

**Geotechnical Report
Level One Inspection and Testing**

**Lavender Estate Stage 1
Beaconsfield VIC**

Prepared for:

**Streetworks Pty Ltd
4 Len Thomas Place
Narre Warren VIC**

PROJECT No 8663

21 December 2015.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

12 Enterprise Ave
BERWICK, VIC. 3806
Phone: 03 9769 5799 Fax: 03 9769 4799
Email: tseymour@terrafirmalabs.com.au

Geotechnical Report Level One Inspection and Testing Lavender Estate Stage 1

1. Introduction

Terra Firma Laboratories was engaged by *Streetworks Pty Ltd* as the geotechnical inspection and testing authority to provide Level 1 supervision and testing works on the earthworks component for Lavender Estate Stage 1. This work was conducted over the period of 30/11/2015 to 01/12/2015.

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 111 to 117. 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 Dalton consulting Engineers and provided by *Streetworks Pty Ltd*.

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 *Streetworks Pty Ltd*. 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:

- *Scraper*
- *Dozer*
- *Pad Foot Roller*
- *Water Cart*

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

Test numbers 4 and 5 originally failed to meet specification. Streetworks Pty Ltd were notified and asked to rework the areas appropriately. Upon adequate reworking Terra Firma Laboratories would conduct a retest; 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 31/11/2015 or work completed after the 01/12/2015, 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

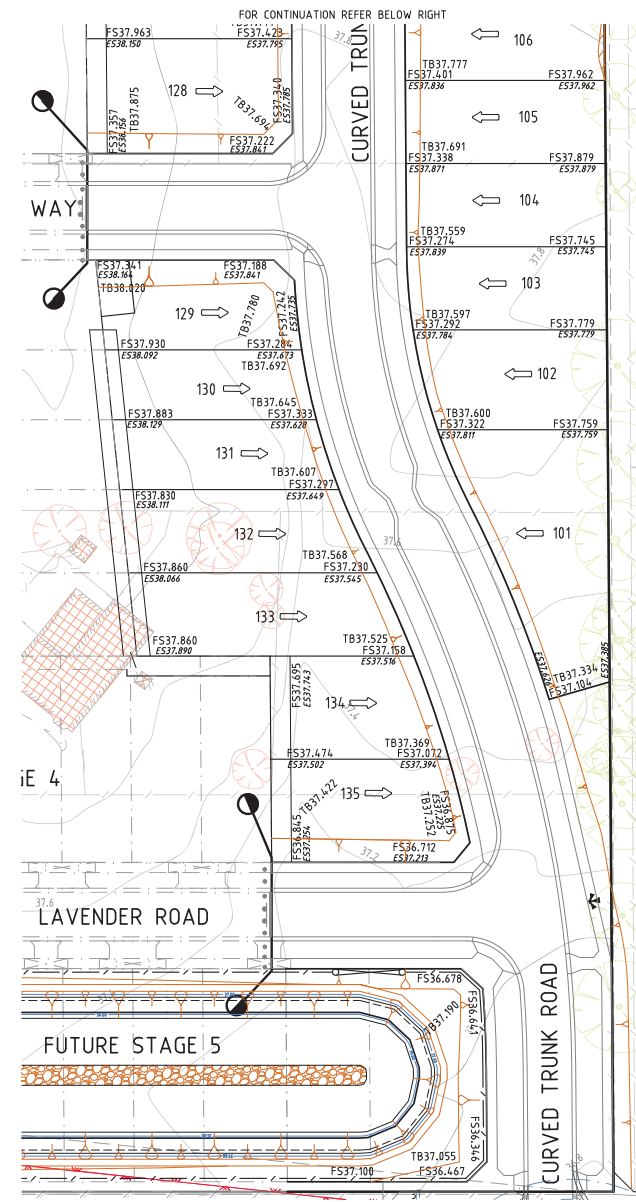
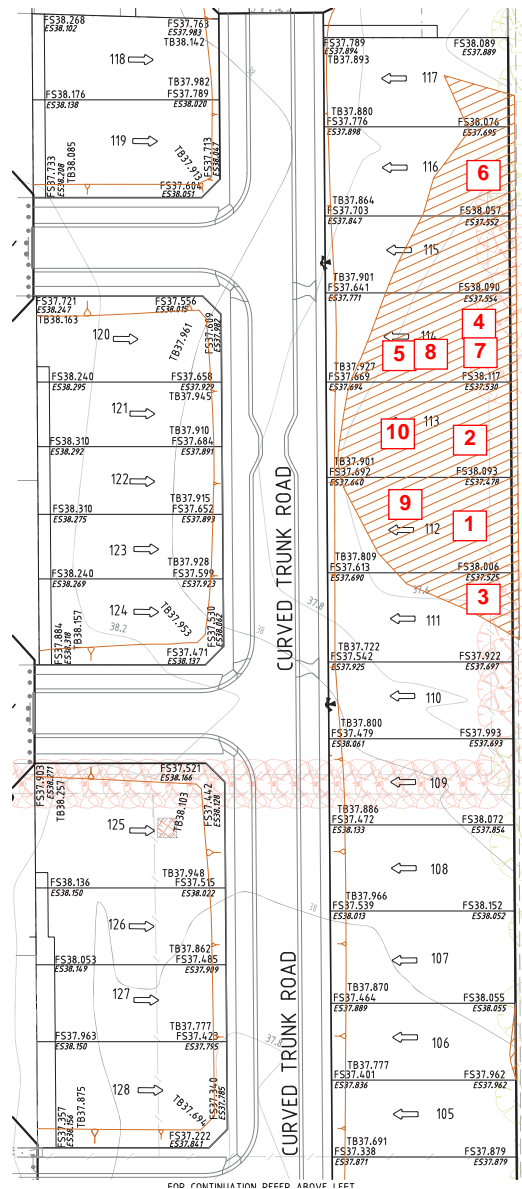
Appendix 3: Test Reports

