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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 210

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 210

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 Stage 2 Lot 210. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 214

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 214

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 Stage 2 Lot 214. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 215

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 215

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 Stage 2 Lot 215. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 217

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 217

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 Stage 2 Lot 217. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 217, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 223

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 223

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 Stage 2 Lot 223. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 217, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

terra firma laboratories

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing

Summerhill Stage 2
Cranbourne

Prepared for:

Streetworks Pty Ltd
4 Len Thomas Place
Narre Warren 3805

Project 9735

15 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2

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 Stage 2. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. 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.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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

Test numbers 5 through to 13 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.

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It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed. Each lot does not necessarily require a compaction test to comply. The compaction control testing indicated that the engineered fill on all lots complied with the technical specification.

5. Uncontrolled Works

Terra Firma Laboratories cannot verify any works completed by others after the final date specified in the introduction. Uncontrolled works may include, but not limited to trenching for services, cut and fill works for slab preparation or subsequent removal of vegetation and back fill of holes.

6. Clean Fill

Terra Firma Laboratories cannot guarantee that the material used as a filling medium is free from chemical or other contamination.

7. Statement of Compliance

Inspections and testing of the fill areas at this site indicate that both sub grade preparation and fill placement have been conducted in accordance with the specification and that the completed fill areas of greater than 300mm, as shown on the site plan attached, and not any preceding the 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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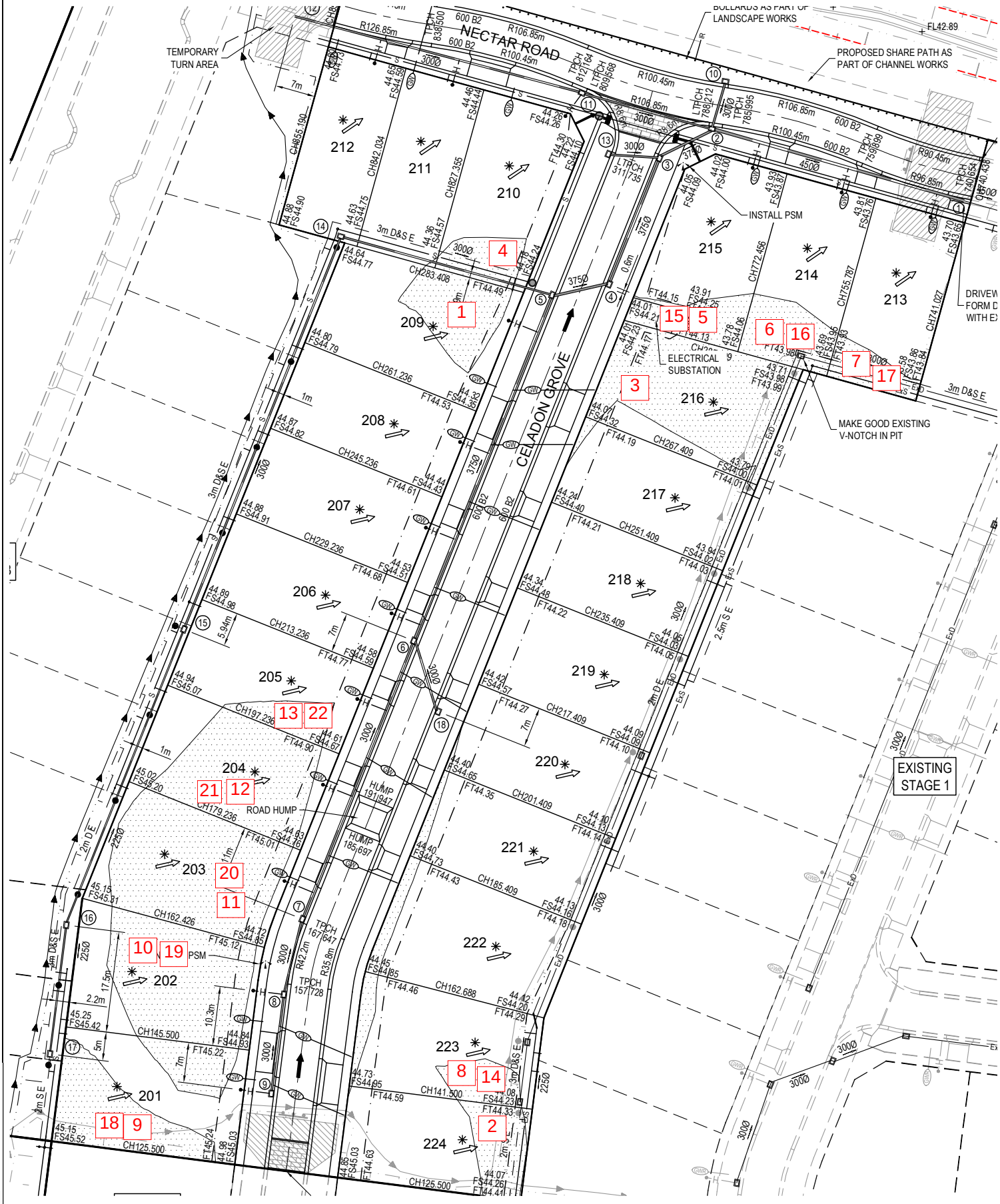
APPENDICES

