³	1.31	1.29	1.29		
field moisture content	%	32.7	32.5	32.9		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	1.73	1.78	1.75		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.5	1.0	-1.0		
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Moisture ratio	%	95.5	104.0	97.5		
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Hilf density ratio (R_{HD})	%	101.0	96.5	98.0		
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material description

Silty CLAY





COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-46
date of issue 11-Oct-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time ALL DAY
date 07-Oct-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		45	46	47		
location	Lot No	442	414	432		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 4	FSL	Layer 4		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.05	2.03	2.02		
field dry density	t/m ³	1.72	1.69	1.69		
field moisture content	%	19.1	20.0	19.4		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.15	2.07	2.11		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.5	0.5		
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Moisture ratio	%	94.5	103.0	103.0		
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Hilf density ratio (R _{HD})	%	95.5	98.0	95.5		
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material description

Silty CLAY



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R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-47
 date of issue 13-Oct-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 10-Oct-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		48	49	50	51		
location	Lot No	445	448	420	416		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 4	Layer 4	FSL	Layer 4		
measurement depth	mm	275	275	275	275		
field wet density	t/m ³	1.90	1.91	1.90	1.90		
field dry density	t/m ³	1.53	1.53	1.53	1.53		
field moisture content	%	24.0	25.0	24.2	24.2		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0	0		
peak converted wet density	t/m ³	1.89	1.93	1.89	1.9		
adjusted peak converted wet density	t/m ³	-	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.5	-2.0	-1.5	-1.5		
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Moisture ratio	%	93.5	92.5	94.0	93.5		
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Hilf density ratio (R_{HD})	%	100.5	99.0	100.5	99.5		
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material description

Silty CLAY



COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-48
date of issue 19-Dec-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by EH
time All Day
date 12-Dec-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		52	53	54		
location	Lot No	432	431	438		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 1	Layer 1		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.95	1.90	1.93		
field dry density	t/m ³	1.66	1.62	1.65		
field moisture content	%	16.9	17.5	16.7		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2	1.93	2.11		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	0.0	-0.5		
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Moisture ratio	%	102.0	98.5	98.0		
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Hilf density ratio (R_{HD})	%	97.5	98.5	91.5		
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material description

Silty CLAY



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requirements.
Accredited for compliance with ISO/IEC 17025

Approved Signature
R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-49
 date of issue 19-Dec-2016

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by WF
 time All Day
 date 13-Dec-2016
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		55	56	57	58		
location	Lot No	438	432	438	431		
		Re-Test of 54					
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 2	Layer 2	Layer 3		
measurement depth	mm	275	275	275	275		
field wet density	t/m ³	2.02	2.04	2.00	2.01		
field dry density	t/m ³	1.71	1.74	1.72	1.70		
field moisture content	%	18.0	17.1	16.5	18.2		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0	0		
peak converted wet density	t/m ³	2.1	2.11	2	2.05		
adjusted peak converted wet density	t/m ³	-	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	0.0	0.0	0.5		
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Moisture ratio	%	102.0	101.5	100.5	103.5		
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Hilf density ratio (R_{HD})	%	96.5	96.5	100.0	98.0		
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material description

Silty CLAY



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-50
date of issue 19-Dec-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by WF
time All Day
date 14-Dec-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		59	60	61		
location	Lot No	438	432	431		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 4	Layer 4		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.01	2.01	2.04		
field dry density	t/m ³	1.70	1.67	1.70		
field moisture content	%	18.0	20.8	19.9		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.07	2.05	2.05		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	0.0	0.5		
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Moisture ratio	%	102.5	100.0	103.0		
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Hilf density ratio (R _{HD})	%	97.0	98.0	99.5		
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material description

Silty CLAY



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards.
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R Schembri



COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

Terra Firma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-51
date of issue 19-Dec-2016

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by WF
time All Day
date 16-Dec-2016
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No	62	63	64			
location Lot No	431	432	438			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)	Stage 12	Stage 12	Stage 12			
depth from F.S.L. m	Layer 5	Layer 5	Layer 5			
measurement depth mm	275	275	275			
field wet density t/m ³	2.02	2.03	2.08			
field dry density t/m ³	1.63	1.66	1.67			
field moisture content %	23.9	22.6	24.5			

laboratory compaction procedure AS1289 5.7.1

compactive effort	standard	standard	standard			
oversize material retained on AS sieve mm	19.0	19.0	19.0			
percent of oversize material wet	0	0	0			
peak converted wet density t/m ³	2.02	2.04	2.07			
adjusted peak converted wet density t/m ³	-	-	-			

moisture variation from OMC (-dry,+wet)%	0.0	0.0	0.0			
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Moisture ratio %	100.0	99.0	100.0			
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Hilf density ratio (R_{HD}) %	100.0	99.5	100.5			
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material description

Silty CLAY



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R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-52
 date of issue 08-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time All Day
 date 31-Jan-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No	65	66	67	68	69	70
location Lot No	445	458	452	449	450	456
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)	Stage 12	Stage 12	Stage 12	Stage 12	Stage 12	Stage 12
depth from F.S.L. m	Layer 1	Layer 2	Layer 2	Layer 3	Layer 3	FSL
measurement depth mm	275	275	275	275	275	275
field wet density t/m ³	1.95	1.85	1.89	1.90	1.93	1.87
field dry density t/m ³	1.62	1.55	1.61	1.55	1.63	1.51
field moisture content %	20.7	18.7	17.6	22.9	18.5	23.9

laboratory compaction procedure AS1289 5.7.1

compactive effort	standard	standard	standard	standard	standard	standard
oversize material retained on AS sieve mm	19.0	19.0	19.0	19.0	19.0	19.0
percent of oversize material wet	0	0	0	0	0	0
peak converted wet density t/m ³	2	1.94	1.97	1.99	2	1.93
adjusted peak converted wet density t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%	-0.5	0.0	-0.5	0.0	0.0	0.0
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Moisture ratio %	98.5	98.5	98.0	101.0	98.5	99.5
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Hilf density ratio (R_{HD}) %	97.5	95.0	96.0	95.5	96.5	96.5
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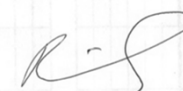
material description

