

Gardenia Estate Stage 4

GITA Inspection Verification Report

Prepared For:	Streetworks Pty Ltd
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Report Number	10058 V1
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Version Release Date	06 May 2020
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Report Released By	Chris Caulfield
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Title	Project Manager
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Signature



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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 Gardenia Estate Stage 4. This work was conducted over the period of 16/12/2017 to 02/02/2018.

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 are between LOTS 37 to 43, bounded by streets Kenilworth Avenue and Sakura Drive. The site will be a residential development.

The area on which fill was placed is shown on site plan (Appendix 1: *Test Location Plan*) based on drawings prepared by Dalton Consulting Engineers, Drawing Reference 12455.4DP 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 (Reference from Drawings) 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 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. The scope and the period of Terra Firma Laboratories as described in the introduction are subject to restrictions and limitations. Terra Firma Laboratories did not perform a complete assessment of all possible conditions and circumstances that may exist at the site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Terra Firma Laboratories.

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

Any drawings or marked locations presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Terra Firma Laboratories for incomplete or inaccurate data supplied by others.

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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

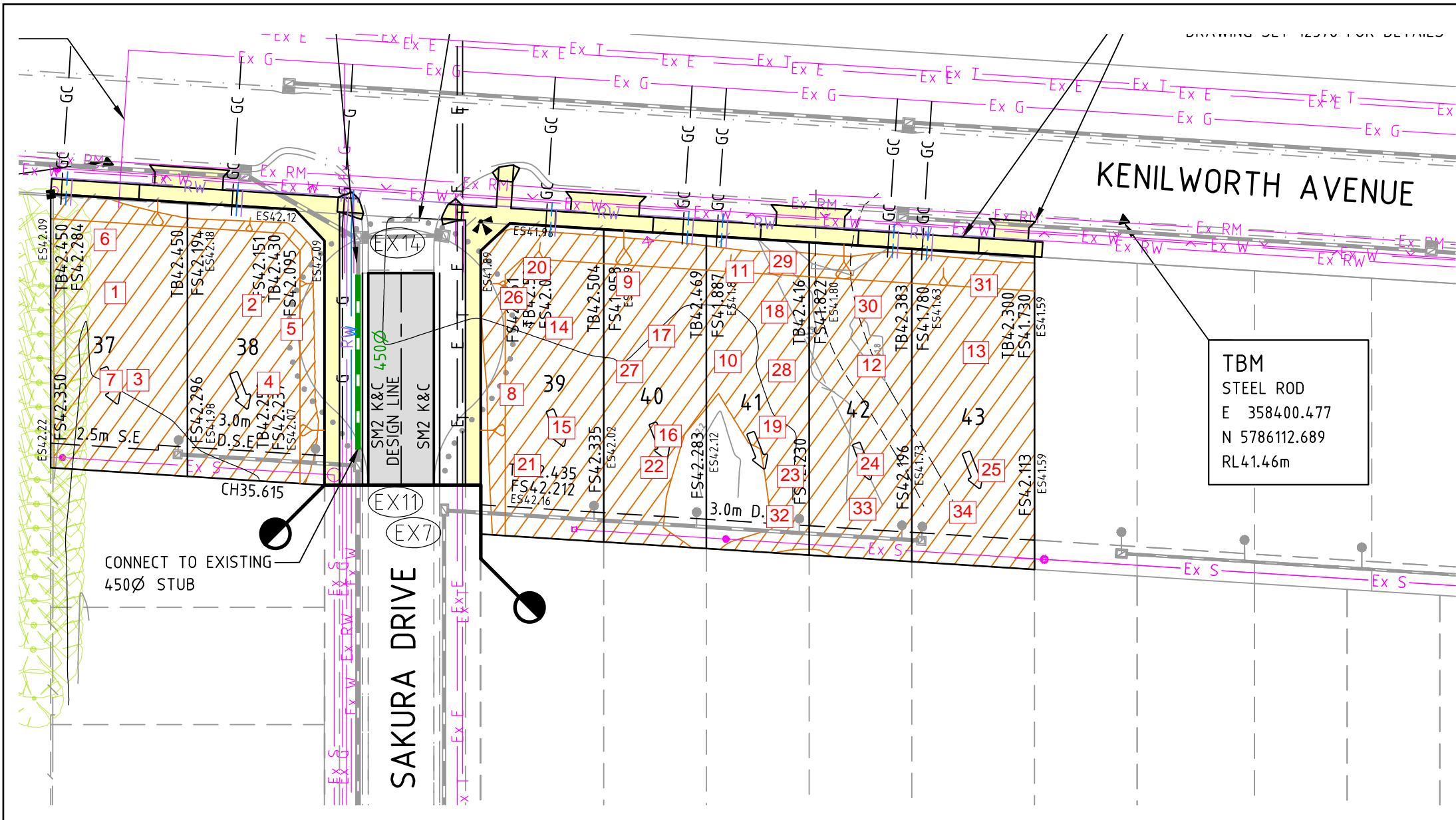
plan (10058D1, Appendix 1) providing a schematic of test locations across the extent of scope of works for every placed layer of fill is also documented.