Appendix 1: Site Plans

Appendix 2: Test Summary

Appendix 3: Test Reports



47 National Avenue
Pakenham VIC 3810

Test Location Plan

Client : Streetworks Pty Ltd

Project : Summerhilll Stage 2

Scale NTS

Level One Test Summary

Client: Streetworks Pty Ltd **Specification:** 95%
Project: Summerhill Stage 2 **Project No:** 9735

Date:	Test Number:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
13/07/2017	1	FSL		98	Pass	209	9735-1
13/07/2017	2	FSL		103	Pass	224	9735-1
13/07/2017	3	FSL		97.5	Pass	216	9735-1
14/07/2017	4	FSL		95.5	Pass	210	9735-2
14/07/2017	5	FSL		92	Fail	215	9735-2
14/07/2017	6	FSL		91.5	Fail	214	9735-2
14/07/2017	7	FSL		90	Fail	213	9735-2
14/07/2017	8	FSL		93	Fail	223	9735-2
14/07/2017	9	FSL		94	Fail	201	9735-2
14/07/2017	10	FSL		93.5	Fail	202	9735-3
14/07/2017	11	FSL		91	Fail	203	9735-4
14/07/2017	12	FSL		93.5	Fail	204	9735-4
14/07/2017	13	FSL		94	Fail	205	9735-4
18/07/2017	14	FSL	8	99.5	Pass	223	9735-5
18/07/2017	15	FSL	5	96	Pass	215	9735-5
18/07/2017	16	FSL	6	99	Pass	214	9735-5
18/07/2017	17	FSL	7	97	Pass	213	9735-5
18/07/2017	18	FSL	9	95.5	Pass	201	9735-5
18/07/2017	19	FSL	10	95	Pass	202	9735-7
18/07/2017	20	FSL	11	96	Pass	203	9735-5
18/07/2017	21	FSL	12	95	Pass	204	9735-6
18/07/2017	22	FSL	13	96	Pass	205	9735-6

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 9735-1

date of issue 15-Aug-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

Feature	Block Fill
Layer thickness (mm)	300

tested by	DM
time	All Day
date	14-Jul-2017
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**1**	**2**	**3**			
location Lot No		209	224	216			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	0	0	0			
measurement depth	mm	275	275	275			
field wet density	t/m^3	1.99	2.02	2.07			
field dry density	t/m^3	1.61	1.71	1.77			
field moisture content	%	23.3	17.9	16.7			
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	2.03	1.96	2.12			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		3.5	-3.0	1.5			
Moisture ratio	**%**	**118.0**	**86.0**	**109.0**			
Hilf density ratio (R_{HD})	**%**	**98.0**	**103.0**	**97.5**			

material description

Gravelly 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

/ersion 6 October 2016

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 9735-2

date of issue 18-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	PM
date	14-Jul-2017
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**4**	**5**	**6**	**7**	**8**	**9**
location Lot No		210	215	214	213	223	201
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	FSL	FSL	FSL	FSL	FSL	FSL
measurement depth	mm	275	275	275	275	275	275
field wet density	t/m^3	1.88	1.93	1.91	1.87	1.86	1.93
field dry density	t/m^3	1.51	1.63	-0.36	1.59	1.56	1.62
field moisture content	%	24.4	18.6	-637.4	18.2	18.7	18.7
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	1.97	2.10	2.09	2.08	2.00	2.05
adjusted peak converted wet density	t/m^3	-	-	-	-	-	-
moisture variation from OMC (-dry,+wet)%		2.0	2.0	3.0	1.5	-1.5	1.0
Moisture ratio	**%**	**108.5**	**112.0**	**102.0**	**109.0**	**93.5**	**105.0**
Hilf density ratio (R_{HD})	**%**	**95.5**	**92.0**	**91.5**	**90.0**	**93.0**	**94.0**

material description

Silty CLAY

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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LABORATORY ACCREDITATION No **15357**

