Imagine Estate Stage 8 Strathfieldsaye

Earthworks Supervision Report for Dunlop & Pitson

Report 18C 0223
March, 2018

GTS
GEOTECHNICAL TESTING SERVICES

Imagine Estate Stage 8
Strathfieldsaye

Earthworks Supervision Report

for

Dunlop & Pitson

Revision

Revision	Date	Authorised
18C 0223	20/3/18	SEH

Distribution (this revision only)

Recipient	Format	Date
GTSS	On file	20/3/18
Dunlop & Pitson Contact: Darren Pitson	Email PDF darren@kpdgroup.com.au	20/3/18

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1 INTRODUCTION

Dunlop & Pitson commissioned Geotechnical Testing Services (GTS) to undertake Level 1 Supervision and testing (AS3798-2007) for the earthworks at Imagine Estate Stage 8, Strathfieldsaye.

Level 1 Testing was generally performed in line with AS3798-2007 “Guidelines on Earthworks for Commercial and Residential Development” and provides inspection of the construction of controlled fill and compaction testing in accordance with AS1289 “Methods of Testing Soils for Engineering Purposes”. The Level 1 testing was undertaken by Geotechnicians with supervision provided by a Geotechnical Engineer from GTS.

2 SCOPE OF WORKS

2.1 AREA OF WORK

Geotechnical Testing Services provided Level 1 inspection and testing of the engineered fill placed across Lots 199 to 207 to backfill the dam and low areas along with large tree stump removals.

The depth of fill across the site varied from none to around 2.0 metres in the dam on Lots 205 with the approximate locations shown on the attached site plan.

2.2 PLACEMENT SPECIFICATION

Whilst there was no earthworks specification compiled for this project, the placement of the fill and associated works generally followed the recommendations outlined in AS3798-2007 “Guidelines for Earthworks for Commercial and Residential Developments” and the construction specification.

In summary, the earthworks comply with the following:

- The layers for residential lots are to be compacted to at least 95% of the density ratio in accordance with AS1289 5.1.1 (or 5.7.1), based on Standard compaction.

In accordance with Table 8.1 of AS3798-2007, the site would be considered small scale (less than 1500m^2) and therefore a minimum of 1 test per layer per lot is required. The testing was conducted at 1 test per lot per layer which exceeds the minimum requirement.

3 INSPECTION AND TESTING

Inspection of the excavated bases were conducted by a Senior Geotechnical Engineer and it was observed that the unsuitable material (vegetation, top soil/silt, roots) had been removed with the base consisting of a Silty Clay material of good strength.

Level 1 inspection and testing was undertaken by a geotechnician from GTS who nominated the timing and location of the in-situ density tests. The approximate location of each test is recorded on the test reports and attached fill plan.

Laboratory compaction testing was undertaken on a one to one basis at our Bendigo laboratory. A summary of the results of the compaction control testing is presented in a table below with the full NATA endorsed test reports included in the Appendix.

4 SUMMARY OF TEST RESULTS

A summary of the test results is included in the following table with full NATA accredited reports included in the Appendix.