A total of 34 density tests (Hilf method in accordance with 1289 5.7.1) were undertaken with 1 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 4 at Gardenia Estate. For completed fill areas of greater than 300mm, and for works completed between 16/12/2017 and 02/02/2018, 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 4 of Gardenia Estate was observed to be constructed in compliance with the requirements of the Technical Specification.

Appendix 1: Test Location Plan



47 National Avenue
Pakenham VIC 3810

Test Location Plan

Client : Streetworks Pty Ltd

Project : Gardinia Estate Stage 4

Reference:
10058D1

Scale
NTS

Appendix 2: Compaction Test Register and Test Certificates



Compaction Test Register

Client: Streetworks Pty Ltd **Specification:** 95%
Project: Gardinia Estate Stage 4 **Project No:** 10058

Date:	Test No:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
16/12/2017	1	L1		99	Pass	37	10058-1
16/12/2017	2	L1		97.5	Pass	38	10058-1
16/12/2017	3	L2		93	Fail	37	10058-2
18/12/2017	4	L3		95	Pass	38	10058-3
18/12/2017	5	L3		96.5	Pass	38	10058-3
18/12/2017	6	L3		95.5	Pass	37	10058-3
18/12/2017	7	L2	3	98.5	Pass	37	10058-4
11/01/2018	8	L1		97	Pass	39	10058-6
11/01/2018	9	L1		96.5	Pass	40	10058-6
11/01/2018	10	L1		98.5	Pass	41	10058-6
15/01/2018	11	L2		100.5	Pass	41	10058-7
15/01/2018	12	L2		97.5	Pass	42	10058-7
15/01/2018	13	L2		97	Pass	43	10058-7
18/01/2018	14	L3		100	Pass	39	10058-5
18/01/2018	15	L4		97	Pass	39	10058-5
18/01/2018	16	L3		102	Pass	40	10058-5
18/01/2018	17	L4		98	Pass	40	10058-5
18/01/2018	18	L3		97.5	Pass	41	10058-5
18/01/2018	19	L4		100	Pass	41	10058-5
24/01/2018	20	L1		99.5	Pass	39	10058-8
24/01/2018	21	L1		99	Pass	39	10058-8
24/01/2018	22	L1		98.5	Pass	40	10058-8
24/01/2018	23	L1		99.5	Pass	41	10058-8
24/01/2018	24	L1		101.5	Pass	42	10058-8
24/01/2018	25	L1		100	Pass	43	10058-8
29/01/2018	26	L2		99	Pass	39	10058-9
29/01/2018	27	L2		95.5	Pass	40	10058-9
29/01/2018	28	L2		102.5	Pass	41	10058-9
1/02/2018	29	L3		100	Pass	41	10058-10
1/02/2018	30	L3		96.5	Pass	42	10058-10
1/02/2018	31	L3		98	Pass	43	10058-10
2/02/2018	32	L4		103.5	Pass	41	10058-11
2/02/2018	33	L4		102	Pass	42	10058-11
2/02/2018	34	L4		101.5	Pass	43	10058-11

