Acacia Estate Stage 12

GITA Inspection Verification Report

Prepared For:	Streetworks Pty Ltd
Report Number	10343A V1
Version Release Date	17th October 2018
Report Released By	Chris Caulfield
Title	Project Manager
Signature	

Our Head Office
47 National Ave
Pakenham, VIC 3810

Our Laboratories
Pakenham 03 9769 5799
Deer Park 03 8348 5596
Bibra Lake 08 9395 7220

Table of Contents

Appendices

1 Introduction

Terra Firma Laboratories was engaged by *Streetworks Pty Ltd* as the Geotechnical Inspection and Testing Authority (GITA) to provide Level 1 supervision and testing works on the earthworks component for Acacia Estate Stage 12. This work was conducted over the period of 12/06/2018 to 26/09/2018.

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 1211 through to 1217, 1222 through to 1229 and lot 1231. 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 GPR Consulting, Drawing reference 0055-12-R02 and provided by *Streetworks Pty Ltd*.

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 for compaction control requirements was provided by Streetworks Pty Ltd 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 1500m^2), the minimum testing frequency is 1 test per layer per material type per 2500m^2 or 1 test per 500m^3 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 to have been conducted within the house allotment but may have been verified by testing conducted within up to a 2500m^2 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.

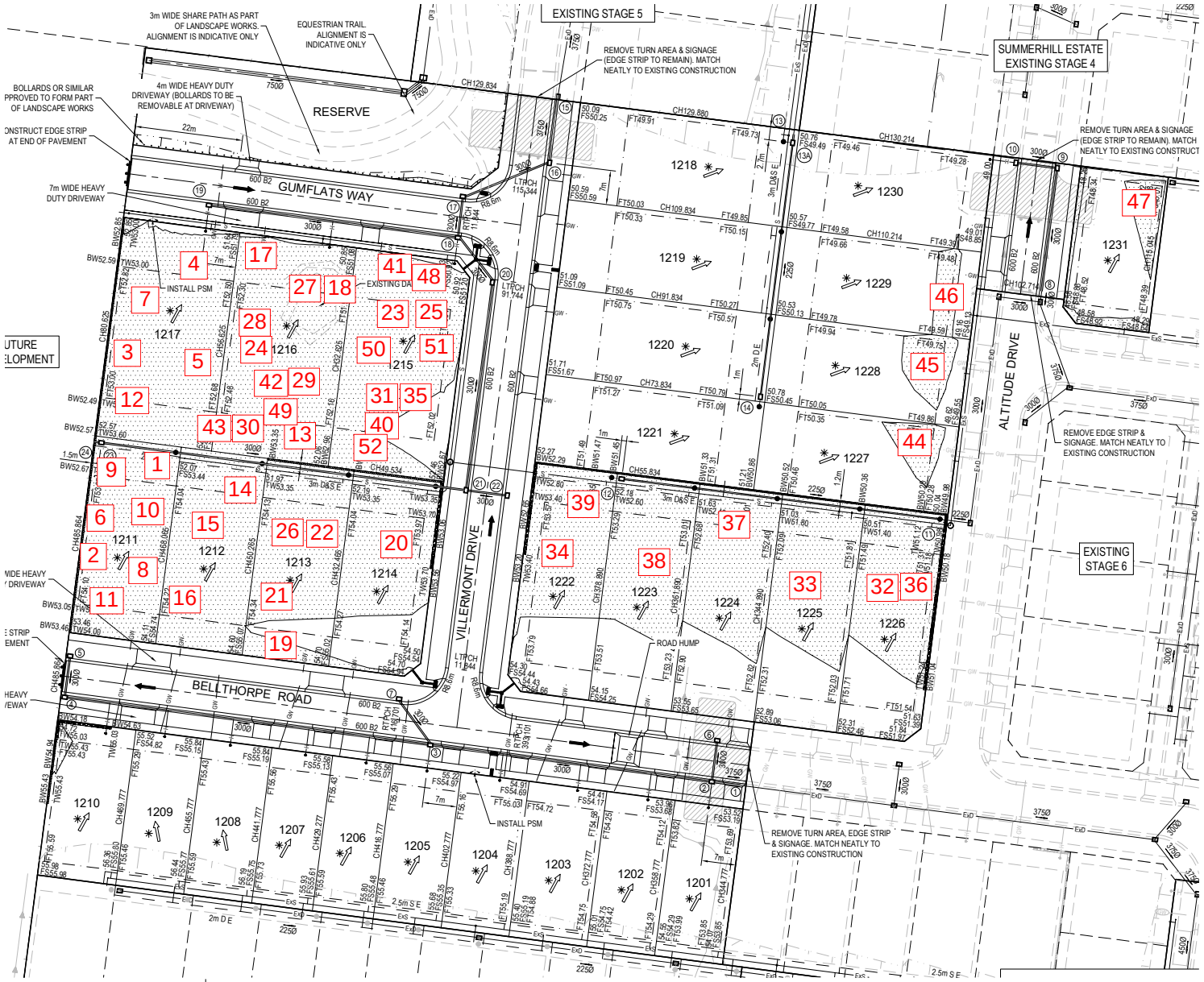
4 Construction Verification

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 (10343D1, 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 52 density tests (Hilf method in accordance with 1289 5.7.1) were undertaken with 7 failed results. The contractor was notified of any failed tests and the failed areas were ripped, watered, compacted and then re-tested to confirm compliance with the specification. 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 12 at Acacia Estate. For completed fill areas of greater than 300mm, and for works completed between 12/06/2018 and 26/0/2018, 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 12 of Acacia Estate was observed to be constructed in compliance with the requirements of the Technical Specification.



