Your Worksite is Our Laboratory.

# Geotechnical Report
# Level One Inspection and Testing

## Summerhill Estate Stage 4
## Cranbourne South

Prepared for:

**Streetworks Pty Ltd**
**4 Len Thomas Place**
**Narre Warren 3804**

Project 9897

9 March 2018

Prepared by:

**TERRA FIRMA LABORATORIES**
Geotechnical Inspection and Testing Authority

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# Geotechnical Report Level One Inspection and Testing
# Summerhill Estate Stage 4

## 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 Summerhill Estate Stage 4. This work was conducted over the period of 28/09/2017 to 20/2/2018.

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 Works

### 2.1 Areas of work

The areas of work included lots 402, 406 to 408, 411 to 415 and 417 to 425. 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 GPR Consulting 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.

A technical specification for compaction control requirements was provided by Streetworks Pty Ltd and established that:

As referenced from AS3798-2007 (Section 5.2) establishes a specification requirement for a minimum density ratio of not less than 95% noting that soils containing more than 20% of particles coarser than 37.5mm cannot be tested for relative compaction using the procedures of AS1289.

Field density testing shall be undertaken at a frequency of not less than 3 tests per visit.

Test Rolling is required for all layers of structural fill and materials within 150mm of permanent subgrade level so as to withstand test rolling without visible deformation or springing. Corrective action is required where unstable areas exceed 20% of the area being considered by test rolling.

# 3 Inspection and Testing

## 3.1 Sub-Grade Preparation

Subgrade preparation involved stripping the site down of topsoil and organic matter to a depth of approximately 200mm below existing levels detailed on the site plans. The sub-grade area was then proof-rolled to determine soft or otherwise unsuitable zones and such zones rectified as necessary. The sub-grade was watered and scarified prior to fill placement to aid layer bonding.

## 3.2 Fill materials

The materials used as fill were locally sourced and observed to generally consist of Silty Clay, sourced from stockpiled materials on site. No particles greater than 150mm were observed. The fill was nominated as clean fill by the contractor.

## 3.3 Fill Construction

The contractor had the following plant available on-site during the construction period for use in the fill placement:

- Excavator
- Pad Foot Roller
- Watercart
- Grader
- Trucks
- Dozer

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

Test numbers 7, 8 and 10 originally failed to meet specification. Streetworks Pty Ltd were notified and asked to rework the area appropriately. Upon adequate reworking Terra Firma Laboratories would perform a re-test.; 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 28/09/2017 or work completed after the 20/2/2018, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

Tom Seymour
Managing Director

# Appendices



**Our Head Office**
47 National Ave
Pakenham, VIC 3810

**Our Laboratories**
Pakenham 03 9769 5799
Deer Park 03 8348 5596
Bibra Lake 0481 227 980


47 National Avenue
Pakenham VIC 3810

# Test Location Plan

| | |
|---|---|
| Client: | Streetworks Pty Ltd |
| Project: | Summerhill Stage 4 |
| Scale | NTS |