12 Enterprise Avenue
Berwick 3806

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



12 Enterprise Ave
Berwick
Vic 3806

Test Location Plan

Client : Streetworks Pty Ltd

Project : Lavender Estate Stage 1,
Beaconsfield

Scale
NTS



Level One Test Summary Test Summary

Client: Streetworks Pty Ltd **Specification:** 95%
Project: Lavender Estate Stage 1 **Project No:** 8663

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
30/11/2015	1	L1		96	PASS	112	8663-1
30/11/2015	2	L1		96	PASS	113	8663-1
30/11/2015	3	L2		96.5	PASS	111	8663-2
30/11/2015	4	L2		92.5	FAIL	114	8663-2
30/11/2015	5	L3		94.5	FAIL	114	8663-3
30/11/2015	6	L3		95.5	PASS	116	8663-3
1/12/2015	7	L2	4	102	PASS	114	8663-4
1/12/2015	8	L3	5	96.5	PASS	114	8663-4
1/12/2015	9	L4		96	PASS	112	8663-4
1/12/2015	10	L4		98	PASS	113	8663-4

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806

ph 97695799 fax 97694799

report No 8663-1

date of issue 01-Dec-2015

Client Streetworks
 Client address 4 Len Thomas Place, Narre Warren, 3805
 Project Lavender Estate Stage 1
 Location Beaconsfield

Feature Block Fill
 Layer thickness (mm) 300

tested by HC
 time All Day
 date 30-Nov-2015
 checked by DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2			
location	Lot No	112	113			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	L1	L1			
measurement depth	mm	275	275			
field wet density	t/m ³	1.97	1.93			
field dry density	t/m ³	1.78	1.74			
field moisture content	%	10.6	10.9			

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	2.05	2.011			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		-0.5	-2.5			
--	--	------	------	--	--	--

Moisture ratio	%	94.0	83.0			
-----------------------	----------	-------------	-------------	--	--	--

Hilf density ratio (R_{HD})	%	96.0	96.0			
--	----------	-------------	-------------	--	--	--

material description

Silty CLAY





COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806

ph 97695799 fax 97694799

report No 8663-2

date of issue 02-Dec-2015

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Lavender Estate Stage 1
Location Beaconsfield

Feature Block Fill
Layer thickness (mm) 300

tested by HC
time All Day
date 30-Nov-2015
checked by DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		3	4			
location	Lot No	111	114			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	L2	L2			
measurement depth	mm	275	275			
field wet density	t/m ³	1.98	1.92			
field dry density	t/m ³	1.69	1.62			
field moisture content	%	17.1	17.9			

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	2.05	2.07			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		-0.5	1.5			
--	--	------	-----	--	--	--

Moisture ratio	%	96.0	108.0			
-----------------------	----------	-------------	--------------	--	--	--

Hilf density ratio (R_{HD})	%	96.5	92.5			
--	----------	-------------	-------------	--	--	--

material description

Silty CLAY



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

LABORATORY ACCREDITATION No 15357

Approved Signature

D Burgess

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806

ph 97695799 fax 97694799

report No 8663-3

date of issue 02-Dec-2015

Client Streetworks
 Client address 4 Len Thomas Place, Narre Warren, 3805
 Project Lavender Estate Stage 1
 Location Beaconsfield

Feature Block Fill
 Layer thickness (mm) 300

tested by HC
 time All Day
 date 30-Nov-2015
 checked by DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		5	6			
location	Lot No	114	116			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	L3	L3			
measurement depth	mm	275	275			
field wet density	t/m ³	1.98	1.99			
field dry density	t/m ³	1.70	1.73			
field moisture content	%	16.6	15.1			

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	2.1	2.09			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		-0.5	0.5			
--	--	------	-----	--	--	--

Moisture ratio	%	98.0	104.0			
-----------------------	----------	-------------	--------------	--	--	--

Hilf density ratio (R_{HD})	%	94.5	95.5			
--	----------	-------------	-------------	--	--	--

material description

Silty CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806

ph 97695799 fax 97694799

report No 8663-4

date of issue 02-Dec-2015

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Lavender Estate Stage 1
Location Beaconsfield

Feature Block Fill
Layer thickness (mm) 300

tested by HC
time AM
date 01-Dec-2015
checked by DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		7	8	9	10		
location	Lot No	114	114	112	113		
		Retest of 4	Retest of 5				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	L2	L3	L4	L4		
measurement depth	mm	275	275	275	275		
field wet density	t/m ³	2.10	2.00	2.02	2.03		
field dry density	t/m ³	1.78	1.72	1.78	1.73		
field moisture content	%	18.2	16.6	13.3	17.2		

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	2.06	2.07	2.1	2.07		
adjusted peak converted wet density	t/m ³	-	-	-	-		

moisture variation from OMC (-dry,+wet)%		1.0	0.0	0.0	-1.0		
--	--	-----	-----	-----	------	--	--

Moisture ratio	%	106.0	98.5	99.0	95.5		
-----------------------	----------	--------------	-------------	-------------	-------------	--	--

Hilf density ratio (R_{HD})	%	102.0	96.5	96.0	98.0		
--	----------	--------------	-------------	-------------	-------------	--	--

material description

Silty CLAY