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Shadforth Civil Pty Ltd
99 Sandalwood Lane
Forest Glen QLD 4556

Project 681732.00
28 April 2021
R.001.Rev1
SDH:BWE

Attention: Alex Watson

Email: Alex.watson@shadcivil.com.au

Geotechnical Inspections and Testing
Proposed Subdivision
Release 12, Harmony Estate

1. Introduction

This report presents the results of the inspection and testing of bulk earthworks for Release 12 and District Collector Road Phase 5 as part of the Harmony Subdivision at Palmview. The work was undertaken at the request of Shadfroths Civil Pty Ltd.

The scope of testing and inspections provided by Douglas Partners Pty Ltd (DP) comprised 'Level 1' geotechnical inspection and testing of bulk earthworks in general accordance with AS3798 (2007). No other earthworks specification was provided for the work.

This report must be read in conjunction with the attached notes entitled 'About this Inspection Report' along with any other explanatory notes and should be kept in its entirety without separation of individual pages or sections.

2. Bulk Filling

2.1 Extent of Works

This report only addresses the bulk filling placed at the development as shown on the earthworks cut and fill drawings 15-000256.120-107, 15-000256.120-108 and 15-000256.121-101 prepared by Calibre Consulting (QLD) Pty Ltd and supplied by Shadforths Civil Pty Ltd over the period 17 August 2020 to 21 October 2020, as covered by the test locations (including elevation) noted on the test report sheets and test location plan attached to this report. All residential lots in Release 12 are covered by this report. Any other part of the site is not covered by this report unless stated otherwise.

In general, the bulk earthworks operations comprised stripping of the existing surface, then placement and compaction of 5,000m^3 fill material sourced from onsite to bring the ground level up to design surface level required for the works.

2.2 Stripping Inspections and Proof Rolling

Geotechnical personnel from DP inspected the stripped subgrade areas prior to the placement of bulk fill. All subgrade areas were stripped of vegetation or other significantly organically contaminated materials exposing the subgrade. The subgrade was test rolled using on site construction equipment (ie. vibrating pad foot compactor, loaded truck) and was considered suitable to accept the placement of fill. Any identified 'weak' or problem subgrade areas were rectified prior to the placement of fill.

2.3 Fill Materials

Fill material typically comprised sandy clay sourced from onsite.

2.4 Placement and Testing of Fill

Fill materials were placed on site by conventional earthmoving equipment, spread out in uniform layers and then compacted using a vibrating roller.

Observations were made on site by the supervising geotechnical personnel from DP who were present on site during the placement of fill over the period 17 August 2020 to 21 October 2020.

The compaction requirements for the earthworks included a minimum density ratio of 95% Standard compaction. No moisture range was specified.

Following the compaction of each layer, testing was carried out to assess compliance with the specified density ratio. In conjunction with test rolling where applicable, testing was carried out using the nuclear gauge method AS1289.5.8.1 (2007) at the testing frequency nominated in AS3798 and the project requirements. The relative compaction was determined using the Hilf method AS1289.5.7.1 (2006).

Where a layer was considered to have failed based on the wet density values measured by the nuclear gauge, these test values were not recorded and the contractor was advised that the layer required further rolling and testing prior to the placement of any further fill. At times when fill material was either too wet or dry, the contractor was advised to dry back or add moisture to the fill, in order to bring the field moisture content back closer to the optimum moisture content.

A total of 10 density tests were recorded by DP on filling placed over the period 17 August 2020 to 21 October 2020. A summary of the testing is presented in Table 1.

Table 1: Summary of Density Testing

	Compaction	Moisture
Specification	95% std.	-
No. of Tests	10	10
Range	96.5% to 103.0%	2.5% wet to 2.5% dry of OMC
Mean Average	99.7%	0% of OMC
No. of Tests Outside Specification	0	-

Note: std. – Standard compaction, OMC – optimum moisture content

3. Comments

DP undertook inspection and earthworks testing in general accordance with a Level 1 standard as defined in AS3798.