terra firma laboratories

47 National Avenue
Pakenham VIC 3810

Test Location Plan

Client : Streetworks Pty Ltd

Project : Acacia Estate Stage 12

Reference: 10343D1

Scale NTS

Compaction Test Register

Client: Streetworks Pty Ltd
Project No: 10343
Project: Acacia Estate Stage 12
Specification: 95%

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
12/06/2018	1	L1		98	Pass	1211	10343-1
12/06/2018	2	L1		98	Pass	1211	10343-1
12/06/2018	3	L1		97.5	Pass	1217	10343-1
13/06/2018	4	L2		100.5	Pass	1217	10343-2
13/06/2018	5	L2		97.5	Pass	1217	10343-2
13/06/2018	6	L2		100	Pass	1211	10343-2
18/06/2018	7	L3		100.5	Pass	1217	10343-3
18/06/2018	8	L3		100	Pass	1211	10343-3
18/06/2018	9	L4		102.5	Pass	1211	10343-3
19/06/2018	10	L5		104.5	Pass	1211	10343-4
19/06/2018	11	L6		101	Pass	1211	10343-4
19/06/2018	12	L4		102.5	Pass	1217	10343-4
20/06/2018	13	L1		101.5	Pass	1216	10343-5
20/06/2018	14	L1		104	Pass	1212	10343-5
20/06/2018	15	L2		98.5	Pass	1212	10343-5
21/06/2018	16	l4		97	Pass	1212	10343-6
21/06/2018	17	L4		98.5	Pass	1216	10343-6
21/06/2018	18	L5		94	Fail	1216	10343-6
23/06/2018	19	L1		103	Pass	1213	10343-7
23/06/2018	20	L2		102.5	Pass	1214	10343-7
23/06/2018	21	L2		102	Pass	1213	10343-7
28/06/2018	22	L3		92.5	Fail	1213	10343-8
28/06/2018	23	L1		90.5	Fail	1215	10343-8
28/06/2018	24	L6		94.5	Fail	1216	10343-8
2/07/2018	25	L1		103.5	Pass	1215	10343-9
2/07/2018	26	L3		98.5	Pass	1213	10343-9
2/07/2018	27	L5		101.5	Pass	1216	10343-9
2/07/2018	28	L6		97	Pass	1216	10343-9
2/07/2018	29	L1		94.5	Fail	1216	10343-10
2/07/2018	30	L1		94.5	Fail	1216	10343-10
2/07/2018	31	L1		91	Fail	1215	10343-10
3/07/2018	32	L1		90.5	Fail	1226	10343-11
3/07/2018	33	L1		95	Pass	1225	10343-11
3/07/2018	34	L2		95	Pass	1222	10343-11
3/07/2018	35	L1	31	98.5	Pass	1215	10343-11
4/07/2018	36	L1	32	99.5	Pass	1226	10343-12
4/07/2018	37	L2		99.5	Pass	1224	10343-12
4/07/2018	38	L2		99	Pass	1223	10343-12
4/07/2018	39	L2		98.5	Pass	1222	10343-12
5/07/2018	40	L1	31	99	Pass	1215	10343-13
5/07/2018	41	L2		91.5	Fail	1215	10343-13

