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**Geotechnical Report
Level One Inspection and Testing**

**Roses Estate Stage 3
Beaconsfield**

Prepared for:

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

PROJECT No 8381

22-Jun-2015.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing Roses Estate Stage 3

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 Roses Estate Stage 3. This work was conducted over the period of 11/06/2015 to 15/06/2015.

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 57 to 65. 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 Pty Ltd 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:

- *Water Cart*
- *Pad Foot Roller*
- *Dump Truck*

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 number 8 originally failed to meet specification. *Streetworks Pty Ltd* were notified and asked to rework the area appropriately. Once adequate reworking had been completed *Terra Firma Laboratories* would perform a retest; this process would continue until a minimum compaction effort of 95% was achieved.



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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 11/06/2015 or work completed after the 15/06/2015, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

A handwritten signature in black ink that reads "Tom Seymour" followed by a horizontal line.

Tom Seymour
Lab Manager



APPENDICES

Appendix 1: Site Plans

Appendix 2: Test Summary

Appendix 3: Test Reports

12 Enterprise Avenue
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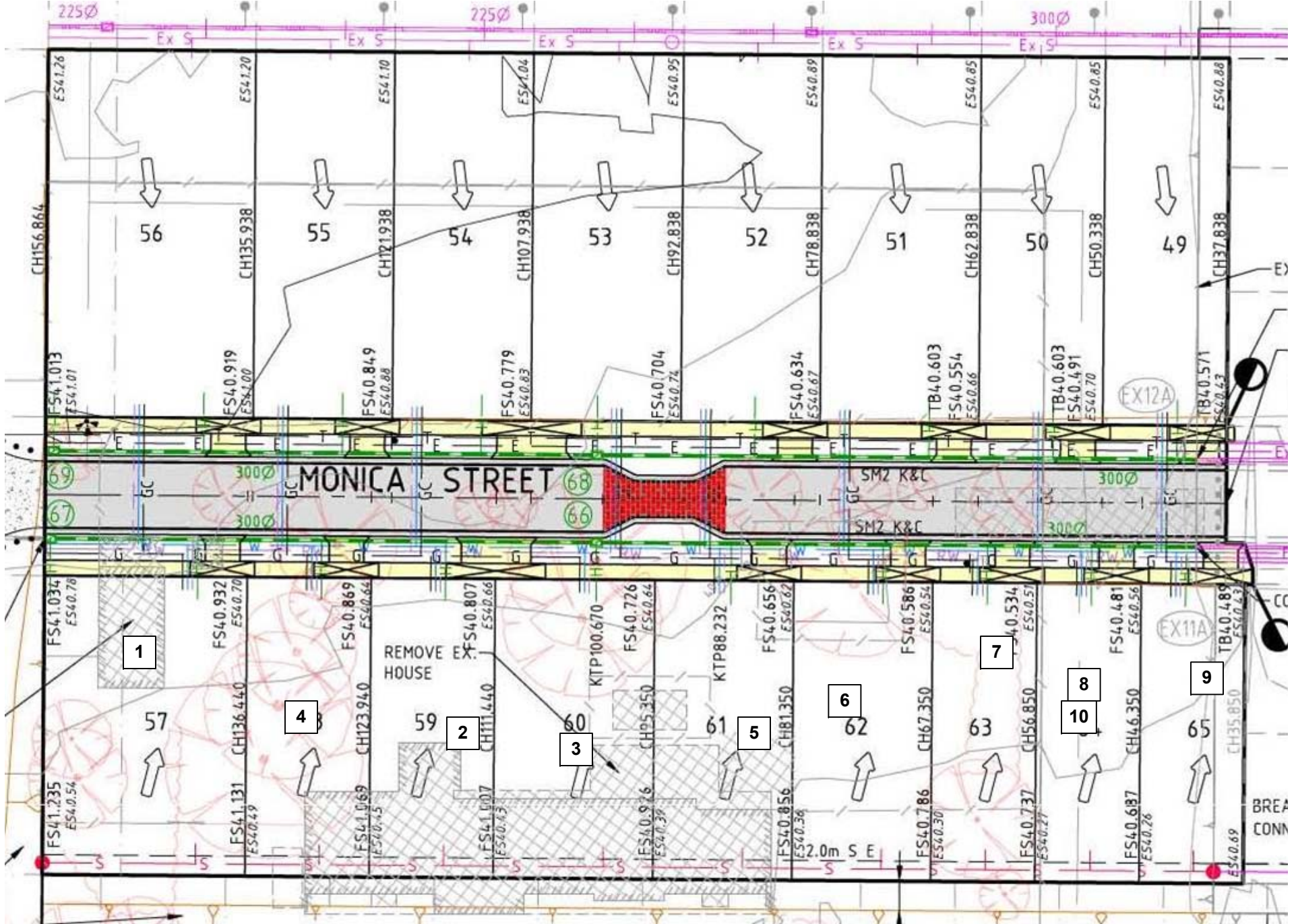
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**Streetworks Pty Ltd
Roses Estate Stage 3
Beaconsfield**