It is considered that the placement and compaction of the bulk filling over the period 17 August 2020 to 21 October 2020 for Release 12 and District Collector Road Phase 5 as part of the Harmony Subdivision at Palmview has been carried out in general accordance with the requirements of the specification. DP does not undertake to guarantee the work of the contractors nor relieve their responsibility to produce a completed product conforming to the requirements of the specification.

For building on controlled filled areas, consideration should be given by the user to the following:

- possible disruption of the compacted fill by the installation of services;
- the possibility that additional fill has been placed before and after the dates of field density tests or at times when DP has not been notified that filling operations are in progress;
- adequate containment of the filled areas;
- the suitability of the filled land to support structures of various types without excessive deflection, in particular, the shrink-swell properties of the fill and natural soils must be considered in foundation/footing slab design and in detailing future structures;
- the potential for differential settlements due to differential thicknesses of fill; and
- any topsoil which may have been placed following the completion of bulk filling.

Based on the inspection and test results, it is considered the filling referred to in this report may be considered as ‘controlled fill’ as defined in AS2870 (2011) for site classification purposes.

4. References

AS 1289.5.7.1. (2006). *Methods for testing soils for engineering purposes - Soil compaction and density tests - Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method).* Standards Australia.

AS 1289.5.8.1. (2007). *Methods for testing soils for engineering purposes - Soil compaction and density tests - Determination of field density and field moisture content of a soil using a nuclear surface moisture-density gauge - Direct transmission mode.* Standards Australia.

AS 2870. (2011). *Residential Slabs and Footings.* Standards Australia.

AS 3798. (2007). *Guidelines on Earthworks for Commercial and Residential Developments.* Standards Australia.

5. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report (or services) for Release 12 and District Collector Road Phase 5 as part of the Harmony Subdivision at Palmview. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Shadforths Civil Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the subsurface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully

Douglas Partners Pty Ltd

Shae Harry
Laboratory Manager

Reviewed by

Brett Egen (RPEQ 8597)
Senior Associate

Attachments: About this Inspection Report
Laboratory Test Results
Test Location Plan

About this Inspection Report

Introduction

These notes are provided to amplify DP's inspection report in regard to the limitations of carrying out inspection work. Not all notes are necessarily relevant to this report.

Standards

This inspection report has been prepared by qualified personnel to current engineering standards of interpretation and analysis.

Copyright and Limits of Use

This inspection report is the property of DP and is provided for the exclusive use of the client for the specific project and purpose as described in the report. It should not be used by a third party for any purpose other than to confirm that the construction works addressed in the report have been inspected as described. Use of the inspection report is limited in accordance with the Conditions of Engagement for the commission.

DP does not undertake to guarantee the works of the contractors or relieve them of their responsibility to produce a completed product conforming to the design.

Reports

This inspection report may include advice or opinion that is based on engineering and/or geological interpretation, information provided by the client or the client's agent, and information gained from:

- an investigation report for the project (if available to DP);
- inspection of the work, exposed ground conditions, excavation spoil and performance of excavating equipment while DP was on site;
- investigation and testing that was carried out during the site inspection;
- anecdotal information provided by authoritative site personnel; and
- DP's experience and knowledge of local geology.

Such information may be limited by the frequency of any inspection or testing that was able to be practically carried out, including possible site or cost constraints imposed by the client/ contractor(s). For these reasons, the reliability of this inspection report is limited by the scope of information on which it relies.

Every care is taken with the inspection report as it relates to interpretation of subsurface conditions and any recommendations or suggestions for construction or design. However, DP cannot anticipate or assume responsibility for:

- unexpected variations in subsurface conditions that are not evident from the inspection; and
- the actions of contractors responding to commercial pressures.

Should these issues occur, then additional advice should be sought from DP and, if required, amendments made.

