Australian Geotechnical Testing

Level One Inspection and Testing

Project No: AGTE21785
Project: Alluvium Estate Stage 4
Suburb: Delacombe

Client: Wayne Horne earthmoving

Date: 9th February 2023

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

Adelaide | Brisbane | Ballarat | Melbourne | Warrnambool

Contents

1 Introduction

Australian Geotechnical Testing (AGT) has been engaged by Wayne Horne Earthmoving to provide Level 1 Geotechnical Supervision for the Alluvium Estate Stage 4 project. The Estate is located in Delacombe.

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 **20th July to 08th December 2022.**

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 ($^2/_3$) 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 2,500m^2 per layer, or 1 test per 500m^3 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 200mm 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: Wayne Horne Earthmoving 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 **Wayne Horne Earthmoving 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.
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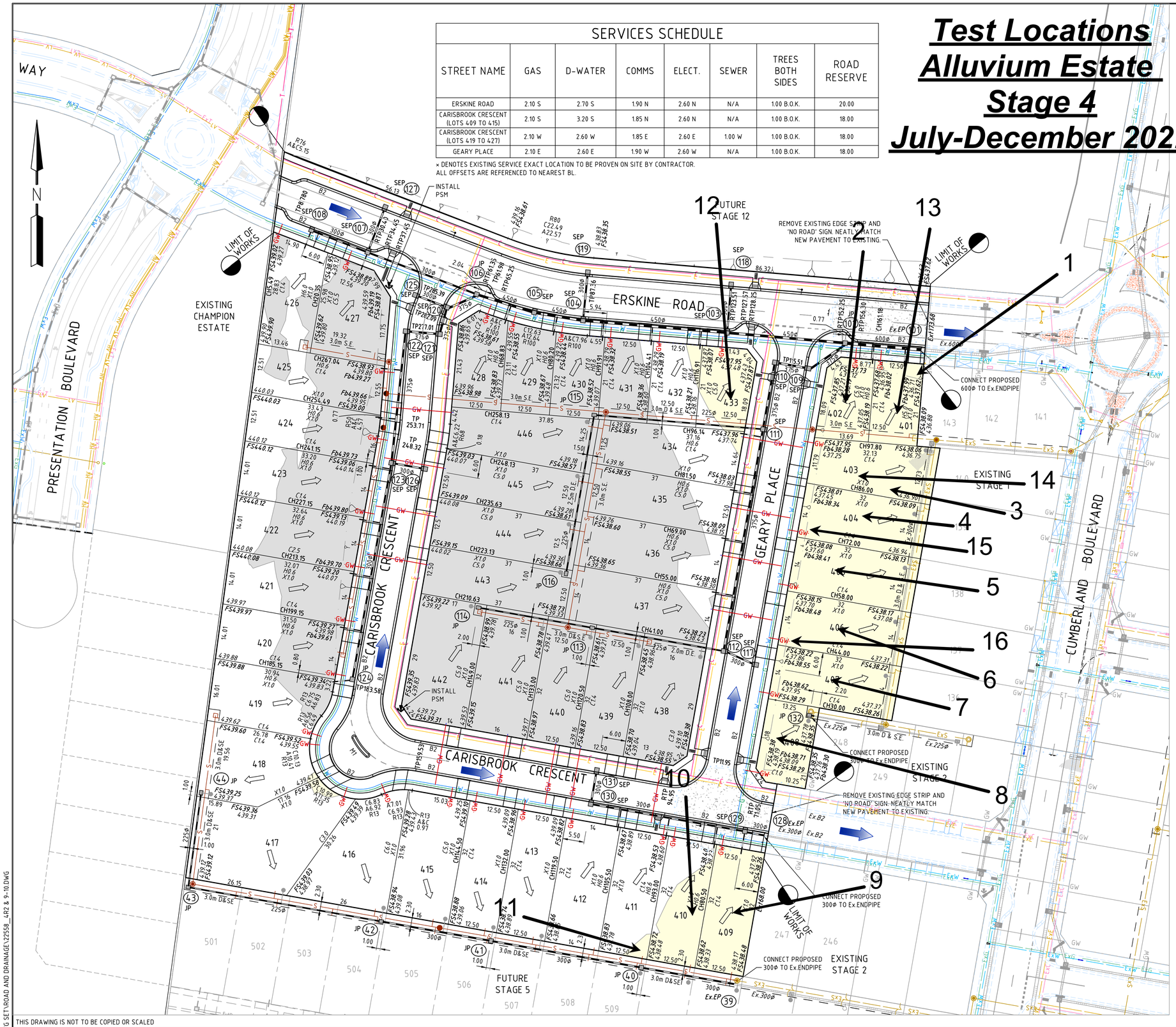
Appendix A – Site Plan