Approved Signature

C Caulfield

/ersion 6 October 2016

COMPACTION ASSESSMENT
BY NUCLEAR GAUGE METHOD

terra firma laboratories
47 National Avenue, Pakenham VIC 3810
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report No 9735-3
date of issue 18-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

chainage	Refer to Location
Layer thickness (mm	300

tested by	SP
time:	PM
date:	14-Jul-2017
checked by	CC

test procedures AS1289.2.1.1 & 5.8.1

test No		**10**					
location Lot No		202					
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	FSL					
measurement depth	mm	275					
field wet density	t/m^3	1.94					
field dry density	t/m^3	1.62					
field moisture content	%	19.5					
laboratory compaction procedure AS1289.5.1.1 Standard Compaction							
standard maximum dry density	t/m^3	**1.74**					
standard optimum moisture content	%	**17.0**					
test procedure AS1289.5.4.1							
oversize material retained on AS sieve	mm	19.0					
percent of oversize material	wet	0					
percent of oversize material	dry	0					
adjusted standard maximum dry density	t/m^3	0.00					
adjusted standard optimum moisture content	%	0.0					
moisture variation (-dry,+wet)	%	2.5					
moisture ratio (R_m)	**%**	113.0					
dry density ratio (R_D)	**%**	**93.5**					

material description

Silty CLAY

compaction test details

date mat'l sampled	14-Jul-2017
material source	on site - stockpile
material stabilised	
time elapsed	

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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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 9735-4

date of issue 18-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

Feature	Block Fill
Layer thickness (mm)	300

tested by	SP
time	PM
date	14-Jul-2017
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**11**	**12**	**13**			
location Lot No		203	204	205			
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	FSL	FSL	FSL			
measurement depth	mm	275	275	275			
field wet density	t/m^3	1.89	1.95	1.95			
field dry density	t/m^3	1.53	1.61	1.62			
field moisture content	%	23.2	21.0	20.6			
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	2.08	2.08	2.08			
adjusted peak converted wet density	t/m^3	-	-	-			
moisture variation from OMC (-dry,+wet)%		2.5	2.5	2.5			
Moisture ratio	**%**	**112.5**	**114.5**	**113.0**			
Hilf density ratio (R_{HD})	**%**	**91.0**	**93.5**	**94.0**			

material description

Silty CLAY

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LABORATORY ACCREDITATION No **15357**

Approved Signature

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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 9735-5

date of issue 19-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

Feature	Block Fill
Layer thickness (mm)	275

tested by	SP
time	AM
date	18-Jul-2017
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**14**	**15**	**16**	**17**	**18**	**20**
location / Lot No		223 Retest of 8	215 Retest of 5	214 Retest of 6	213 Retest of 7	201 Retest of 9	203 Retest of 11
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	FSL	FSL	FSL	FSL	FSL	FSL
measurement depth	mm	250	250	250	250	250	250
field wet density	t/m^3	2.00	2.03	2.02	2.00	2.01	2.00
field dry density	t/m^3	1.71	1.69	1.71	1.69	1.69	1.63
field moisture content	%	16.9	20.1	18.3	18.4	18.7	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	2.01	2.12	2.04	2.07	2.10	2.08
adjusted peak converted wet density	t/m^3	-	-	-	-	-	-
moisture variation from OMC (-dry,+wet)%		-2.5	3.5	0.5	1.0	0.5	3.5
Moisture ratio	**%**	**87.5**	**121.0**	**103.5**	**106.0**	**104.0**	**118.0**
Hilf density ratio (R_{HD})	**%**	**99.5**	**96.0**	**99.0**	**97.0**	**95.5**	**96.0**

material description

Silty CLAY

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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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 9735-6