Project No.	Sample No.	Test Date.	Location.	Reduced Level (mm)	Moisture Variation %O.M.C	Hilf Density Ratio %
1	B17-776A	30/11/17	Lot 205	1400	4.5 dry	106.5
2	B17-796A	4/12/17	Lot 205	900	1.0 dry	103.0
3	B17-796B	4/12/17	Lot 204 WR	200	1.0 dry	105.5
4	B17-796C	4/12/17	Lot 204 WR	200	2.5 dry	101.5
5	B17-796D	4/12/17	Lot 204 Dam	600	1.5 dry	104.0
6	B17-796E	4/12/17	Lot 205	600	2.0 dry	101.0
7	B17-804A	5/12/17	Lot 199 TS	250	4.5 dry	108.5
8	B17-804B	5/12/17	Lot 200 TS	250	3.5 dry	101.0
9	B17-804C	5/12/17	Lot 200 TS	150	4.5 dry	105.0
10	B17-804D	5/12/17	Lot 202 TS	150	3.5 dry	103.0
11	B17-804E	5/12/17	Lot 202 TS	150	2.0 dry	97.5
12	B17-804F	5/12/17	Lot 203 TS	200	3.5 dry	103.0
13	B17-804G	5/12/17	Lot 205	300	1.5 dry	100.0
14	B17-804H	5/12/17	Lot 204	300	3.5 dry	104.0
15	B17-815A	7/12/17	Lot 206	300	3.5 dry	108.0
16	B17-815B	7/12/17	Lot 207	300	3.0 dry	103.5
17	B17-815C	7/12/17	Lot 199	FSL	3.0 dry	102.0
18	B17-825A	8/12/17	Lot 204	FSL	3.0 dry	106.5

Project No.	Sample No.	Test Date.	Location.	Reduced Level (mm)	Moisture Variation %O.M.C	Hilf Density Ratio %
19	B17-825B	8/12/17	Lot 205	FSL	3.5 dry	105.0
20	B17-825C	8/12/17	Lot 206	FSL	5.0 dry	101.5
21	B17-825D	8/12/17	Lot 207	FSL	4.5 dry	106.5

5 STATEMENT OF COMPLIANCE

GTS personnel have provided Level 1 inspection and testing services during the placement of material for the filling of Lots 199 to 207. The placement of fill and construction techniques adopted was observed throughout the project.

Based on observations made by GTS personnel and the results of field and laboratory tests, we consider that the fill has been placed and compacted and is considered to be engineered or controlled fill. Therefore, subject to residential site classifications, the controlled fill material is deemed a suitable founding medium for future residential buildings. It is noted that top soil material may be spread across the sites following completion of these earthworks and that this top soil material is not considered controlled fill.

Shane Hampton (BE (Hons))
Senior Geotechnical Engineer

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APPENDIX

Fig 1: Site Plan

Compaction Control Test Report

Report Number: **P17236-1**
Issue Number: 1
Date Issued: 04/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 776
Date Sampled: 30/11/2017 12:13
Sampling Method: AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard

Geotechnical Testing Services (Southern)
Bendigo Soil and Concrete Testing Laboratory
Gate 7, Sharon Street Bendigo VIC 3550
Phone: (03) 5441 4881
Email: joshl@gts.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	B17-776A	B17-776B	B17-776C
Date Tested	30/11/2017	30/11/2017	30/11/2017
Time Tested	12:18	12:27	12:29
Test Request #/Location	Dam backfill	House lot	House lot
Chainage (m)	Centre	171	172
Location Offset (m)	**	**	**
Elevation (m)	**	**	**
Layer / Reduced Level	-1400	FSL	FSL
Thickness of Layer (mm)	300	300	300
Soil Description	Gravelly Silty Clay Red Brown	Gravelly Silty Clay Red Brown	Gravelly Silty Clay Red Brown
Test Depth (mm)	250	250	250
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**
Field Wet Density (FWD) t/m^3	1.99	1.98	2.12
Field Dry Density (FDD) t/m^3	**	**	**
Peak Converted Wet Density t/m^3	1.87	1.87	1.92
Adjusted Peak Converted Wet Density t/m^3	**	**	**
Moisture Variation (Wv) %	4.5	5.5	5.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	**106.5**	**106.0**	**110.5**
Compaction Method	**Standard**	**Standard**	**Standard**

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

Compaction Control Test Report

Report Number: **P17236-2**
Issue Number: 1
Date Issued: 04/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 796
Date Sampled: 04/12/2017 10:00
Sampling Method: AS1289 1.2.1 6.4 - Sampling from layers in earthworks or pavement - uncompacted/compacted
Specification: 95% Standard

