

Riverwalk Estate Stage 18

GITA Inspection Verification Report

Prepared For: Excell Gray Bruni

Report Number 10139A V1

Version Release Date 31/08/2018

Report Released By Richard Schembri

Title Laboratory Manager

Signature



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1 Introduction

Terra Firma Laboratories was engaged by *Excell Gray Bruni* as the Geotechnical Inspection and Testing Authority (GITA) to provide Level 1 supervision and testing works on the earthworks component for Riverwalk Estate Stage 18. This work was conducted over the period of 15/02/2018 to 22/02/2018.

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 Work

2.1 Area of Work

The areas of work included lots 1803, 1804, 1805, 1806, 1807, 1808, 1813, 1816 and 1819. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1: *Test Location Plan*) based on drawings prepared by Smec Urban Development Ref 1932E-18-03 and provided by *Excell Gray Bruni*.

The supervision work by the GITA involved both inspection of sub grade preparation work and full time inspection and testing of fill placement.

2.2 Specification

The technical specification (Drawing Reference 1932E-18-03) for compaction control requirements was provided by *Excell Gray Bruni* and established that:

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.

Section 5.2 of 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 5.1.1 and AS1289 5.2.1.

In accordance with Table 8.1 (AS3798), for large scale operations, (greater than 1500m²), the minimum testing frequency is 1 test per layer per material type per 2500m² or 1 test per 500m³ distributed reasonable evenly throughout full depth and area or 3 tests per lot. AS3798 defines a lot as “an area of work that is essentially homogenous in relation to material type and moisture condition, rolling response and compaction technique, and which has been used for the assessment of the relative compaction of an area of work”. All three of these test frequencies must be achieved and this is typically confirmed to have been achieved when 3 tests per visit (day) have been completed.

2.3 Limitations

Terra Firma Laboratories cannot verify any works completed by others outside of the time period specified in the introduction. Uncontrolled works may include, but are not limited to trenching for services, cut and fill works for slab preparation or subsequent removal of vegetation and back fill of holes unless specified in section 2.1 of this report.

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

Verification of finished surface level to design levels is outside of the scope of the GITA report.

3 Construction Method

3.1 Subgrade Preparation

At the time of subgrade inspection the following was observed:

- Subgrade preparation involved stripping the site of topsoil, vegetation and organic matter to a depth of approximately 200mm below existing levels.
- The site was cleared of all trees and stumps to the extent necessary for the fill placement to proceed
- The roots of all trees and any debris was removed from site prior to any fill placement

The sub-grade area was then proof-rolled to confirm it was capable of withstanding test rolling without visible deformation or springing and any areas observed to be soft or otherwise unsuitable were rectified. The sub-grade was watered and scarified prior to fill placement to aid layer bonding.

3.2 Fill Placement

The contractor was observed to have suitable construction equipment and plant available on-site during the construction period for use in the fill placement.

All fill was placed in layers of thicknesses not exceeding 300mm. At the completion of a placed layer, compaction testing was performed to confirm appropriate compaction had been achieved and supported the observations made. It should be noted that the compaction tests are representative samples of the fill placed and support the visual assessment of the works completed. Each house lot does not necessarily require a compaction test to have been conducted within the house allotment but may have been verified by testing conducted within up to a 2500m² area of the house lot.

Final fill placement levels were verified against design level by others. For the purposes of this report, it was observed that finished levels were in accordance with levels marked on site by survey markers.

The final 300mm of fill placed across the site was placed as a topsoil layer or growing medium and should be considered as non-structural, as it was placed in an uncontrolled manner, as allowed by specifications and placement of the final 300mm of fill was not observed by the GITA.

4 Construction Verification

Compaction Verification testing is summarized in a detailed test register with test certificates attached provided in Appendix 2: *Compaction Test Register and Test Certificates*. A test location plan (10139D1, Appendix 1) providing a schematic of test locations across the extent of scope of works for every placed layer of fill is also documented.

A total of 20 density tests (Hilf method in accordance with 1289 5.7.1) were undertaken. The results summarised in the compaction test register (Appendix 2) confirm that for every layer of fill placed in a specific work area, satisfactory testing was completed.

5 Statement of Compliance

The intention of this report is to provide a description of the earthworks construction for Stage 18 at Riverwalk Estate. For completed fill areas of greater than 300mm, and for works completed between 15/02/2018 and 22/02/2018, earthworks construction activities were conducted under the full time supervision of the Geotechnical Inspection and Testing Authority. 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. The earthworks construction for Stage 18 of Riverwalk Estate Stage 18 was observed to be constructed in compliance with the requirements of the Technical Specification.