terra firma laboratories

# Level One Test Summary

**Client:** Streetworks Py Ltd **Specification:** 95%
**Project:** Summerhill Stage 4 **Project No:** 9897

| Date: | Test Number: | Layer: | Retest of: | Density: | Pass/Fail: | Lot No: | Report No: |
|---|---|---|---|---|---|---|---|
| 28/09/2017 | 1 | L1 | | 101 | Pass | 425 | 9897-1 |
| 28/09/2017 | 2 | L1 | | 100 | Pass | 424 | 9897-1 |
| 28/09/2017 | 3 | L1 | | 103 | Pass | 422 | 9897-1 |
| 15/12/2017 | 4 | L1 | | 98.5 | Pass | 418 | 9897-2 |
| 15/12/2017 | 5 | L1 | | 99.5 | Pass | 419 | 9897-2 |
| 15/12/2017 | 6 | L1 | | 96 | Pass | 420 | 9897-2 |
| 15/12/2017 | 7 | L1 | | 93.5 | Fail | 421 | 9897-2 |
| 16/12/2017 | 8 | L2 | | 91.5 | Fail | 423 | 9897-3 |
| 16/12/2017 | 9 | L2 | | 96 | Pass | 402 | 9897-3 |
| 16/12/2017 | 10 | L1 | | 91.5 | Fail | 407 | 9897-3 |
| 19/12/2017 | 11 | L1 | 7 | 97 | Pass | 421 | 9897-4 |
| 19/12/2017 | 12 | L3 | | 95 | Pass | 420 | 9897-4 |
| 19/12/2017 | 13 | L3 | | 101 | Pass | 419 | 9897-4 |
| 19/12/2017 | 14 | L3 | | 103 | Pass | 418 | 9897-4 |
| 19/02/2018 | 15 | L1 | | 102.5 | Pass | 417 | 9897-5 |
| 19/02/2018 | 16 | L1 | | 95 | Pass | 415 | 9897-5 |
| 19/02/2018 | 17 | L2 | | 98 | Pass | 414 | 9897-5 |
| 19/02/2018 | 18 | L2 | 8 | 99 | Pass | 423 | 9897-5 |
| 19/02/2018 | 19 | L1 | 10 | 97.5 | Pass | 407 | 9897-5 |
| 19/02/2018 | 20 | L3 | | 97 | Pass | 407 | 9897-5 |
| 19/02/2018 | 21 | L2 | | 104 | Pass | 408 | 9897-6 |
| 19/02/2018 | 22 | FSL | | 96.5 | Pass | 402 | 9897-6 |
| 19/02/2018 | 23 | L2 | | 96 | Pass | 412 | 9897-6 |
| 19/02/2018 | 24 | L2 | | 97 | Pass | 413 | 9897-6 |
| 20/02/2018 | 25 | L2 | | 96.5 | Pass | 411 | 9897-7 |
| 20/02/2018 | 26 | FSL | | 104 | Pass | 408 | 9897-7 |
| 20/02/2018 | 27 | FSL | | 96 | Pass | 406 | 9897-7 |

# 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 9897-1

date of issue 05-Oct-2017

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| Feature | Block Fill |
| Layer thickness (mm) | 300 |

| | |
|---|---|
| tested by | AA |
| time | All Day |
| date | 28-Sep-2017 |
| checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **1** | **2** | **3** | | | |
|---|---|---|---|---|---|---|---|
| location | Lot No | 425 | 424 | 422 | | | |
| 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 | 225 | | | |
| field wet density | $t/m^3$ | 2.03 | 2.05 | 2.06 | | | |
| field dry density | $t/m^3$ | 1.70 | 1.71 | 1.76 | | | |
| field moisture content | % | 19.9 | 19.4 | 16.6 | | | |
| 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 | $t/m^3$ | 2.01 | 2.05 | 2.00 | | | |
| adjusted peak converted wet density | $t/m^3$ | - | - | - | | | |
| moisture variation from OMC (-dry,+wet)% | | -1.0 | 0.0 | -2.5 | | | |
| **Moisture ratio** | **%** | **96.0** | **100.0** | **87.5** | | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **101.0** | **100.0** | **103.0** | | | |

material description

**Gravelly 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 9897-2

date of issue 20-Dec-2017

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| Feature | Block Fill |
| Layer thickness (mm) | 300 |

| | |
|---|---|
| tested by | BM |
| time | PM |
| date | 15-Dec-2017 |
| checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **4** | **5** | **6** | **7** | | |
|---|---|---|---|---|---|---|---|
| location Lot No | | 418 | 419 | 420 | 421 | | |
| Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | | | | | | |
| depth from F.S.L. | m | Layer 1 | Layer 1 | Layer 1 | Layer 1 | | |
| measurement depth | mm | 275 | 275 | 275 | 275 | | |
| field wet density | $t/m^3$ | 2.06 | 1.99 | 1.92 | 1.88 | | |
| field dry density | $t/m^3$ | 1.80 | 1.70 | 1.65 | 1.56 | | |
| field moisture content | % | 14.4 | 16.9 | 16.6 | 20.1 | | |
| 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 | $t/m^3$ | 2.09 | 2.08 | 2.00 | 2.01 | | |
| adjusted peak converted wet density | $t/m^3$ | - | - | - | - | | |
| moisture variation from OMC (-dry,+wet)% | | -1.0 | 1.0 | 0.0 | 1.5 | | |
| **Moisture ratio** | **%** | **94.5** | **106.0** | **100.0** | **109.0** | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **98.5** | **95.5** | **96.0** | **93.5** | | |