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-1
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by CC
time AM
date 16-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2			
location	Lot No	37	38			
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	2.14	2.10			
field dry density	t/m ³	1.88	1.80			
field moisture content	%	13.6	16.8			

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	2.16	2.15			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		1.0	1.0			
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Moisture ratio	%	106.0	105.0			
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Hilf density ratio (R_{HD})	%	99.0	97.5			
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material description

Sandy CLAY



47 National Avenue, Pakenham VIC 3810
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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-2
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by BM
time All Day
date 16-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		3				
location	Lot No	37				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 2				
measurement depth	mm	275				
field wet density	t/m ³	2.05				
field dry density	t/m ³	1.80				
field moisture content	%	13.9				

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	2.20				
adjusted peak converted wet density	t/m ³	-				

moisture variation from OMC (-dry,+wet)%		1.0				
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Moisture ratio	%	106.0				
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Hilf density ratio (R_{HD})	%	93.0				
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material description

Sandy 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

LABORATORY ACCREDITATION No 15357

Approved Signature
C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-3
date of issue 10-Jan-2018

tested by MAA
time 01:00 PM
date 18-Dec-2017
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		4	5	6		
location	Lot No	38	38	37		
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	2.05	2.11	2.06		
field dry density	t/m ³	1.86	1.88	1.84		
field moisture content	%	10.2	12.3	11.9		

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	2.16	2.19	2.15		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-0.5	0.5	0.5		
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Moisture ratio	%	94.0	103.0	104.0		
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Hilf density ratio (R_{HD})	%	95.0	96.5	95.5		
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material description

Sandy CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-4
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by MH
time All Day
date 18-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No	7					
location	Lot No	37				
		Retest of #3				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 2				
measurement depth	mm	275				
field wet density	t/m ³	2.16				
field dry density	t/m ³	1.90				
field moisture content	%	14.0				

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	2.19				
adjusted peak converted wet density	t/m ³	-				

moisture variation from OMC (-dry,+wet)%		1.0				
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Moisture ratio	%	106.0				
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Hilf density ratio (R_{HD})	%	98.5				
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material description

Sandy CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-5
date of issue 24-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 200

tested by SB
time All Day
date 18-Jan-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		14	15	16	17	18	19
location	Lot No	39	39	40	40	41	41
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 3	Layer 4	Layer 3	Layer 4	Layer 3	Layer 4
measurement depth	mm	175	175	175	175	175	175
field wet density	t/m ³	2.16	2.13	2.18	2.13	2.12	2.09
field dry density	t/m ³	1.91	1.98	1.95	1.92	1.91	1.86
field moisture content	%	12.8	7.9	11.9	10.7	11.4	12.6

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	5
peak converted wet density	t/m ³	2.16	2.20	2.14	2.17	2.18	2.10
adjusted peak converted wet density	t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%		0.0	0.5	-0.5	-0.5	0.5	-0.5
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Moisture ratio	%	101.0	104.5	95.5	94.0	105.0	95.5
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Hilf density ratio (R_{HD})	%	100.0	97.0	102.0	98.0	97.5	100.0
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material description

Silty CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-6
date of issue 08-Feb-2018

tested by MW
time 05:09 PM
date 11-Jan-2018
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		8	9	10		
location	Lot No	39	40	41		
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	125	125	125		
field wet density	t/m ³	2.14	2.13	2.19		
field dry density	t/m ³	1.92	1.91	1.97		
field moisture content	%	11.2	11.3	11.0		