Silty CLAY



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards requirements.
 Accredited for compliance with ISO/IEC 17025

LABORATORY ACCREDITATION No 15357



Approved Signature
 R Schembri



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-53
date of issue 08-Feb-2017

Client Excell Gray Bruni
Client address 12 Allied Drive, Tullamarine, 3043
Project Riverwalk Estate Stage 12,13,14
Location Werribee

Feature Lot Fill
Layer thickness (mm) 300

tested by JN
time ALL DAY
date 01-Feb-2017
checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		71	72	73		
location	Lot No	452	451	450		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 2	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.97	2.01	1.99		
field dry density	t/m ³	1.72	1.77	1.75		
field moisture content	%	14.3	13.8	14.0		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.06	2.1	2.07		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	-0.5	-2.0		
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Moisture ratio	%	94.5	96.0	88.0		
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Hilf density ratio (R _{HD})	%	95.5	96.0	96.5		
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material description

Silty CLAY



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian national standards requirements.
Accredited for compliance with ISO/IEC 17025

LABORATORY ACCREDITATION No 15357

Approved Signature
R Schembri

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-54
 date of issue 08-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 02-Feb-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		74	75	76		
location	Lot No	449	455	457		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 2	Layer 3	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.02	2.04	1.97		
field dry density	t/m ³	1.74	1.73	1.74		
field moisture content	%	15.9	18.1	13.3		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2	2.07	1.93		
adjusted peak converted wet density	t/m ³	-	-	-		

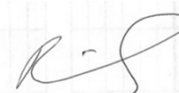
moisture variation from OMC (-dry,+wet)%		-1.5	0.5	-3.5		
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Moisture ratio	%	90.5	102.0	78.5		
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Hilf density ratio (R_{HD})	%	101.0	98.5	102.0		
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material description

Silty CLAY



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-55
 date of issue 09-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 07-Feb-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		77	78	79		
location	Lot No	450	449	448		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 3	Layer 3	FSL		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.04	2.05	2.03		
field dry density	t/m ³	1.73	1.80	1.69		
field moisture content	%	17.9	14.0	20.3		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	8		
peak converted wet density	t/m ³	2.125	2.015	-		
adjusted peak converted wet density	t/m ³	-	-	2.12		

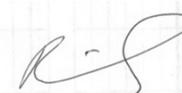
moisture variation from OMC (-dry,+wet)%		0.5	-3.0	1.0		
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Moisture ratio	%	104.0	81.5	105.5		
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Hilf density ratio (R_{HD})	%	96.0	101.5	96.0		
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material description

Silty CLAY



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-56
 date of issue 09-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 07-Feb-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		80	81	82		
location	Lot No	431	432	431		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 2	Layer3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.05	2.07	2.09		
field dry density	t/m ³	1.73	1.73	1.75		
field moisture content	%	18.5	20.0	19.3		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.04	2.03	2.06		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.5	-0.5		
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Moisture ratio	%	94.5	103.0	97.0		
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Hilf density ratio (R_{HD})	%	100.5	102.0	101.5		
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material description

Silty CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-57
 date of issue 16-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 10-Feb-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		83	84	85		
location	Lot No	431	432	431		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12	Stage 12		
depth from F.S.L.	m	Layer 1	Layer 2	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	2.05	2.08	2.08		
field dry density	t/m ³	1.87	1.90	1.90		
field moisture content	%	9.4	9.3	9.7		

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard	standard		
oversize material retained on AS sieve	mm	19.0	19.0	19.0		
percent of oversize material	wet	0	0	0		
peak converted wet density	t/m ³	2.08	2.09	2.07		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.5	-3.5	-3.5		
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Moisture ratio	%	72.5	72.0	73.0		
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Hilf density ratio (R_{HD})	%	98.5	99.5	100.5		
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material description

Silty CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

Terraforma Laboratories - Deer Park Laboratory
 Factory 6 / 22-24 Westwood Drive, Deer Park Phone No: 8348 5596

report No 9059-58
 date of issue 17-Feb-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 12,13,14
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by JN
 time ALL DAY
 date 14-Feb-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		86	87			
location	Lot No	431	432			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		Stage 12	Stage 12			
depth from F.S.L.	m	FSL	FSL			
measurement depth	mm	275	275			
field wet density	t/m ³	2.03	2.06			
field dry density	t/m ³	1.80	1.80			
field moisture content	%	12.6	14.2			

laboratory compaction procedure AS1289 5.7.1

compactive effort		standard	standard			
oversize material retained on AS sieve	mm	19.0	19.0			
percent of oversize material	wet	0	0			
peak converted wet density	t/m ³	1.97	1.95			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		-4.0	-4.5			
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Moisture ratio	%	76.0	75.5			
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Hilf density ratio (R_{HD})	%	103.0	105.5			
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material description

Silty CLAY