Compaction Test Register

Client: Streetworks Pty Ltd
Project: Acacia Estate Stage 12
Project No: 10343
Specification: 95%

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
5/07/2018	42	L1	29	97.5	Pass	1216	10343-13
5/07/2018	43	L1	30	89	Fail	1216	10343-13
5/07/2018	44	L1		95	Pass	1227	10343-13
5/07/2018	45	L1		98	Pass	1228	10343-13
5/07/2018	46	L1		95.5	Pass	1229	10343-14
5/07/2018	47	L1		95.5	Pass	1231	10343-14
26/09/2018	48	L1	41	96.5	Pass	1215	10343-15
26/09/2018	49	L2	43	96	Pass	1216	10343-15
26/09/2018	50	L1		98	Pass	1226	10343-15
26/09/2018	51	L1		98.5	Pass	1226	10343-15
26/09/2018	52	L3		104.5	Pass	1226	10343-15

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-1

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	KC
time	All Day
date	12-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**1**	**2**	**3**			
location Lot No		1211	1211	1217			
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	2.03	2.05	1.91			
field dry density	t/m^3	1.63	1.71	1.58			
field moisture content	%	24.7	20.4	21.2			
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	2.10	1.96			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		1.5	-0.5	-1.5			
Moisture ratio	**%**	**107.5**	**97.5**	**94.0**			
Hilf density ratio (R_{HD})	**%**	**98.0**	**98.0**	**97.5**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-2

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	KC
time	All Day
date	13-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**4**	**5**	**6**			
location Lot No		1217	1217	1211			
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	1.97	1.88	2.04			
field dry density	t/m^3	1.62	1.59	1.63			
field moisture content	%	21.5	17.8	25.2			
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	1.96	1.93	2.03			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		0.5	-1.5	-3.0			
Moisture ratio	**%**	**103.0**	**92.5**	**88.0**			
Hilf density ratio (R_{HD})	**%**	**100.5**	**97.5**	**100.0**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-3

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	KC
time	All Day
date	18-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**7**	**8**	**9**			
location	Lot No	1217	1211	1211			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 3	Layer 3	Layer 4			
measurement depth	mm	275	275	275			
field wet density	t/m^3	2.04	2.07	2.15			
field dry density	t/m^3	1.59	1.67	1.76			
field moisture content	%	28.1	23.8	21.5			
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	2.06	2.09			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		3.0	3.0	1.0			
Moisture ratio	**%**	**113.0**	**115.0**	**104.5**			
Hilf density ratio (R_{HD})	**%**	**100.5**	**100.0**	**102.5**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-4

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	KC
time	All Day
date	19-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**10**	**11**	**12**			
location Lot No		1211	1211	1217			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 5	Layer 6	Layer 4			
measurement depth	mm	275	275	275			
field wet density	t/m^3	2.12	2.04	2.16			
field dry density	t/m^3	1.79	1.68	1.79			
field moisture content	%	18.4	21.4	20.5			
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	2.03	2.02	2.11			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		0.5	1.0	1.0			
Moisture ratio	**%**	**104.0**	**106.0**	**105.0**			
Hilf density ratio (R_{HD})	**%**	**104.5**	**101.0**	**102.5**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-5

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	JH
time	All Day
date	20-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**13**	**14**	**15**			
location Lot No		1216	1212	1212			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 1	Layer 2			
measurement depth	mm	275	275	275			
field wet density	t/m^3	1.99	2.03	1.95			
field dry density	t/m^3	1.65	1.70	1.57			
field moisture content	%	20.5	19.3	24.0			
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	1.96	1.95	1.98			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		-1.5	-1.5	1.5			
Moisture ratio	**%**	**93.0**	**92.5**	**107.0**			
Hilf density ratio (R_{HD})	**%**	**101.5**	**104.0**	**98.5**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-6

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	All Day
date	22-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**16**	**17**	**18**			
location	Lot No	1212	1216	1216			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 4	Layer 4	Layer 5			
measurement depth	mm	275	275	275			
field wet density	t/m^3	2.00	2.03	1.85			
field dry density	t/m^3	1.65	1.70	1.56			
field moisture content	%	21.1	19.9	18.6			
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	2.07	2.06	1.96			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		0.5	1.5	1.0			
Moisture ratio	**%**	**103.5**	**109.0**	**107.0**			
Hilf density ratio (R_{HD})	**%**	**97.0**	**98.5**	**94.0**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-7