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	2.20	2.20	2.22		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	1.0	0.0		
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Moisture ratio	%	105.0	107.5	99.0		
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Hilf density ratio (R_{HD})	%	97.0	96.5	98.5		
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material description

Silty CLAY



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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-7
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

tested by DM
time 04:00 PM
date 15-Jan-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		11	12	13		
location	Lot No	41	42	43		
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	125	125	125		
field wet density	t/m ³	2.16	2.12	2.10		
field dry density	t/m ³	1.95	1.90	1.88		
field moisture content	%	10.9	11.8	11.7		

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	2.15	2.18	2.17		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		1.0	0.0	-0.5		
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Moisture ratio	%	107.5	100.0	94.5		
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Hilf density ratio (R _{HD})	%	100.5	97.5	97.0		
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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.
Accredited for compliance with ISO/IEC 17025- Testing

LABORATORY ACCREDITATION No 15357

Approved Signature
C Caulfield

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-8
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by CC
time PM
date 24-Jan-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		20	21	22	23	24	25
location	Lot No	39	39	40	41	42	43
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	Layer 1	Layer 1
measurement depth	mm	275	275	275	275	275	275
field wet density	t/m ³	2.16	2.15	2.14	2.14	2.20	2.18
field dry density	t/m ³	1.94	1.91	1.88	1.88	1.93	1.93
field moisture content	%	11.8	12.8	13.7	13.8	13.7	13.0

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	2.18	2.17	2.17	2.15	2.17	2.18
adjusted peak converted wet density	t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%		1.0	0.5	1.0	0.5	0.5	-0.5
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Moisture ratio	%	107.0	104.5	108.0	104.5	104.5	96.0
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Hilf density ratio (R_{HD})	%	99.5	99.0	98.5	99.5	101.5	100.0
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material description

Sandy CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-9
date of issue 08-Feb-2018

tested by DM
time 01:30 PM
date 29-Jan-2018
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		26	27	28		
location	Lot No	39	40	41		
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	2.20	2.04	2.26		
field dry density	t/m ³	1.99	1.82	2.01		
field moisture content	%	10.5	11.9	12.3		

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	2.22	2.14	2.20		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-0.5	-0.5	1.0		
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Moisture ratio	%	95.0	95.5	107.0		
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Hilf density ratio (R_{HD})	%	99.0	95.5	103.0		
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material description

Sandy CLAY



47 National Avenue, Pakenham VIC 3810
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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-10
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 250

tested by NH
time All Day
date 01-Feb-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		29	30	31		
location	Lot No	41	42	43		
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	225	225	225		
field wet density	t/m ³	2.18	2.14	2.13		
field dry density	t/m ³	1.94	1.89	1.88		
field moisture content	%	12.7	13.0	13.2		

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	3	4	0		
peak converted wet density	t/m ³	-	-	2.17		
adjusted peak converted wet density	t/m ³	2.18	2.21	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.0	-0.5		
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Moisture ratio	%	93.5	98.5	96.5		
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Hilf density ratio (R _{HD})	%	100.0	96.5	98.0		
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material description

Sandy CLAY



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LABORATORY ACCREDITATION No 15357

Approved Signature
C Caulfield



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

COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-11
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

tested by HC
time All Day
date 02-Feb-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		32	33	34		
location	Lot No	41	42	43		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 4	Layer 4	Layer 4		
measurement depth	mm	125	125	125		
field wet density	t/m ³	2.21	2.22	2.19		
field dry density	t/m ³	1.99	2.04	1.96		
field moisture content	%	11.2	9.0	11.4		

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	2.14	2.18	2.15		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.0	0.0	0.0		
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Moisture ratio	%	100.0	100.0	100.0		
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Hilf density ratio (R _{HD})	%	103.5	102.0	101.5		
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material description