Level 1 - Supervision - Summary of Tests

Client Streetworks Pty Ltd
Project Roses Estate Stage 3
Job # 8381
Density Ratio 95%



Date	Test #	Retest of #	Layer	Density	Lot #	Report #	Pass/Fail
11/06/2015	1		L1	101.5	57	8381-1	P
11/06/2015	2		L1	98	59	8381-1	P
11/06/2015	3		L1	98	60	8381-1	P
12/06/2015	4		L2	97	58	8381-2	P
12/06/2015	5		L2	101	61	8381-2	P
12/06/2015	6		L2	101	62	8381-2	P
12/06/2015	7		L2	100.5	63	8381-2	P
12/06/2015	8		L2	91.5	64	8381-2	F
12/06/2015	9		L2	95.5	65	8381-2	P
15/06/2015	10	8	L2	103.5	64	8381-3	P



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806
 ph 97695799 fax 97694799

report No 8381-1
 date of issue 15-Jun-2015

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Roses Estate Stage 3 Level One
Location	Beaconsfield

Feature	Block Fill
Layer thickness (mm)	300

tested by	NH
time	06:48 PM
date	11-Jun-2015
checked by	DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2	3		
location	Lot No	57	59	60		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	L1	L1	L1		
measurement depth	mm	275	275	275		
field wet density	t/m ³	1.88	1.94	1.98		
field dry density	t/m ³	1.47	1.53	1.63		
field moisture content	%	27.9	26.8	21.4		

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	1.86	1.97	2.025		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		2.0	1.5	1.5		
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Moisture ratio	%	107.0	107.0	107.5		
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Hilf density ratio (R_{HD})	%	101.5	98.0	98.0		
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material description

Clayey Silt



ACCREDITED FOR
TECHNICAL
 COMPETENCE

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 8381-2
 date of issue 16-Jun-2015

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Roses Estate Stage 3 Level One
Location	Beaconsfield

Feature	Block Fill
Layer thickness (mm)	300

tested by	NH
time	All Day
date	12-Jun-2015
checked by	DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		4	5	6	7	8	9
location	Lot No	58	61	62	63	64	65
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	L2	L2	L2	L2	L2	L2
measurement depth	mm	275	275	275	275	275	275
field wet density	t/m ³	1.84	2.12	2.00	1.96	1.90	2.02
field dry density	t/m ³	1.44	1.81	1.62	1.51	1.58	1.69
field moisture content	%	27.8	17.6	23.2	29.8	20.5	19.6

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	1.9	2.105	1.98	1.95	2.08	2.12
adjusted peak converted wet density	t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%		3.0	2.5	2.0	4.0	1.5	1.5
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Moisture ratio	%	112.0	115.5	108.5	115.0	107.0	110.0
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Hilf density ratio (R_{HD})	%	97.0	101.0	101.0	100.5	91.5	95.5
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material description

Sandy Silty CLAY



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 D Burgess



COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

12 Enterprise Avenue Berwick Vic 3806
 ph 97695799 fax 97694799

report No 8381-3
 date of issue 19-Jun-2015

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Roses Estate Stage 3 Level One
Location	Beaconsfield

Feature	Block Fill
Layer thickness (mm)	300

tested by	NH
time	04:54 PM
date	15-Jun-2015
checked by	DB

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		10				
location	Lot No	Lot 64				
		Retest of 8				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	L2				
measurement depth	mm	275				
field wet density	t/m ³	2.01				
field dry density	t/m ³	1.64				
field moisture content	%	22.9				

laboratory compaction procedure AS1289 5.7.1

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

moisture variation from OMC (-dry,+wet)%		1.0				
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Moisture ratio	%	105.0				
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Hilf density ratio (R_{HD})	%	104.0				
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material description

Sandy Silty CLAY



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