



47 National Avenue,
Pakenham VIC 3810

ph: 03 9769 5799
fax: 03 9769 4799
mob: 0417 004 072
tseymour@terrafirmalabs.com.au

www.terrafirmalabs.com.au

ABN: 11 925 206 385

**Geotechnical Report
Level One Inspection and Testing**

**Riverwalk Estate Stage 5 Lot Fronts
Werribee**

Prepared for:

**Excell Gray Bruni
12 Allied Drive
Tullamarine**

Project 9564

07 June 2017.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

47 National Avenue,
Pakenham VIC 3810
Phone: 03 9769 5799 Fax: 03 9769 4799
Email: tseymour@terrafirmalabs.com.au

Geotechnical Report Level One Inspection and Testing Riverwalk Estate Stage 5 Lot Fronts

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 5 Lot Fronts. This work was conducted on the 19/04/2017.

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 508, 517, 518, 519 and 520. 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 Australia Pty Ltd 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.

A technical specification for compaction control requirements was provided by Excell Gray Bruni and established that:

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:

- *Excavator*
- *Dump Truck*
- *Pad Foot Roller*
- *Watercart*
- *Grader*

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

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 19/04/2017 or work completed after the 19/04/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,



Tom Seymour
Lab Manager



APPENDICES

Appendix 1: Site Plans

Appendix 2: Test Summary

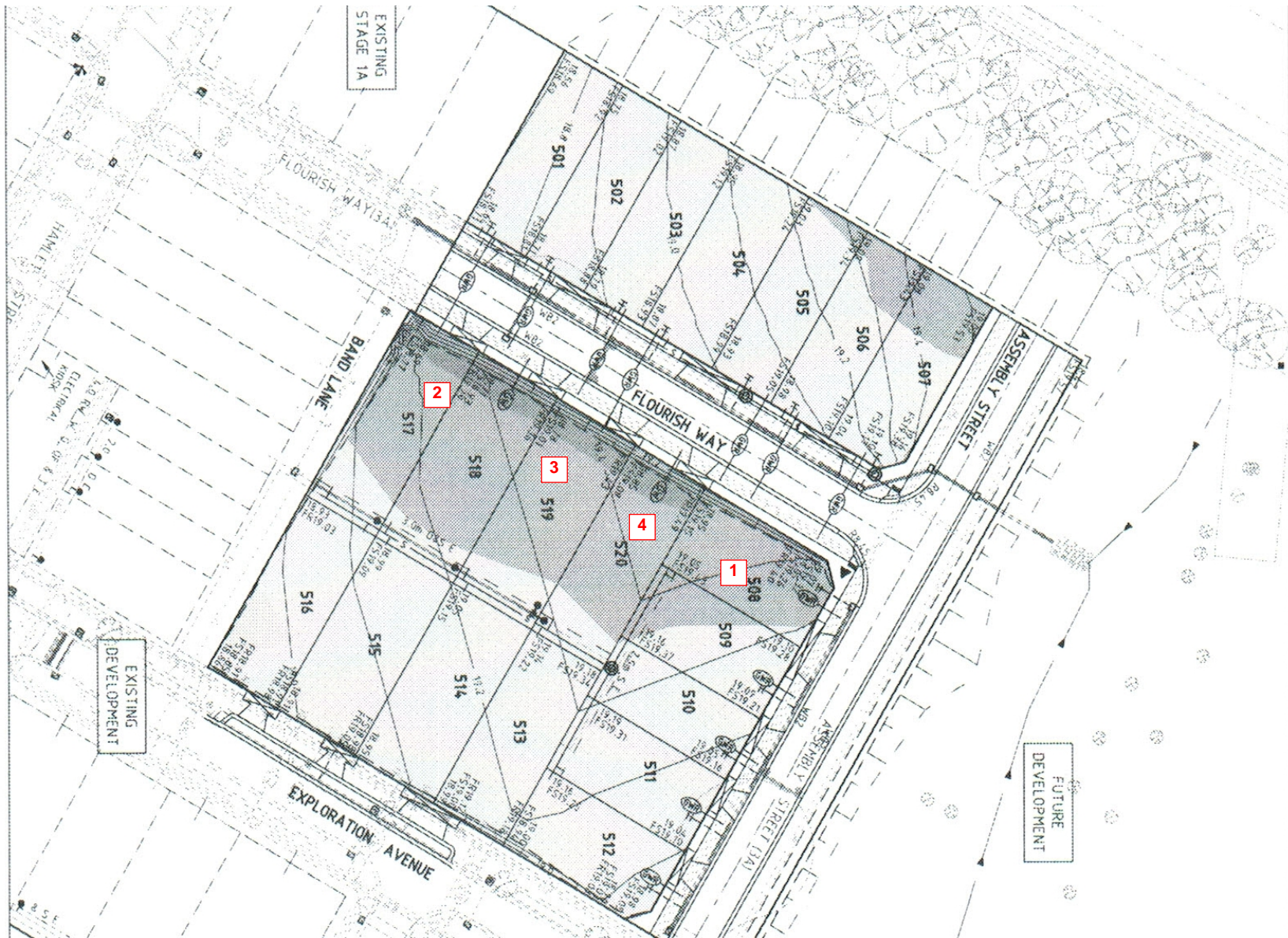
Appendix 3: Test Reports

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Level One Test Summary Test Summary

Client: Excell Bruni Gray **Specification:** 95%
Project: River Walk Stage 5 Lot Fronts **Project No:** 9564

Date:	Test Numb	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report Number
19/04/2017	1	1		98	PASS	508	9546-1
19/04/2017	2	1		103	PASS	517	9546-1
19/04/2017	3	1		96.5	PASS	519	9546-1
19/04/2017	4	1		100.5	PASS	520	9546-1

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

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

report No 9546-1
 date of issue 02-May-2017

Client Excell Gray Bruni
 Client address 12 Allied Drive, Tullamarine, 3043
 Project Riverwalk Estate Stage 5 Lot Fronts
 Location Werribee

Feature Front of Lots (Lot Fill)
 Layer thickness (mm) 300

tested by RS
 time ALL DAY
 date 19-Apr-2017
 checked by RS

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2	3	4		
location	Lot No	508	517	519	520		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 1	Layer 1	Layer 1		
measurement depth	mm	275	275	275	275		
field wet density	t/m ³	2.09	2.10	2.04	2.09		
field dry density	t/m ³	1.87	1.81	1.71	1.79		
field moisture content	%	11.7	16.0	19.0	16.5		

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	2.13	2.045	2.11	2.075		
adjusted peak converted wet density	t/m ³	-	-	-	-		

moisture variation from OMC (-dry,+wet)%		-3.0	-3.0	1.0	-1.0		
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Moisture ratio	%	79.0	83.5	106.0	93.0		
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Hilf density ratio (R_{HD})	%	98.0	103.0	96.5	100.5		
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material description

Silty CLAY