Sandy CLAY



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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-1
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by CC
time AM
date 16-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		1	2			
location	Lot No	37	38			
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	2.14	2.10			
field dry density	t/m ³	1.88	1.80			
field moisture content	%	13.6	16.8			

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	2.16	2.15			
adjusted peak converted wet density	t/m ³	-	-			

moisture variation from OMC (-dry,+wet)%		1.0	1.0			
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Moisture ratio	%	106.0	105.0			
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Hilf density ratio (R _{HD})	%	99.0	97.5			
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material description

Sandy CLAY



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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-2
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by BM
time All Day
date 16-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		3				
location	Lot No	37				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 2				
measurement depth	mm	275				
field wet density	t/m ³	2.05				
field dry density	t/m ³	1.80				
field moisture content	%	13.9				

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	2.20				
adjusted peak converted wet density	t/m ³	-				

moisture variation from OMC (-dry,+wet)%		1.0				
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Moisture ratio	%	106.0				
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Hilf density ratio (R_{HD})	%	93.0				
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material description

Sandy CLAY



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COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-3
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by MAA
time 01:00 PM
date 18-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		4	5	6		
location	Lot No	38	38	37		
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	2.05	2.11	2.06		
field dry density	t/m ³	1.86	1.88	1.84		
field moisture content	%	10.2	12.3	11.9		

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	2.16	2.19	2.15		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-0.5	0.5	0.5		
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Moisture ratio	%	94.0	103.0	104.0		
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Hilf density ratio (R_{HD})	%	95.0	96.5	95.5		
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material description

Sandy CLAY



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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-4
date of issue 10-Jan-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by MH
time All Day
date 18-Dec-2017
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		7				
location	Lot No	37				
		Retest of #3				
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 2				
measurement depth	mm	275				
field wet density	t/m ³	2.16				
field dry density	t/m ³	1.90				
field moisture content	%	14.0				

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	2.19				
adjusted peak converted wet density	t/m ³	-				

moisture variation from OMC (-dry,+wet)%		1.0				
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Moisture ratio	%	106.0				
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Hilf density ratio (R_{HD})	%	98.5				
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material description

Sandy CLAY



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COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-5
date of issue 24-Jan-2018

tested by SB
time All Day
date 18-Jan-2018
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 200

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		14	15	16	17	18	19
location	Lot No	39	39	40	40	41	41
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	Layer 3	Layer 4	Layer 3	Layer 4	Layer 3	Layer 4
measurement depth	mm	175	175	175	175	175	175
field wet density	t/m ³	2.16	2.13	2.18	2.13	2.12	2.09
field dry density	t/m ³	1.91	1.98	1.95	1.92	1.91	1.86
field moisture content	%	12.8	7.9	11.9	10.7	11.4	12.6

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	5
peak converted wet density	t/m ³	2.16	2.20	2.14	2.17	2.18	2.10
adjusted peak converted wet density	t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%		0.0	0.5	-0.5	-0.5	0.5	-0.5
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Moisture ratio	%	101.0	104.5	95.5	94.0	105.0	95.5
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Hilf density ratio (R_{HD})	%	100.0	97.0	102.0	98.0	97.5	100.0
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material description

Silty CLAY



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COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

report No 10058-6
date of issue 08-Feb-2018

tested by MW
time 05:09 PM
date 11-Jan-2018
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		8	9	10		
location	Lot No	39	40	41		
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	125	125	125		
field wet density	t/m ³	2.14	2.13	2.19		
field dry density	t/m ³	1.92	1.91	1.97		
field moisture content	%	11.2	11.3	11.0		

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	2.20	2.20	2.22		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.5	1.0	0.0		
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Moisture ratio	%	105.0	107.5	99.0		
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Hilf density ratio (R _{HD})	%	97.0	96.5	98.5		
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material description