date of issue 19-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

Feature	Block Fill
Layer thickness (mm)	275

tested by	SP
time	AM
date	18-Jul-2017
checked by	CC

Field density test procedure AS1289.2.1.1 and 5.8.1

Test No		**21**	**22**				
location Lot No Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)		204 Retest of 12	205 Retest of 13				
depth from F.S.L.	m	FSL	FSL				
measurement depth	mm	250	250				
field wet density	t/m^3	1.99	2.03				
field dry density	t/m^3	1.67	1.69				
field moisture content	%	19.2	20.1				
laboratory compaction procedure AS1289 5.7.1							
compactive effort		standard	standard				
oversize material retained on AS sieve	mm	19.0	19.0				
percent of oversize material	wet	0	0				
peak converted wet density	t/m^3	2.10	2.11				
adjusted peak converted wet density	t/m^3	-	-				
moisture variation from OMC (-dry,+wet)%		2.0	3.5				
Moisture ratio	**%**	**112.5**	**120.0**				
Hilf density ratio (R_{HD})	**%**	**95.0**	**96.0**				

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

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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 9735-7
date of issue 19-Jul-2017

Client	Streetworks
Client address	4 Len Thomas Place, Narre Warren, 3805
Project	Summer Hill Stage 2
Location	Cranbourne

chainage	Refer to Location
Layer thickness (mm	275

tested by	SP
time:	AM
date:	18-Jul-2017
checked by	CC

test procedures AS1289.2.1.1 & 5.8.1

test No		**19**					
location Lot No		202 Retest of 10					
Sampling procedures AS1289.1.1,1.2.1-Clause 6.4(b)							
depth from F.S.L.	m	FSL					
measurement depth	mm	250					
field wet density	t/m^3	2.02					
field dry density	t/m^3	1.66					
field moisture content	%	21.5					
laboratory compaction procedure AS1289.5.1.1 Standard Compaction							
standard maximum dry density	t/m^3	**1.75**					
standard optimum moisture content	%	**16.5**					
test procedure AS1289.5.4.1							
oversize material retained on AS sieve	mm	19.0					
percent of oversize material	wet	0					
percent of oversize material	dry	0					
adjusted standard maximum dry density	t/m^3	0.00					
adjusted standard optimum moisture content	%	0.0					
moisture variation (-dry,+wet)	%	4.5					
moisture ratio (R_m)	**%**	128.0					
dry density ratio (R_D)	**%**	**95.0**					

material description

Silty CLAY

compaction test details

date mat'l sampled	18-Jul-2017
material source	on site - stockpile
material stabilised	
time elapsed	

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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Accredited for compliance with ISO/IEC 17025- Testing

LABORATORY ACCREDITATION No **15357**

Approved Signature
C Caulfield

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 201

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 201

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 Stage 2 Lot 201. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 202

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 202

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 Stage 2 Lot 202. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 203

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 203

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 Stage 2 Lot 203. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 204

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 204

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 Stage 2 Lot 204. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 205

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 205

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 Stage 2 Lot 205. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 209

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
Geotechnical Inspection and Testing Authority

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 209

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 Stage 2 Lot 209. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 213

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 213

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 Stage 2 Lot 213. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager

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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 216

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 216

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 Stage 2 Lot 216. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
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Geotechnical Report
Level One Inspection and Testing
Individual Lot Report

Summerhill Stage 2
Cranbourne
Lot 224

Prepared for:

The Land Owner

Project 9735

17 August 2018.

Prepared by:

TERRA FIRMA LABORATORIES
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Geotechnical Report Level One Inspection and Testing
Summerhill Stage 2 Lot 224

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 Stage 2 Lot 224. This work was conducted over the period of 13/07/2017 to 18/07/2017.

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 201 to 205, 209, 210, 213 to 216, 217, 223 and 224. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1 as shown in the Level One report for the entire stage) based on drawings prepared by GPR Consulting and provided by Streetworks.

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.

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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:

- *Dozer*
- *Pad foot Roller*
- *Loader*
- *Excavator*
- *Monies*

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 as shown in the Level One report for the entire stage.

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.

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4. Compaction Control Testing

Testing comprised of a total of 22 in-situ density tests, with a summary of results included in Appendix 2 as shown in the Level One report for the entire stage. Test Reports are referenced in Appendix 3 as shown in the Level One report for the entire stage.

Test numbers 5 through to 13 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 13/07/2017 or work completed after the 18/07/2017, may be certified as being compliant with the specification.

For and on behalf of
Terra Firma Laboratories,

T Seymour

Tom Seymour
Lab Manager