Test Locations
Alluvium Estate
Stage 4
July-December 2022

SERVICES SCHEDULE

STREET NAME	GAS	D-WATER	COMMS	ELECT.	SEWER	TREES BOTH SIDES	ROAD RESERVE
ERSKINE ROAD	2.10 S	2.70 S	1.90 N	2.60 N	N/A	1.00 B.O.K.	20.00
CARISBROOK CRESCENT (LOTS 409 TO 415)	2.10 S	3.20 S	1.85 N	2.60 N	N/A	1.00 B.O.K.	18.00
CARISBROOK CRESCENT (LOTS 419 TO 427)	2.10 W	2.60 W	1.85 E	2.60 E	1.00 W	1.00 B.O.K.	18.00
GEARY PLACE	2.10 E	2.60 E	1.90 W	2.60 W	N/A	1.00 B.O.K.	18.00

× DENOTES EXISTING SERVICE EXACT LOCATION TO BE PROVEN ON SITE BY CONTRACTOR.
ALL OFFSETS ARE REFERENCED TO NEAREST BL.

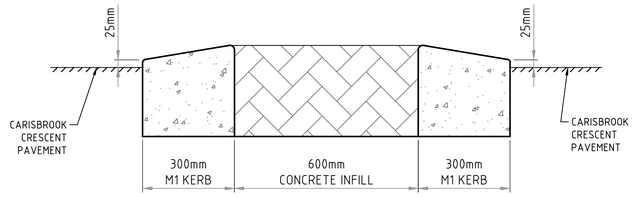


LEGEND

- PROPOSED WATER MAIN
- PROPOSED. SEWER
- PROPOSED GAS MAINS
- PROP. ELECTRICAL CABLES
- PROPOSED COMMS CABLES
- PROPOSED DRAIN & PIT
- PROPOSED HOUSE DRAIN
- PROPOSED PROPERTY INLET
- PROPOSED TOE OF BATTER
- PROPOSED TOP OF BATTER
- PSM
- TBM
- Ex. WATER MAIN
- Ex. SEWER
- Ex. GAS MAINS & VALVE
- Ex. ELECTRICAL CABLE
- Ex. COMMS CABLES
- Ex. DRAIN & PIT
- Ex. HOUSE DRAIN
- DIRECTIONAL WARNING TACTILES
- Ex. TACTILES
- DESIGN FINISHED SURFACE CONTOURS (0.25m INT.)
- DIRECTION OF LOT FINISHED SURFACE FALL
- OVERLAND FLOW PATH

DRAINAGE PIT LEGEND

35 EP	END PIPE
33 JP	JUNCTION PIT
31 SEP	SIDE ENTRY PIT
51 WW	WINGWALL
78 GSEP	GRATED SIDE ENTRY PIT

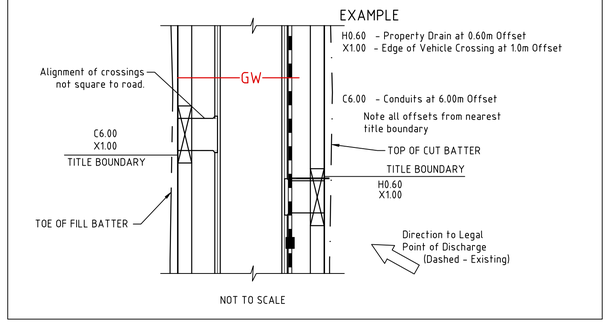


CARISBROOK CRESCENT SPLITTER ISLAND

EARTHWORKS LEGEND

- FILL EARTHWORKS - FILL AREA WITHIN LOTS GREATER THAN 150mm DEPTH
- CUT EARTHWORKS - CUT AREA WITHIN LOTS GREATER THAN 150mm DEPTH