Silty CLAY



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COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-7
date of issue 08-Feb-2018

tested by DM
time 04:00 PM
date 15-Jan-2018
checked by CC

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		11	12	13		
location	Lot No	41	42	43		
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	125	125	125		
field wet density	t/m ³	2.16	2.12	2.10		
field dry density	t/m ³	1.95	1.90	1.88		
field moisture content	%	10.9	11.8	11.7		

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	2.15	2.18	2.17		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		1.0	0.0	-0.5		
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Moisture ratio	%	107.5	100.0	94.5		
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Hilf density ratio (R_{HD})	%	100.5	97.5	97.0		
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material description

Silty CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-8
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by CC
time PM
date 24-Jan-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		20	21	22	23	24	25
location	Lot No	39	39	40	41	42	43
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	Layer 1	Layer 1
measurement depth	mm	275	275	275	275	275	275
field wet density	t/m ³	2.16	2.15	2.14	2.14	2.20	2.18
field dry density	t/m ³	1.94	1.91	1.88	1.88	1.93	1.93
field moisture content	%	11.8	12.8	13.7	13.8	13.7	13.0

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	2.18	2.17	2.17	2.15	2.17	2.18
adjusted peak converted wet density	t/m ³	-	-	-	-	-	-

moisture variation from OMC (-dry,+wet)%		1.0	0.5	1.0	0.5	0.5	-0.5
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Moisture ratio	%	107.0	104.5	108.0	104.5	104.5	96.0
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Hilf density ratio (R_{HD})	%	99.5	99.0	98.5	99.5	101.5	100.0
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material description

Sandy CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-9
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 300

tested by DM
time 01:30 PM
date 29-Jan-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		26	27	28		
location	Lot No	39	40	41		
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	2.20	2.04	2.26		
field dry density	t/m ³	1.99	1.82	2.01		
field moisture content	%	10.5	11.9	12.3		

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	2.22	2.14	2.20		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		-0.5	-0.5	1.0		
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Moisture ratio	%	95.0	95.5	107.0		
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Hilf density ratio (R_{HD})	%	99.0	95.5	103.0		
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material description

Sandy CLAY

COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

report No 10058-10
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 250

tested by NH
time All Day
date 01-Feb-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		29	30	31		
location	Lot No	41	42	43		
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	225	225	225		
field wet density	t/m ³	2.18	2.14	2.13		
field dry density	t/m ³	1.94	1.89	1.88		
field moisture content	%	12.7	13.0	13.2		

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	3	4	0		
peak converted wet density	t/m ³	-	-	2.17		
adjusted peak converted wet density	t/m ³	2.18	2.21	-		

moisture variation from OMC (-dry,+wet)%		-1.0	0.0	-0.5		
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Moisture ratio	%	93.5	98.5	96.5		
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Hilf density ratio (R_{HD})	%	100.0	96.5	98.0		
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material description

Sandy CLAY



COMPACTION ASSESSMENT BY NUCLEAR GAUGE METHOD

47 National Avenue, Pakenham VIC 3810
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report No 10058-11
date of issue 08-Feb-2018

Client Streetworks
Client address 4 Len Thomas Place, Narre Warren, 3805
Project Gardenia Stage 4
Location Officer

Feature Block Fill
Layer thickness (mm) 150

tested by HC
time All Day
date 02-Feb-2018
checked by CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		32	33	34		
location	Lot No	41	42	43		
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)						
depth from F.S.L.	m	Layer 4	Layer 4	Layer 4		
measurement depth	mm	125	125	125		
field wet density	t/m ³	2.21	2.22	2.19		
field dry density	t/m ³	1.99	2.04	1.96		
field moisture content	%	11.2	9.0	11.4		

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	2.14	2.18	2.15		
adjusted peak converted wet density	t/m ³	-	-	-		

moisture variation from OMC (-dry,+wet)%		0.0	0.0	0.0		
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Moisture ratio	%	100.0	100.0	100.0		
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Hilf density ratio (R_{HD})	%	103.5	102.0	101.5		
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material description

Sandy CLAY



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