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Test Location Plan

not to scale

Client: Excell Gray Bruni

Project: Riverwalk Estate, Stage 18

Reference: 10139 D1



Compaction Test Register

Client: Excell Gray Bruni **Project No:** 10139
Project: Riverwalk Estate Stage 18 **Specification:** 95%

Date:	Test No:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
15/02/2018	1	L1		98	Pass	1805	10139-1
15/02/2018	2	L1		97	Pass	1807	10139-1
15/02/2018	3	L1		97.5	Pass	1813	10139-1
16/02/2018	4	L4		95.5	Pass	1807	10139-2
16/02/2018	5	L5		95.5	Pass	1805	10139-2
16/02/2018	6	L6		95	Pass	1804	10139-2
19/02/2018	7	L2		99	Pass	1807	10139-3
19/02/2018	8	L2		100	Pass	1805	10139-3
19/02/2018	9	L2		101	Pass	1803	10139-3
20/02/2018	10	L3		98.5	Pass	1813	10139-4
20/02/2018	11	L3		98	Pass	1816	10139-4
20/02/2018	12	L3		95.5	Pass	1819	10139-4
21/02/2018	13	L4		96.5	Pass	1803	10139-5
21/02/2018	14	L4		97.5	Pass	1805	10139-5
21/02/2018	15	L4		95.5	Pass	1807	10139-5
21/02/2018	16	L5		95.5	Pass	1804	10139-5
21/02/2018	17	L5		95.5	Pass	1806	10139-5
22/02/2018	18	L6		95.5	Pass	1804	10139-6
22/02/2018	19	L6		96	Pass	1806	10139-6
22/02/2018	20	L6		96	Pass	1808	10139-6



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 10139-1
 date of issue 09-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Location Lot Fill
 Layer thickness (mm) 300

tested by RF, EH
 time ALL DAY
 date 15-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2	3		
location	Lot No	1805	1807	1813		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 1	Layer 1	Layer 1		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.81	1.86	1.91		
field dry density	t/m ³	1.65	1.69	1.74		
field moisture content	%	10.1	9.9	9.6		

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	1.851	1.917	1.96		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.0	-3.0	-3.0		
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Moisture ratio	%	78.5	78.0	77.5		
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Hilf density ratio (R_{HD})	%	98.0	97.0	97.5		
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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

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 10139-2
 date of issue 09-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Location Lot Fill
 Layer thickness (mm) 300

tested by EH
 time ALL DAY
 date 16-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		4	5	6		
location	Lot No	1807	1805	1804		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 1	Layer 1	Layer 1		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.90	1.89	1.91		
field dry density	t/m ³	1.69	1.67	1.69		
field moisture content	%	12.5	12.7	12.7		

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	1.985	1.975	2.01		
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	%	77.0	77.5	78.0		
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Hilf density ratio (R_{HD})	%	95.5	95.5	95.0		
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material description

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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 10139-3
 date of issue 09-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Location Lot Fill
 Layer thickness (mm) 300

tested by EH
 time ALL DAY
 date 19-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		7	8	9		
location	Lot No	1807	1805	1803		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 2	Layer 2	Layer 2		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.81	1.81	1.82		
field dry density	t/m ³	1.58	1.58	1.59		
field moisture content	%	14.6	14.7	14.6		

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	1.825	1.815	1.805		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.0	-3.0	-3.0		
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Moisture ratio	%	83.5	83.5	83.5		
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Hilf density ratio (R_{HD})	%	99.0	100.0	101.0		
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material description

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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 10139-4
 date of issue 09-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Location Lot Fill
 Layer thickness (mm) 300

tested by RF, EH
 time ALL DAY
 date 20-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		10	11	12		
location	Lot No	1813	1816	1819		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 3	Layer 3	Layer 3		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.93	1.92	1.87		
field dry density	t/m ³	1.51	1.57	1.57		
field moisture content	%	27.8	21.9	18.9		

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	1.955	1.96	1.961		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.5	-3.5	-4.0		
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Moisture ratio	%	87.0	85.5	82.0		
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Hilf density ratio (R_{HD})	%	98.5	98.0	95.5		
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material description

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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 10139-5
 date of issue 10-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Feature Lot Fill
 Layer thickness (mm) 300

tested by EH
 time All Day
 date 21-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		13	14	15	16	17	
location	Lot No	1803	1805	1807	1804	1806	
Sampling procedures AS1289.1.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 4	Layer 4	Layer 4	Layer 5	Layer 5	
measurement depth	mm	275	275	275	275	275	
field wet density	t/m ³	1.98	2.00	1.99	1.97	1.91	
field dry density	t/m ³	1.65	1.65	1.63	1.56	1.60	
field moisture content	%	19.6	20.9	21.6	26.2	19.7	

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	0	0	0	0	0	
peak converted wet density	t/m ³	2.05	2.05	2.08	2.06	2	
adjusted peak converted wet density	t/m ³	-	-	-	-	-	

moisture variation from OMC (-dry,+wet)%		-1.5	-2.0	-1.5	-3.5	-3.0	
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Moisture ratio	%	91.5	89.5	92.0	87.5	85.5	
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Hilf density ratio (R_{HD})	%	96.5	97.5	95.5	95.5	95.5	
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material description

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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 10139-6
 date of issue 10-May-2018

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 18 Level One
 Location Werribee

Location Lot Fill
 Layer thickness (mm) 300

tested by EH
 time All Day
 date 22-Feb-2018
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		18	19	20		
location	Lot No	1804	1806	1808		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 6	Layer 6	Layer 6		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.89	1.87	1.86		
field dry density	t/m ³	1.66	1.63	1.62		
field moisture content	%	13.8	14.9	15.0		

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	1.975	1.955	1.935		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.0	-3.0	-3.0		
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Moisture ratio	%	83.0	84.0	83.5		
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Hilf density ratio (R_{HD})	%	95.5	96.0	96.0		
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