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	CC
time	All Day
date	23-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**19**	**20**	**21**			
location	Lot No	1213	1214	1213			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 2	Layer 2			
measurement depth	mm	275	275	275			
field wet density	t/m^3	2.00	2.02	2.02			
field dry density	t/m^3	1.65	1.69	1.67			
field moisture content	%	21.0	19.2	20.8			
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	1.94	1.97	1.98			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		-1.5	-2.0	-1.0			
Moisture ratio	**%**	**92.0**	**90.5**	**94.5**			
Hilf density ratio (R_{HD})	**%**	**103.0**	**102.5**	**102.0**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-8

date of issue 03-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	JH
time	All Day
date	28-Jun-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**22**	**23**	**24**			
location Lot No		1213	1215	1216			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 3	Layer 1	Layer 6			
measurement depth	mm	275	275	275			
field wet density	t/m^3	1.80	1.78	1.93			
field dry density	t/m^3	1.52	1.48	1.54			
field moisture content	%	18.6	20.3	25.1			
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	1.95	1.97	2.04			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		-2.5	-1.5	3.5			
Moisture ratio	**%**	**88.5**	**93.5**	**116.0**			
Hilf density ratio (R_{HD})	**%**	**92.5**	**90.5**	**94.5**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

47 National Avenue, Pakenham VIC 3810
ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-9
date of issue 05-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	All Day
date	02-Jul-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**25**	**26**	**27**	**28**		
location Lot No Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		1215 Retest of 23	1213 Retest of 22	1216 Retest of 18	1216 Retest of 24		
depth from F.S.L.	m	Layer 1	Layer 3	Layer 5	Layer 6		
measurement depth	mm	275	275	275	275		
field wet density	t/m^3	2.01	1.99	2.14	1.98		
field dry density	t/m^3	1.66	1.64	1.84	1.64		
field moisture content	%	21.3	21.0	16.5	21.0		
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	1.94	2.02	2.11	2.04		
adjusted peak converted wet density	t/m^3	-	-	-	-		
moisture variation from OMC (-dry,+wet)%		1.5	0.0	1.0	1.0		
Moisture ratio	**%**	**108.5**	**100.0**	**106.0**	**104.0**		
Hilf density ratio (R_{HD})	**%**	**103.5**	**98.5**	**101.5**	**97.0**		

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature
C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-10

date of issue 05-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	All Day
date	02-Jul-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**29**	**30**	**31**			
location Lot No		1216	1216	1215			
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	1.95	1.79			
field dry density	t/m^3	1.53	1.57	1.43			
field moisture content	%	24.2	24.2	25.0			
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	10	6	0			
peak converted wet density	t/m^3	-	-	1.97			
adjusted peak converted wet density	t/m^3	2.01	2.06	-			
moisture variation from OMC (-dry,+wet)%		0.5	3.0	-1.5			
Moisture ratio	**%**	**102.5**	**117.0**	**94.0**			
Hilf density ratio (R_{HD})	**%**	**94.5**	**94.5**	**91.0**			

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-12

date of issue 06-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	PUD
time	All Day
date	04-Jul-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**36**	**37**	**38**	**39**		
location Lot No		1226 Retest of #32	1224	1223	1222		
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 2		
measurement depth	mm	275	275	275	275		
field wet density	t/m^3	2.00	2.05	1.93	2.06		
field dry density	t/m^3	1.61	1.67	1.52	1.71		
field moisture content	%	23.8	22.9	27.1	20.5		
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	2.01	2.06	1.95	2.09		
adjusted peak converted wet density	t/m^3	-	-	-	-		
moisture variation from OMC (-dry,+wet)%		1.0	3.5	1.0	2.5		
Moisture ratio	**%**	**105.5**	**119.0**	**104.0**	**115.5**		
Hilf density ratio (R_{HD})	**%**	**99.5**	**99.5**	**99.0**	**98.5**		