THIS PLAN SHOWS ONLY APPROXIMATE EXTENTS & LEVELS OF FILL TO BE PLACED DURING CONSTRUCTION. DEPTH OF FILL USED FOR TOP DRESSING ALL ALLOTMENTS MAY VARY BY UP TO 0.15m. THE EXTENT OF FILL SHOWN IS BASED ON DESIGN AND MAY BE SUBJECT TO CHANGE FOLLOWING FINAL INSPECTION BY GEOTECHNICAL ENGINEER.



TYPICAL NOTATIONS - EXAMPLE

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

CONSTRUCTION PLAN

VERSION	REMARKS		
D	CONSTRUCTION ISSUE	30.05.22	LP
C	CARISBROOK CRESCENT BEND UPDATED. PRAM CROSSING	07.05.22	LP
B	ISSUE TO COUNCIL	17.02.22	LP
A	ISSUE FOR MARKETING	12.08.21	LP

0 5 10 20
Scale 1:500 @ A1

DRAWN BY	N. ROBINSON	DESIGNED BY	L. PHAN
MELWAY		CHECKED BY	L. PHAN
DATUM	AHD	AUTHORISED BY	P. MILLER

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CITY OF BALLARAT
ALLUVIUM ESTATE, WINTER VALLEY
STAGE 4
LAYOUT PLAN

DRAWING No.	VERSION
4R2	D
REFERENCE	
22558E	
SHEET	
2 OF 15	

H:\22558\STAGE-4\CAD\DWG SET\ROAD AND DRAINAGE\22558_4R2 & 9-10.DWG

Appendix B – Laboratory Testing

Material Test Report

Report Number: **AGT60133-1**
Issue Number: 1
Date Issued: 01/08/2022
Client: Wayne Horne Earthmoving
3 Trewin Street, Wendouree VIC 3355
Project Number: AGT60133
Project Name: Alluvium Estate Stage 4
Project Location: Alluvium Estate Stage 4
Work Request: 1033
Date Sampled: 20/07/2022
Dates Tested: 24/07/2022 - 25/07/2022
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
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	60133-1	60133-2	60133-3	60133-4
Date Tested	20/07/2022	20/07/2022	20/07/2022	20/07/2022
Time Tested	15:00	15:05	15:15	15:25
Test Request #/Location	TRN - 1 Alluvium Estate Stage 4 Lot 401	TRN - 1 Alluvium Estate Stage 4 Lot 402	TRN - 1 Alluvium Estate Stage 4 Lot 403	TRN - 1 Alluvium Estate Stage 4 Lot 404
Latitude	-37.56998	-37.56998	-37.57002	-37.57008
Longitude	143.79932	143.56998	143.79321	143.79321
Layer / Reduced Level	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	150	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**	**
Field Wet Density (FWD) t/m^3	2.05	2.01	2.16	2.06
Field Moisture Content %	24.1	25.2	32.5	25.2
Field Dry Density (FDD) t/m^3	1.65	1.61	1.63	1.65
Peak Converted Wet Density t/m^3	2.05	2.02	2.10	2.04
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**
Moisture Variation (Wv) %	0.0	1.0	0.5	0.5
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	**100.0**	**100.0**	**103.0**	**101.0**
Compaction Method	**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: **AGT60133-1**
Issue Number: 1
Date Issued: 01/08/2022
Client: Wayne Horne Earthmoving
3 Trewin Street, Wendouree VIC 3355
Project Number: AGT60133
Project Name: Alluvium Estate Stage 4
Project Location: Alluvium Estate Stage 4
Work Request: 1033
Date Sampled: 20/07/2022
Dates Tested: 24/07/2022 - 25/07/2022
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
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	60133-5	60133-6	60133-7	60133-8
Date Tested	20/07/2022	20/07/2022	20/07/2022	20/07/2022
Time Tested	15:30	15:40	15:50	16:00
Test Request #/Location	TRN - 1 Alluvium Estate Stage 4 Lot 405	TRN - 1 Alluvium Estate Stage 4 Lot 406	TRN - 1 Alluvium Estate Stage 4 Lot 407	TRN - 1 Alluvium Estate Stage 4 Lot 408
Latitude	-37.570024	-37.57029	-37.57043	-37.57060
Longitude	143.79322	143.79310	143.79310	143.79305
Layer / Reduced Level	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	150	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**	**
Field Wet Density (FWD) t/m^3	2.03	2.02	2.12	2.04
Field Moisture Content %	28.5	20.8	20.4	21.8