This inspection report must be read in conjunction with any attached information. This inspection report should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions from review by others of this inspection report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this inspection report.

Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Sunshine Coast Laboratory
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Phone: (07) 5351 0400
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Email: Shae.Harry@douglaspartners.com.au

Report Number:	**681732.00-1**
Issue Number:	2 - *This version supersedes all previous issues*
Reissue Reason:	*GPS Location Error*
Date Issued:	28/04/2021
Client:	Shadforth Civil Pty Ltd
	99 Sandalwood Lane, Forest Glen QLD 4556
Contact:	Alex Watson
Project Number:	681732.00
Project Name:	Proposed Subdivision
Project Location:	Release 12, Harmony Estate
Work Request:	10242
Date Sampled:	17/08/2020
Dates Tested:	17/08/2020 - 26/08/2020
Sampling Method:	AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification:	Minimum 95% Standard Hilf Density Ratio
Location:	Bulk Earthworks
Material Source:	Onsite

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Shae Harry
Laboratory Manager
Laboratory Accreditation Number: 828

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	SS-10242A	SS-10242B	
Date Tested	17/08/2020	17/08/2020	
Time Tested	12:56	13:07	
Test Request #/Location	Bulk Earthworks	Bulk Earthworks	
Easting	0505408	0505418	
Northing	7043018	7043016	
Elevation (m)	R.L. 17.0	R.L. 17.0	
Soil Description	Sandy Clay	Sandy Clay	
Test Depth (mm)	150	150	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m^3	2.00	1.99	
Field Dry Density (FDD) t/m^3	**	**	
Peak Converted Wet Density t/m^3	2.07	2.07	
Adjusted Peak Converted Wet Density t/m^3	**	**	
Moisture Variation (Wv) %	-2.5	-1.5	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	**97.0**	**96.5**	
Compaction Method	**Standard**	**Standard**	
Report Remarks	**	**	

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

Material Test Report

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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Martin Cook
Assistant Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **681732.00-2**
Issue Number: 1
Date Issued: 28/10/2020
Client: Shadforths Civil Pty Ltd
99 Sandalwood Lane, Forest Glen QLD 4556
Contact: Alex Watson
Project Number: 681732.00
Project Name: Proposed Subdivision
Project Location: Release 12, Harmony Estate
Work Request: 10931
Date Sampled: 16/10/2020
Dates Tested: 16/10/2020 - 26/10/2020
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: Minimum 95% Standard Hilf Density Ratio
Material Source: Onsite

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	SS-10931A	SS-10931B	
Date Tested	16/10/2020	16/10/2020	
Time Tested	09:30	09:40	
Test Request #/Location	Bulk Earthworks	Bulk Earthworks	
Easting	0505527	0505541	
Northing	7043067	7043094	
Elevation (m)	R.L 16.3	R.L 16.5	
Soil Description	Sandy Clay	Sandy Clay	
Test Depth (mm)	150	150	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m^3	2.07	2.07	
Field Dry Density (FDD) t/m^3	**	**	
Peak Converted Wet Density t/m^3	2.06	2.01	
Adjusted Peak Converted Wet Density t/m^3	**	**	
Moisture Variation (Wv) %	-2.5	-2.5	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	**100.5**	**103.0**	
Compaction Method	**Standard**	**Standard**	
Report Remarks	**	**	

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

Material Test Report

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Approved Signatory: Martin Cook
Assistant Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **681732.00-3**
Issue Number: 1
Date Issued: 28/10/2020
Client: Shadforths Civil Pty Ltd
99 Sandalwood Lane, Forest Glen QLD 4556
Contact: Alex Watson
Project Number: 681732.00
Project Name: Proposed Subdivision
Project Location: Release 12, Harmony Estate
Work Request: 10952
Date Sampled: 19/10/2020
Dates Tested: 19/10/2020 - 26/10/2020
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: Minimum 95% Standard Hilf Density Ratio
Material Source: Onsite