material description

**Sandy CLAY**

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C Caulfield

# COMPACTION ASSESSMENT

BY NUCLEAR GAUGE METHOD

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

report No 9897-3
date of issue 20-Dec-2017

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| 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** | | **8** | **9** | **10** | | | |
|---|---|---|---|---|---|---|---|
| location | Lot No | 423 | 402 | 407 | | | |
| Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | | | | | | |
| depth from F.S.L. | m | Layer 2 | Layer 2 | Layer 1 | | | |
| measurement depth | mm | 275 | 275 | 275 | | | |
| field wet density | $t/m^3$ | 1.88 | 1.91 | 1.84 | | | |
| field dry density | $t/m^3$ | 1.57 | 1.60 | 1.52 | | | |
| field moisture content | % | 19.5 | 18.8 | 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 | $t/m^3$ | 2.05 | 1.98 | 2.01 | | | |
| adjusted peak converted wet density | $t/m^3$ | - | - | - | | | |
| moisture variation from OMC (-dry,+wet)% | | 1.0 | 0.0 | 0.5 | | | |
| **Moisture ratio** | **%** | **105.0** | **100.0** | **103.5** | | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **91.5** | **96.0** | **91.5** | | | |

material description

**Gravelly Silty Clay**

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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 9897-4

date of issue 21-Dec-2017

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| Feature | Block Fill |
| Layer thickness (mm) | 300 |

| | |
|---|---|
| tested by | BM |
| time | All Day |
| date | 19-Dec-2017 |
| checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **11** | **12** | **13** | **14** | | |
|---|---|---|---|---|---|---|---|
| location Lot No<br>Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | 421<br>Retest of 7 | 420 | 419 | 418 | | |
| depth from F.S.L. | m | Layer 1 | Layer 3 | Layer 3 | Layer 3 | | |
| measurement depth | mm | 275 | 275 | 275 | 275 | | |
| field wet density | $t/m^3$ | 1.95 | 1.94 | 2.04 | 2.01 | | |
| field dry density | $t/m^3$ | 1.68 | 1.63 | 1.77 | 1.66 | | |
| field moisture content | % | 15.5 | 19.4 | 14.8 | 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 | 5 | 0 | 0 | 0 | | |
| peak converted wet density | $t/m^3$ | - | 2.05 | 2.01 | 1.95 | | |
| adjusted peak converted wet density | $t/m^3$ | 2.00 | - | - | - | | |
| moisture variation from OMC (-dry,+wet)% | | -1.5 | 0.0 | -2.0 | -1.5 | | |
| **Moisture ratio** | **%** | **91.0** | **101.0** | **88.0** | **92.0** | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **97.0** | **95.0** | **101.0** | **103.0** | | |

material description

**Gravelly Silty Clay**

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# 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 9897-5

date of issue 23-Feb-2018

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| Feature | Block Fill |
| Layer thickness (mm) | 300 |

| | |
|---|---|
| tested by | MH |
| time | All Day |
| date | 19-Feb-2018 |
| checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **15** | **16** | **17** | **18** | **19** | **20** |
|---|---|---|---|---|---|---|---|
| location Lot No<br>Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | 417 | 415 | 414 | 423<br>Retest of #8 | 407<br>Retest of # 10 | 407 |
| depth from F.S.L. | m | Layer 1 | Layer 1 | Layer 2 | Layer 2 | Layer 1 | Layer 3 |
| measurement depth | mm | 275 | 275 | 275 | 275 | 275 | 275 |
| field wet density | $t/m^3$ | 2.14 | 1.98 | 2.02 | 1.99 | 1.99 | 1.98 |
| field dry density | $t/m^3$ | 1.97 | 1.76 | 1.78 | 1.65 | 1.64 | 1.62 |
| field moisture content | % | 8.9 | 12.8 | 14.0 | 20.7 | 20.9 | 22.4 |
| 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 | $t/m^3$ | 2.09 | 2.08 | 2.06 | 2.01 | 2.04 | 2.04 |
| adjusted peak converted wet density | $t/m^3$ | - | - | - | - | - | - |
| moisture variation from OMC (-dry,+wet)% | | -2.0 | -1.5 | -2.0 | -1.5 | 0.0 | 0.0 |
| **Moisture ratio** | **%** | **83.5** | **89.0** | **86.0** | **93.5** | **99.0** | **99.5** |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **102.5** | **95.0** | **98.0** | **99.0** | **97.5** | **97.0** |