Field Dry Density (FDD) t/m^3	1.58	1.67	1.76	1.67
Peak Converted Wet Density t/m^3	2.01	1.97	2.09	2.00
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**
Moisture Variation (Wv) %	0.5	-1.5	-0.5	0.0
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	**101.0**	**102.5**	**102.0**	**101.5**
Compaction Method	**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: **AGT60133-2**
Issue Number: 1
Date Issued: 09/12/2022
Client: Wayne Horne Earthmoving
3 Trewin Street, Wendouree VIC 3355
Project Number: AGT60133
Project Name: Alluvium Estate Stage 4
Project Location: Alluvium Estate Stage 4
Work Request: 1204
Date Sampled: 08/12/2022
Dates Tested: 08/12/2022 - 08/12/2022
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
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	60133-9	60133-10	60133-11	60133-12
Date Tested	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Time Tested	08:10	08:15	08:20	08:25
Test Request #/Location	TRN - 2 Alluvium Estate Stage 4 Lot 409	TRN - 2 Alluvium Estate Stage 4 Lot 410	TRN - 2 Alluvium Estate Stage 4 Lot 411	TRN - 2 Alluvium Estate Stage 4 Lot 433
Latitude	-37.57073	-37.57077	-37.57126	-37.56996
Longitude	143.79262	143.79196	143.79231	143.79271
Layer / Reduced Level	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	150	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**	**
Field Wet Density (FWD) t/m^3	2.07	2.00	2.06	1.99
Field Moisture Content %	16.8	19.7	16.0	16.0
Field Dry Density (FDD) t/m^3	1.77	1.67	1.78	1.72
Peak Converted Wet Density t/m^3	2.09	2.09	2.09	2.07
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**
Moisture Variation (Wv) %	1.0	0.0	1.5	0.0
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	**99.0**	**95.5**	**98.5**	**96.0**
Compaction Method	**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: **AGT60133-2**
Issue Number: 1
Date Issued: 09/12/2022
Client: Wayne Horne Earthmoving
3 Trewin Street, Wendouree VIC 3355
Project Number: AGT60133
Project Name: Alluvium Estate Stage 4
Project Location: Alluvium Estate Stage 4
Work Request: 1204
Date Sampled: 08/12/2022
Dates Tested: 08/12/2022 - 08/12/2022
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
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	60133-13	60133-14	60133-15	60133-16
Date Tested	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Time Tested	08:40	08:50	09:00	09:10
Test Request #/Location	TRN - 2 Alluvium Estate Stage 4 Lot 401	TRN - 2 Alluvium Estate Stage 4 Lot 403	TRN - 2 Alluvium Estate Stage 4 Lot 404	TRN - 2 Alluvium Estate Stage 4 Lot 406
Latitude	-37.56999	-37.57004	-37.57008	-37.57030
Longitude	143.79933	143.79322	143.79323	143.79310
Layer / Reduced Level	300 Below FSL	300 Below FSL	300 Below FSL	300 Below FSL
Thickness of Layer (mm)	150	150	150	150
Soil Description	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay	Brown Silty Clay
Test Depth (mm)	125	125	125	125
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	**	**	**	**
Field Wet Density (FWD) t/m^3	1.98	2.00	2.00	2.00
Field Moisture Content %	18.0	18.4	18.4	18.3
Field Dry Density (FDD) t/m^3	1.68	1.69	1.69	1.69
Peak Converted Wet Density t/m^3	2.07	2.08	2.04	2.05
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**
Moisture Variation (Wv) %	0.0	0.0	2.0	2.0
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	**96.0**	**96.0**	**98.5**	**98.0**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**
Report Remarks	**	**	**	**

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

Appendix C – Site Photos