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	SS-10952A	SS-10952B	
Date Tested	19/10/2020	19/10/2020	
Time Tested	10:35	13:10	
Test Request #/Location	Bulk Earthworks	Bulk Earthworks	
Easting	0505500	0505501	
Northing	7043060	7043094	
Elevation (m)	R.L 16.5	R.L 16.4	
Soil Description	Sandy clay	Sandy clay	
Test Depth (mm)	150	150	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m^3	2.07	2.06	
Field Dry Density (FDD) t/m^3	**	**	
Peak Converted Wet Density t/m^3	2.08	2.07	
Adjusted Peak Converted Wet Density t/m^3	**	**	
Moisture Variation (Wv) %	2.0	1.5	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	**99.5**	**99.0**	
Compaction Method	**Standard**	**Standard**	
Report Remarks	**	**	

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

Material Test Report

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Approved Signatory: Shae Harry
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **681732.00-4**
Issue Number: 1
Date Issued: 16/11/2020
Client: Shadforths Civil Pty Ltd
99 Sandalwood Lane, Forest Glen QLD 4556
Contact: Alex Watson
Project Number: 681732.00
Project Name: Proposed Subdivision
Project Location: Release 12, Harmony Estate
Work Request: 10964
Date Sampled: 20/10/2020
Dates Tested: 20/10/2020 - 29/10/2020
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: Minimum 95% Standard Hilf Density Ratio
Material Source: Onsite

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	SS-10964A	SS-10964B	
Date Tested	20/10/2020	20/10/2020	
Time Tested	14:03	14:12	
Test Request #/Location	Bulk Earthworks	Bulk Earthworks	
Easting	0505421	0505447	
Northing	7043088	7043096	
Elevation (m)	R.L.16.1	R.L. 16.1	
Soil Description	Clayey Sand	Clayey Sand	
Test Depth (mm)	150	150	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m^3	1.94	1.97	
Field Dry Density (FDD) t/m^3	**	**	
Peak Converted Wet Density t/m^3	1.98	1.96	
Adjusted Peak Converted Wet Density t/m^3	**	**	
Moisture Variation (Wv) %	2.5	2.5	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	**98.0**	**100.5**	
Compaction Method	**Standard**	**Standard**	
Report Remarks	**	**	

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

Material Test Report

Douglas Partners
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Accredited for compliance with ISO/IEC 17025 - Testing