material description

**Gravelly Silty Clay**

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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 9897-6

date of issue 23-Feb-2018

| | | | | | |
|---|---|---|---|---|---|
| Client | Streetworks | Feature | Block Fill | tested by | MH |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 | | | time | All Day |
| Project | Summer Hill Stage 4 | Layer thickness (mm) | 300 | date | 19-Feb-2018 |
| Location | Cranbourne South | | | checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **21** | **22** | **23** | **24** | | |
|---|---|---|---|---|---|---|---|
| location Lot No | | 408 | 402 | 412 | 413 | | |
| Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | | | | | | |
| depth from F.S.L. | m | Layer 2 | FSL | Layer 2 | Layer 2 | | |
| measurement depth | mm | 275 | 275 | 275 | 275 | | |
| field wet density | $t/m^3$ | 1.98 | 2.03 | 1.97 | 1.95 | | |
| field dry density | $t/m^3$ | 1.57 | 1.75 | 1.68 | 1.70 | | |
| field moisture content | % | 25.6 | 15.6 | 17.1 | 14.6 | | |
| 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 | 5 | | |
| peak converted wet density | $t/m^3$ | 1.90 | 2.10 | 2.05 | - | | |
| adjusted peak converted wet density | $t/m^3$ | - | - | - | 2.01 | | |
| moisture variation from OMC (-dry,+wet)% | | -2.0 | 0.5 | -0.5 | -2.0 | | |
| **Moisture ratio** | **%** | **93.0** | **102.5** | **98.0** | **87.5** | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **104.0** | **96.5** | **96.0** | **97.0** | | |

material description

**Gravelly Silty Clay**

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# 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 9897-7

date of issue 23-Feb-2018

| | |
|---|---|
| Client | Streetworks |
| Client address | 4 Len Thomas Place, Narre Warren, 3805 |
| Project | Summer Hill Stage 4 |
| Location | Cranbourne South |

| | |
|---|---|
| Feature | Block Fill |
| Layer thickness (mm) | 300 |

| | |
|---|---|
| tested by | MH |
| time | All Day |
| date | 20-Feb-2018 |
| checked by | CC |

Field density test procedure AS1289.2.1.1 and 5.8.1

| **Test No** | | **25** | **26** | **27** | | | |
|---|---|---|---|---|---|---|---|
| location Lot No | | 411 | 408 | 407 | | | |
| Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b) | | | | | | | |
| depth from F.S.L. | m | Layer 2 | FSL | FSL | | | |
| measurement depth | mm | 275 | 275 | 275 | | | |
| field wet density | $t/m^3$ | 1.99 | 2.09 | 1.98 | | | |
| field dry density | $t/m^3$ | 1.65 | 1.76 | 1.70 | | | |
| field moisture content | % | 20.6 | 18.3 | 16.1 | | | |
| 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 | 4 | 0 | | | |
| peak converted wet density | $t/m^3$ | 2.06 | - | 2.06 | | | |
| adjusted peak converted wet density | $t/m^3$ | - | 2.00 | - | | | |
| moisture variation from OMC (-dry,+wet)% | | 1.0 | -3.0 | -1.5 | | | |
| **Moisture ratio** | **%** | **104.5** | **85.5** | **91.0** | | | |
| **Hilf density ratio ( $R_{HD}$ )** | **%** | **96.5** | **104.0** | **96.0** | | | |

material description

**Gravelly Silty Clay**

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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Approved Signature

C Caulfield