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-13

date of issue 10-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300/200

tested by	SP
time	All Day
date	05-Jul-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**40**	**41**	**42**	**43**	**44**	**45**
location Lot No		1215 Retest of 31	1215	1216 Retest of 29	1216 Retest of 30	1227	1228
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 2	Layer 1	Layer 1	Layer 1	Layer 1
measurement depth	mm	275	275	275	275	175	175
field wet density	t/m^3	1.94	1.84	1.92	1.86	1.89	1.95
field dry density	t/m^3	1.50	1.55	1.53	1.57	1.54	1.60
field moisture content	%	28.9	19.2	25.6	18.4	22.3	21.9
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	1.96	2.02	1.97	2.09	1.99	1.99
adjusted peak converted wet density	t/m^3	-	-	-	-	-	-
moisture variation from OMC (-dry,+wet)%		1.0	0.5	1.5	1.0	-0.5	-1.0
Moisture ratio	**%**	**104.0**	**104.0**	**107.0**	**104.5**	**98.0**	**94.5**
Hilf density ratio (R_{HD})	**%**	**99.0**	**91.5**	**97.5**	**89.0**	**95.0**	**98.0**

material description

Silty CLAY

NATA 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- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

terra firma laboratories

47 National Avenue, Pakenham VIC 3810

ph 03 5943 0980 www.terrafirmalabs.com.au

report No 10343-14

date of issue 10-Jul-2018

Client	Streetworks
Client address	45 Commercial Drive, Pakenham, 3810
Project	Acacia Stage 12
Location	Cranbourne South

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	All Day
date	05-Jul-2018
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**46**	**47**				
location Lot No		1229	1231				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 1	Layer 1				
measurement depth	mm	275	275				
field wet density	t/m^3	1.90	1.88				
field dry density	t/m^3	1.66	1.56				
field moisture content	%	14.8	20.5				
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	1.99	1.96				
adjusted peak converted wet density	t/m^3	-	-				
moisture variation from OMC (-dry,+wet)%		-1.5	-1.0				
Moisture ratio	**%**	**92.0**	**96.0**				
Hilf density ratio (R_{HD})	**%**	**95.5**	**95.5**				

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- Testing

NATA ACCREDITED FOR TECHNICAL COMPETENCE

LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

Material Test Report

Report Number: **10343-15**
Issue Number: 1
Date Issued: 08/10/2018
Client: Streetworks Pty Ltd
45 Commercial Drive, Pakenham Vic 3810
Project Number: 10343
Project Name: Acacia Stage 12
Project Location: Cranbourne
Client Reference: 05267
Work Request: 219
Date Sampled: 26/09/2018 10:30
Sampling Method: AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Material: silty Clay

Pakenham Laboratory
47 National Avenue Parkenham VIC 3810
Phone: (03) 9769 5799
Email: sbenbow@terrafirmalabs.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Scott Benbow
Laboratory Manager
NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1					
Sample Number	P18-219A	P18-219B	P18-219C	P18-219D	P18-219E
Test Number	48	49	50	51	52
Date Tested	26/09/2018	26/09/2018	26/09/2018	26/09/2018	26/09/2018
Time Tested	10:30	10:30	10:30	10:30	10:30
Test Request #/Location	Lot 1215	Lot 1216	Lot 1215	Lot 1215	Lot 1215
Chainage (m)	Retest of # 41	Retest of # 43	**	**	**
Location Offset (m)	**	**	**	**	**
Layer / Reduced Level	Layer 1	Layer 2	Layer 1	Layer 1	Layer 3
Thickness of Layer (mm)	300	300	300	300	300
Soil Description	silty Clay	silty Clay	silty Clay	silty Clay	silty Clay
Test Depth (mm)	275	275	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0	0.0	0.0
Field Wet Density (FWD) t/m^3	1.93	1.96	1.90	1.90	2.02
Field Moisture Content %	20.8	23.0	17.9	22.1	17.7
Field Dry Density (FDD) t/m^3	1.60	1.60	1.61	1.55	1.72
Peak Converted Wet Density t/m^3	2.00	2.05	1.93	1.93	1.93
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**	**
Moisture Ratio % (AS 1289.5.4.1)	115.0	117.5	88.0	93.5	92.5
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**	**	**	**	**
Moisture Variation (Wv) %	-2.5	-3.0	2.5	1.5	1.5
Adjusted Moisture Variation %	**	**	**	**	**
Hilf Density Ratio (%)	**96.5**	**96.0**	**98.0**	**98.5**	**104.5**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**

Moisture Variation Note:
Positive values = test is dry of OMC
Negative values = test is wet of OMC