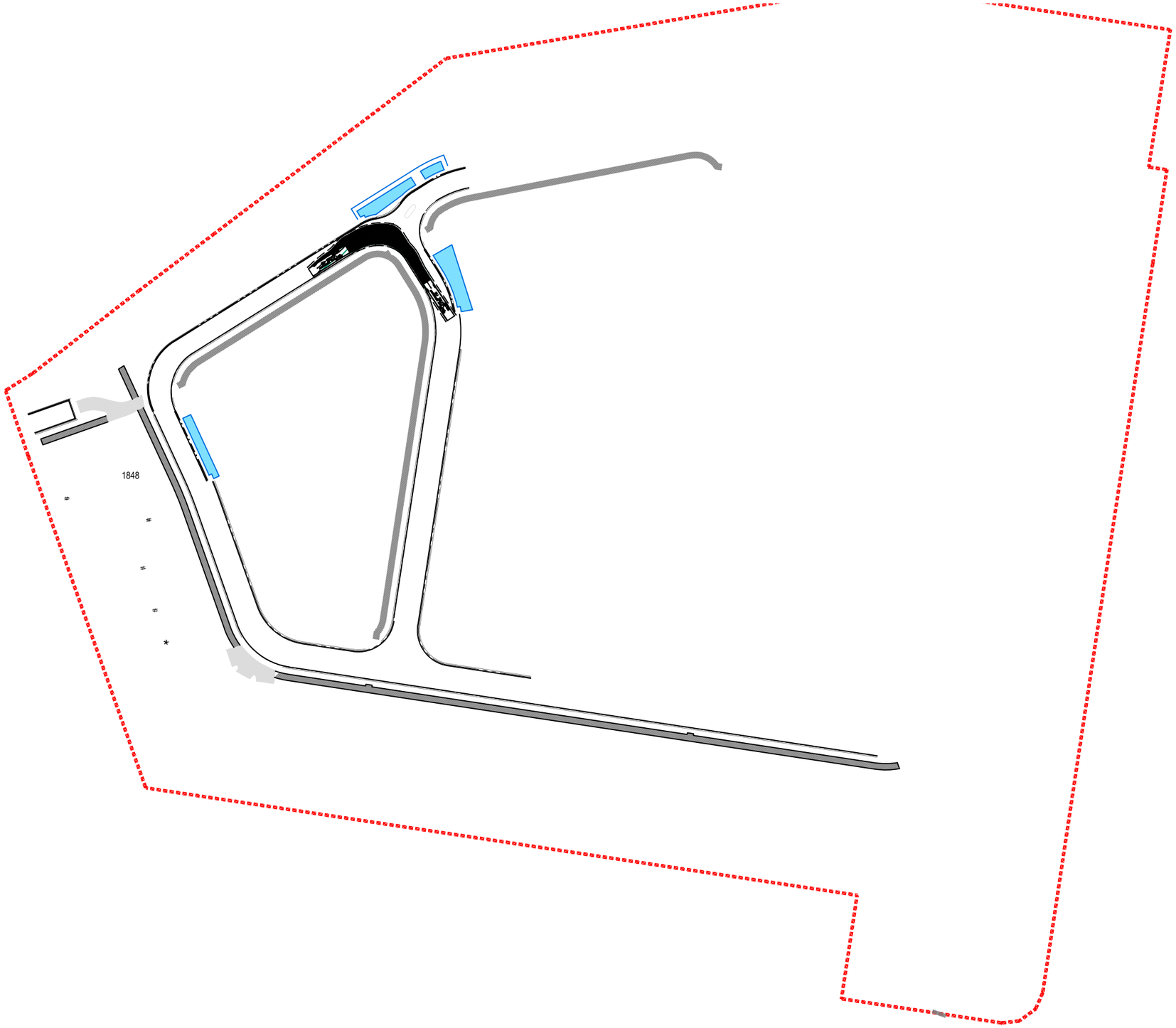
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Shae Harry
Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **681732.00-5**
Issue Number: 1
Date Issued: 16/11/2020
Client: Shadforths Civil Pty Ltd
99 Sandalwood Lane, Forest Glen QLD 4556
Contact: Alex Watson
Project Number: 681732.00
Project Name: Proposed Subdivision
Project Location: Release 12, Harmony Estate
Work Request: 10989
Date Sampled: 21/10/2020
Dates Tested: 21/10/2020 - 29/10/2020
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: Minimum 95% Standard Hilf Density Ratio
Material Source: Onsite

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	SS-10989A	SS-10989B	
Date Tested	21/10/2020	21/10/2020	
Time Tested	13:05	13:10	
Test Request #/Location	Bulk Earthworks	Bulk Earthworks	
Easting	0505509	0505507	
Northing	7043016	7043003	
Elevation (m)	R.L. 17.0	R.L. 16.9	
Soil Description	Sandy Clay	Sandy Clay	
Test Depth (mm)	150	150	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m^3	2.04	2.02	
Field Dry Density (FDD) t/m^3	**	**	
Peak Converted Wet Density t/m^3	1.99	2.01	
Adjusted Peak Converted Wet Density t/m^3	**	**	
Moisture Variation (Wv) %	0.5	0.0	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	**102.5**	**100.5**	
Compaction Method	**Standard**	**Standard**	
Report Remarks	**	**	

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