



Australian Geotechnical Testing

Level One Inspection and Testing

Project No: AGTE21445

Project: Blythen Road

Suburb: Lucas



Client: Earth and Water Technologies

Date: 13th December 2021

Geotechnical	Pavement	Environmental	Residential	Design
Slope Stability Assessment	Land Capability Assessments	Erosion and Sediment Control Plan		
Retaining Walls	Level 1 Supervision	Earthworks Specification's	Percolation	

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1 Introduction

Australian Geotechnical Testing (AGT) has been engaged by Earth and Water Technologies to provide Level 1 Geotechnical Supervision for the Blythen Road project. The Estate is located in Lucas, Balarat.

This Level 1 report presents the results of supervision activities, compaction and moisture control, material placement and laboratory testing for ground works undertaken for the project. This report covers construction activities carried out from **25th November 2021 to 2nd December 2021**.

2 Scope of Works

The scope of works involved the placement of on-site General Fill. Fill Material was placed in Level one fill areas, in accordance with **AS 3798-2007, Guidelines on earthworks for commercial and residential developments and project specifications**. The level of FILL to be placed is less than 5m as per AS3798 Section 1.1.

The fill material is required as per AS3798 and the project specification to achieve:

- **95% Standard Maximum Dry Density (Compaction)**

General fill material used for the construction was locally sourced and predominantly comprising of **Silty Clay**.

3 Inspections / Supervision

Full-time Level 1 supervision and inspection was undertaken including the supervision and inspections regarding the stripping and removal as per AS3798 Section 3 shall have removed:

- Organic soils, such as topsoils, severely root affected subsoils and peat;
- Contaminated soils are part of the brief;
- Materials which undergo volume change or loss of strength when disturbed and exposed to moisture;
- Silts, or materials that have deleterious engineering properties of silt;
- Other materials with properties that are unsuitable for the forming of structural fill;
- Fill that contains wood, metal plastic, boulders or other deleterious material, in sufficient proportions to affect the required performance of the fill.
- The maximum particle size of any rocks or other lumps, within the layer, has not exceeded two-thirds ($\frac{2}{3}$) of the compacted layer thickness.

The lots inspected were essentially homogeneous in relation to material type and moisture condition, rolling response and compaction technique and which has been used for the assessment of relative compaction of an area of work (AS3798 Section 1.2.8).

Prior to placement any existing filled ground, for which the conditions of the placement are not adequately documented have not been assumed to have been of either standard compaction or of the composition adequate to support fill or any loads has been removed (AS3798 Section 2).

4 Testing

The project was classified as **Residential**, thereby requiring a minimum compaction result of **95%** density ratio Standard Compaction for the **cohesive soils** (AS 1289 5.7.1 & 5.1.1)

throughout the Level 1 Fill and in accordance with AS 3798-2007 – Table 5.2. The test was performed using a Nuclear Density Gauge for field density determination AS 1289.5.8.1.

As a minimum testing was undertaken either 3 tests per lot, 1 test per 2,500m² per layer, or 1 test per 500m³ throughout the placement of fill as per AS3798 Table 8.1.

The material was site derived **Silty Clay Fill**. The material was placed in approximately 250 mm loose layers, rolling effort with on-site Compactor (to seal of each layer of placed General Fill material) to a compacted 150mm layer that achieved 95% Standard Compaction which met Australian Standards specifications. This was considered the best method to achieve compaction using the plant and machinery available.

The NATA compaction reports verify the achievement of the minimum density requirement of 95% Standard Compaction throughout the full depth area, with each layer tested accordingly. All test results were provided to our client: Earth and Water Technologies for inclusion within their internal quality system.

At the completion of the structural layers and material within 150mm of permanent subgrade level in cuttings, test rolling was undertaken and the layers withstood test rolling without visible deformation or springing (AS 3798 Section 5.5).

The area covered by this Level 1 Supervision report is shown in the Site Plan (Refer to Appendix A). The results of the laboratory Testing are indicated in Appendix B.

5 Conclusion

On the completion of the earthworks and after analysing the materials used, it has been concluded that the filling procedure conducted by **our client Earth and Water Technologies satisfied** the general requirements of AS 3798 regards to the placement of fill materials on a project under Level 1 Supervision and in accordance with the project specification as provided to AGT.

The fill meets the requirements for “structural fill for residential applications” in accordance with AS3798. The fill has been placed, compacted and tested in accordance with AS3798 and the fill meets the requirements for controlled fill in accordance with AS2870 (2011) “Residential Slabs and Footings”.

This report has been prepared for the benefit of our client with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement. No responsibility for this report will be taken by AGT if it is altered in any way, or not reproduced in full.

6 Applicability

The findings and conclusions contained in this Report are made based on site conditions that existed at the time this work was conducted. The conclusions presented in this report are relevant to the conditions of the site and the state of legislation currently enacted as at the date of this report.

Findings and conclusions are made assuming that the soil, groundwater, geological and chemical conditions detailed within this report are accurate and remain applicable to the site at the time of writing. The conclusions of this report may become invalid if filling or excavation occurs after the boreholes and test pits referred to in this report were drilled or excavated. No other warranties are made or intended.