Geotechnical Testing Services (Southern)
Bendigo Soil and Concrete Testing Laboratory
Gate 7, Sharon Street Bendigo VIC 3550
Phone: (03) 5441 4881
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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1					
Sample Number	B17-796A	B17-796B	B17-796C	B17-796D	B17-796E
Date Tested	04/12/2017	04/12/2017	04/12/2017	04/12/2017	04/12/2017
Time Tested	10:09	10:13	10:15	14:28	14:32
Test Request #/Location	Dam Backfill / House lot	Water race	Water race	Dam backfill / house lot	Dam backfill / house lot
Chainage (m)	Lot 205	Lot 204	Lot 204	Lot 204	Lot 205
Location Offset (m)	**	**	**	**	**
Elevation (m)	**	**	**	**	**
Layer / Reduced Level	-900	-200	-200	-600	-600
Thickness of Layer (mm)	300	300	300	300	300
Soil Description	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown
Test Depth (mm)	250	250	250	250	250
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0	0.0	0.0
Field Wet Density (FWD) t/m^3	2.09	2.15	2.13	2.12	2.05
Field Dry Density (FDD) t/m^3	**	**	**	**	**
Peak Converted Wet Density t/m^3	2.03	2.03	2.09	2.04	2.03
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**	**
Moisture Variation (Wv) %	1.0	1.0	2.5	1.5	2.0
Adjusted Moisture Variation %	**	**	**	**	**
Hilf Density Ratio (%)	**103.0**	**105.5**	**101.5**	**104.0**	**101.0**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**

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

Compaction Control Test Report

Report Number: **P17236-3**
Issue Number: 1
Date Issued: 06/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 804
Date Sampled: 05/12/2017
Sampling Method: AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client

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Gate 7, Sharon Street Bendigo VIC 3550
Phone: (03) 5441 4881
Email: joshl@gts.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1						
Sample Number	B17-804A	B17-804B	B17-804C	B17-804D	B17-804E	B17-804F
Date Tested	05/12/2017	05/12/2017	05/12/2017	05/12/2017	05/12/2017	05/12/2017
Time Tested	10:16	10:22	10:29	10:38	10:46	10:53
Test Request #/Location	Tree Stump Backfill / House lot	Tree Stump Backfill / House lot	Tree Stump Backfill / House lot	Tree Stump Backfill / House lot	Tree Stump Backfill / House lot	Tree Stump Backfill / House lot
Chainage (m)	Lot 199	Lot 200	Lot 200	Lot 202	Lot 202	Lot 203
Location Offset (m)	**	(Right side-Rear of Lot)	(Left side-Mid of Lot)	(Right side-Rear of Lot)	(Left side-Rear of Lot)	**
Elevation (m)	**	**	**	**	**	**
Layer / Reduced Level	250 Bfsl	250 Bfsl	150 Bfsl	150 Bfsl	150 Bfsl	200 Bfsl
Thickness of Layer (mm)	300	300	300	300	300	300
Soil Description	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown	Silty Gravelly Clay Red / Brown
Test Depth (mm)	250	250	250	250	250	250
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	**	**	**	**	0.0
Field Wet Density (FWD) t/m^3	2.03	2.00	2.04	2.03	2.02	1.95
Field Dry Density (FDD) t/m^3	**	**	**	**	**	**
Peak Converted Wet Density t/m^3	1.87	1.97	1.94	1.97	2.07	1.89
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**	**	**
Moisture Variation (Wv) %	4.5	3.5	4.5	3.5	2.0	3.5
Adjusted Moisture Variation %	**	**	**	**	**	**
Hilf Density Ratio (%)	**108.5**	**101.0**	**105.0**	**103.0**	**97.5**	**103.0**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**

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

Compaction Control Test Report

Report Number: **P17236-3**
Issue Number: 1
Date Issued: 06/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 804
Date Sampled: 05/12/2017
Sampling Method: AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client

Geotechnical Testing Services (Southern)
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Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1		
Sample Number	B17-804G	B17-804H
Date Tested	05/12/2017	05/12/2017
Time Tested	15:16	15:18
Test Request #/Location	Dam backfill / house lot	Dam backfill / house lot
Chainage (m)	205	204
Location Offset (m)	Centre	Centre
Elevation (m)	**	**
Layer / Reduced Level	-300	-300
Thickness of Layer (mm)	300	300
Soil Description	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown
Test Depth (mm)	250	250
Sieve used to determine oversize (mm)	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0
Field Wet Density (FWD) t/m^3	2.02	2.00
Field Dry Density (FDD) t/m^3	**	**
Peak Converted Wet Density t/m^3	2.01	1.92
Adjusted Peak Converted Wet Density t/m^3	**	**
Moisture Variation (Wv) %	1.5	3.5
Adjusted Moisture Variation %	**	**
Hilf Density Ratio (%)	**100.0**	**104.0**
Compaction Method	**Standard**	**Standard**

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

Compaction Control Test Report

Report Number: **P17236-4**
Issue Number: 1
Date Issued: 08/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 815
Date Sampled: 08/12/2017 14:00
Sampling Method: AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard

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Gate 7, Sharon Street Bendigo VIC 3550
Phone: (03) 5441 4881
Email: joshl@gts.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1			
Sample Number	B17-815A	B17-815B	B17-815C
Date Tested	07/12/2017	07/12/2017	07/12/2017
Time Tested	14:16	14:20	14:27
Test Request #/Location	House lot	House lot	House lot
Chainage (m)	206	207	199
Location Offset (m)	Centre	Centre	Centre
Elevation (m)	**	**	**
Layer / Reduced Level	-300	-300	FSL
Thickness of Layer (mm)	300	300	300
Soil Description	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown
Test Depth (mm)	250	250	250
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0
Field Wet Density (FWD) t/m^3	2.05	2.07	2.05
Field Dry Density (FDD) t/m^3	**	**	**
Peak Converted Wet Density t/m^3	1.90	2.00	2.01
Adjusted Peak Converted Wet Density t/m^3	**	**	**
Moisture Variation (Wv) %	3.5	3.0	3.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	**108.0**	**103.5**	**102.0**
Compaction Method	**Standard**	**Standard**	**Standard**

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

Compaction Control Test Report

Report Number: **P17236-5**
Issue Number: 1
Date Issued: 09/12/2017
Client: Dunlop & Pitson

Project Number: P17236
Project Name: Imagine Estate-Strathfieldsaye
Work Request: 825
Date Sampled: 08/12/2017 9:00
Sampling Method: AS1289 1.2.1 6.4 - Sampling from layers in earthworks or pavement - uncompacted/compacted
Specification: 95% Standard

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Email: joshl@gts.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Josh Lagodzki
NATA Accredited Laboratory Number: 19506

Compaction Control AS 1289 5.7.1 & 5.8.1				
Sample Number	B17-825A	B17-825B	B17-825C	B17-825D
Date Tested	08/12/2017	08/12/2017	08/12/2017	08/12/2017
Time Tested	09:09	09:11	09:17	09:20
Test Request #/Location	House block	House block	House block	House block
Chainage (m)	204	205	206	207
Location Offset (m)	**	**	**	**
Elevation (m)	**	**	**	**
Layer / Reduced Level	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	300	300	300	300
Soil Description	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown	Silty Gravelly Clay Red Brown
Test Depth (mm)	250	250	250	250
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0	0.0
Field Wet Density (FWD) t/m^3	2.19	2.10	2.09	2.14
Field Dry Density (FDD) t/m^3	**	**	**	**
Peak Converted Wet Density t/m^3	2.06	2.00	2.06	2.01
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**
Moisture Variation (Wv) %	3.0	3.5	5.0	4.5
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	**106.5**	**105.0**	**101.5**	**106.5**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**

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