AGT has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality.

AGT does not make any representation or warranty that the conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the conclusions contained in this report. This report has been prepared exclusively for use by our Client. This report cannot be reproduced without the written authorisation of AGT and then can only be reproduced in its entirety.



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Appendix A – Site Plan



General Notes
 1. CUT / FILL VOLUMES SHOWN ARE FROM EXISTING SURFACE TO DESIGN SURFACE. NO ALLOWANCE FOR REMOVAL OF TOPSOIL OR SILT HAS BEEN MADE.

SAFETY FIRST
 SAFETY STARTS WITH YOU

Rev	Amendment	Initials	Date
1	Issued for Comment		15/12/20
2			
3			
4			



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Project
**LUCAS ESTATE
 RESIDENTIAL SUBDIVISION
 STAGE P1
 LUCAS**

Authority
Ballarat City Council - (03) 5320 5500

Drawing Title
EARTHWORKS PLAN

Status
**PRELIMINARY
 NOT FOR CONSTRUCTION**

Designer: T Oldaker
 Checker: _____
 Verified: _____
 Scale (A1) 1:500 Scale (A3) 1:1000
 HDR 0 5 10 15 20 25
 VER _____

Sheet Number
1 of 1

Drawing Number Revision
LUP1-CD-701 1

FILL LEGEND

DEPTH OF FILL
-3.404 TO -1.500
-1.500 TO -1.000
-1.000 TO -0.500
-0.500 TO -0.400
-0.400 TO -0.300
-0.300 TO -0.200
-0.200 TO -0.100
-0.100 TO -0.050
0.050 TO 0.100
0.100 TO 0.200
0.200 TO 0.300
0.300 TO 0.400
0.400 TO 0.500
0.500 TO 1.000
1.000 TO 1.500
1.500 TO 3.000

BOREHOLE LOGS

BOREHOLE	SILT (mm)	CLAY (mm)	ROCK
63	250	1450	YES
64	300	1000	YES
104	100	1000	YES

BOREHOLE LOG NOTES:
 1. ROCK CLASSIFIED AS BASALT

Appendix B – Laboratory Testing

Material Test Report

Report Number: AGT60071-1
Issue Number: 1
Date Issued: 27/11/2021
Client: Earth and Water Technologies
 PO Box 170, Mortlake VIC 3272
Project Number: AGT60071
Project Name: Blythen Rd
Project Location: Lucas
Work Request: 763
Date Sampled: 25/11/2021
Dates Tested: 25/11/2021 - 27/11/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client
Location: Blythen Rd, Lucas
Lot Number: 1812
Material: Brown Silty Clay
Material Source: Onsite



Australian Geotechnical Testing
 Ballarat Laboratory
 2/55 Heinz Road Delacombe VIC 3356
 Phone: 1300 026 583
 Email: PaulF@ausgeotest.com.au

Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Paul Francis
 Laboratory Manager - Ballarat
 NATA Accredited Laboratory Number: 20457

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	60071-1	60071-2	60071-3
Date Tested	25/11/2021	25/11/2021	25/11/2021
Time Tested	10:40	10:50	11:00
Test Request #/Location	Blythen Road Lot 1812	Blythen Road Lot 1812	Blythen Road Lot 1812
Latitude	-37.54042	-37.54035	-37.54047
Longitude	143.77713	143.77713	143.77689
Layer / Reduced Level	900 below	900 below	900 below
Thickness of Layer (mm)	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**
Field Wet Density (FWD) t/m ³	1.96	2.04	2.05
Field Moisture Content %	28.8	26.4	24.0
Field Dry Density (FDD) t/m ³	1.52	1.62	1.65
Peak Converted Wet Density t/m ³	1.99	2.09	2.12
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	1.5	-1.0	-0.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	98.5	98.0	97.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Material Test Report

Report Number: AGT60071-2
Issue Number: 1
Date Issued: 28/11/2021
Client: Earth and Water Technologies
 PO Box 170, Mortlake VIC 3272
Project Number: AGT60071
Project Name: Blythen Rd
Project Location: Lucas
Work Request: 767
Date Sampled: 26/11/2021
Dates Tested: 26/11/2021 - 27/11/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client
Location: Blythen Rd, Lucas
Material: Brown Silty Clay
Material Source: Onsite



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Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	60071-4	60071-5	60071-6
Date Tested	26/11/2021	26/11/2021	26/11/2021
Time Tested	15:35	15:45	15:55
Test Request #/Location	Blythen Rd Lot 1812	Blythen Rd Lot 1812	Blythen Rd Lot 1812
Latitude	-37.54045	-37.54051	-37.54042
Longitude	143.77691	143.77705	143.77704
Layer / Reduced Level	900mm below	600mm below	600mm below
Thickness of Layer (mm)	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**
Field Wet Density (FWD) t/m ³	2.00	2.01	2.00
Field Moisture Content %	23.1	23.5	22.3
Field Dry Density (FDD) t/m ³	1.62	1.63	1.64
Peak Converted Wet Density t/m ³	2.00	2.07	2.09
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	0.0	-0.5	-0.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	100.0	97.0	96.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Material Test Report

Report Number: AGT60071-3
Issue Number: 1
Date Issued: 03/12/2021
Client: Earth and Water Technologies
 PO Box 170, Mortlake VIC 3272
Project Number: AGT60071
Project Name: Blythen Rd
Project Location: Lucas
Work Request: 771
Date Sampled: 29/11/2021
Dates Tested: 29/11/2021 - 29/11/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client
Location: Blythen Rd, Lucas
Material: Salvage Clay
Material Source: Onsite



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Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1						
Sample Number	60071-7	60071-8	60071-9	60071-10	60071-11	60071-12
Date Tested	29/11/2021	29/11/2021	29/11/2021	29/11/2021	29/11/2021	29/11/2021
Time Tested	10:30	10:40	12:30	12:40	14:40	14:50
Test Request #/Location	Blythen Rd Lot 1806	Blythen Rd Lot 1809	Blythen Rd Lot 1807	Blythen Rd Lot 1806	Blythen Rd Lot 1810	Blythen Rd Lot 1811
Latitude	-37.54069	-37.54078	-37.54080	-37.54073	-37.54113	-37.54064
Longitude	143.77784	143.77832	143.77839	143.77820	143.77751	143.77741
Layer / Reduced Level	450 Below	450 Below	200 Below	200 Below	200 below	200 below
Thickness of Layer (mm)	150	150	150	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**	**	**	**
Field Wet Density (FWD) t/m ³	1.93	1.91	1.94	2.02	1.95	2.01
Field Moisture Content %	**	**	**	**	**	**
Field Dry Density (FDD) t/m ³	**	**	**	**	**	**
Peak Converted Wet Density t/m ³	1.92	1.95	1.95	2.00	1.91	1.98
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**	**	**
Moisture Variation (Wv) %	2.0	2.5	2.0	1.5	2.0	2.5
Adjusted Moisture Variation %	**	**	**	**	**	**
Hilf Density Ratio (%)	100.5	98.0	99.5	101.0	102.0	101.0
Compaction Method	Standard	Standard	Standard	Standard	Standard	Standard
Report Remarks	**	**	**	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Material Test Report

Report Number: AGT60071-4
Issue Number: 1
Date Issued: 03/12/2021
Client: Earth and Water Technologies
 PO Box 170, Mortlake VIC 3272
Project Number: AGT60071
Project Name: Blythen Rd
Project Location: Lucas
Work Request: 772
Date Sampled: 30/11/2021
Dates Tested: 30/11/2021 - 01/12/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: Selected by Client
Location: Blythen Rd, Lucas



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 Laboratory Manager - Ballarat
 NATA Accredited Laboratory Number: 20457

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	60071-13	60071-14	60071-15
Date Tested	30/11/2021	30/11/2021	30/11/2021
Time Tested	10:05	10:12	10:20
Test Request #/Location	Blythen Rd Lot 1812	Blythen Rd Lot 1811	Blythen Rd Lot 1809
Latitude	-37.54047	-37.54057	-37.54061
Longitude	143.77723	143.77748	143.77785
Layer / Reduced Level	FSL	FSL	FSL
Thickness of Layer (mm)	150	150	150
Soil Description	Salvage Clay	Salvage Clay	Salvage Clay
Test Depth (mm)	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**
Field Wet Density (FWD) t/m ³	2.05	2.02	1.93
Field Moisture Content %	23.0	23.9	27.5
Field Dry Density (FDD) t/m ³	1.67	1.63	1.52
Peak Converted Wet Density t/m ³	2.09	2.06	1.91
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	1.5	1.5	2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	98.5	97.5	101.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Material Test Report

Report Number: AGT60071-5
Issue Number: 1
Date Issued: 04/12/2021
Client: Earth and Water Technologies
 PO Box 170, Mortlake VIC 3272
Project Number: AGT60071
Project Name: Blythen Rd
Project Location: Lucas
Work Request: 781
Date Sampled: 02/12/2021
Dates Tested: 02/12/2021 - 03/12/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard
Site Selection: RC 316.10
Location: Blythen Rd, Lucas
Material Source: Onsite



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 Laboratory Manager - Ballarat
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Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	60071-16	60071-17	60071-18
Date Tested	02/12/2021	02/12/2021	02/12/2021
Time Tested	14:05	14:15	14:25
Test Request #/Location	Blythen Rd Lot 1812	Blythen Rd Lot 1812	Blythen Rd Lot 1812
Latitude	-37.54037	-37.54052	-37.54031
Longitude	143.77692	143.77707	143.77718
Layer / Reduced Level	FSL	FSL	FSL
Thickness of Layer (mm)	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**
Field Wet Density (FWD) t/m ³	1.97	2.08	1.96
Field Moisture Content %	27.4	21.9	27.4
Field Dry Density (FDD) t/m ³	1.55	1.71	1.54
Peak Converted Wet Density t/m ³	1.90	1.97	1.90
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	2.5	2.5	2.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	104.0	105.5	103.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC