

WORKS INSPECTION & TESTING Bulk Earthworks

PROPOSED
RESIDENTIAL
DEVELOPMENT

**Binnies Road
(Aurora Estate)**

JOB NO: P1880 comp01



Prepared for CCA Winslow
01st July 2020

Document Information

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Appendix A Bulk Earthworks - Compaction

INTRODUCTION

Construction Sciences was commissioned by **CCA Winslow** to carry out the geotechnical inspection and testing required for the proposed development at Aurora Estate, Binnies Road, which was carried out between 04th April and on 25th May 2020.

SCOPE OF WORKS

The Earthworks on this development was monitored in accordance with the scope of our commission as follows:-

Level 1 : Bulk earthworks stripping and filling was inspected and tested on a Level 1 basis, in accordance with AS 3798-2007.

Scope of Level 1 responsibility: ***“The primary objective of Level 1 Inspection and Testing is for the geotechnical inspection and testing authority (GITA) to be able to express an opinion on the compliance of the work. The GITA is responsible for ensuring that the inspection and testing is sufficient for this purpose.***

The GITA needs to have competent personnel on site at all times while earthwork operations are undertaken. Such operations include the following:

- (a) ***Completion of removal of topsoil.***
- (b) ***Placing of imported or cut material.***
- (c) ***Compaction and adding/removal of moisture.***
- (d) ***Trenching and backfilling, where applicable.***
- (e) ***Test rolling.***
- (f) ***Testing.***

The superintendent should agree on a suitable inspection and testing plan prior to the commencement of the works”.

reference AS3798 – Section 8.2

SPECIFICATION REQUIREMENTS

Earthworks on this development was inspected and tested in accordance with the specification of the design engineer, **Peak Urban Development Engineers + Advisors** and to the specifications of the local authority, **Ipswich City Council**.

The following table is a summary of the basic compaction and quality requirements for the project.

Testing procedures used to confirm that these requirements were met were all in accordance with Australian Standard test methods

SPECIFICATIONS	
Item	Minimum Compaction Requirement
<i>Bulk Earthworks Fill</i>	<i>95% Dry Density Ratio - Standard</i>

SITE WORKS - BULK EARTHWORKS

General : Full time site inspection was maintained in accordance with Level 1 requirements whilst earthworks were carried out on this development. Fill areas included residential allotments, roads and embankments.

The areas to be filled were stripped and proof rolled in accordance with the specification requirements. Areas displaying instability were generally excavated until competent conditions were encountered. Benching was provided on slopes where filling was to be placed.

The natural ground in the areas of filling generally comprised gravelly to brown gravelly CLAYS.

The material used in the bulk earthworks filling was sourced from site cutting to design levels.

Compaction Control Testing : Compaction control testing via the nuclear densometer method was carried out at regular intervals throughout the placement of fill, in accordance with the minimum test frequency recommendations included in AS3798 "Guidelines on Earthworks for Commercial and Residential Developments".

All test results are included in Appendix A. A summary of the test results is included as Table 1. A total of 22 field density tests were carried out throughout the earthworks. The average dry density ratio was recorded to be 98.9%. The maximum dry density ratio was 101.5% and minimum was 97.5%.

CONCLUSION

We confirm that:

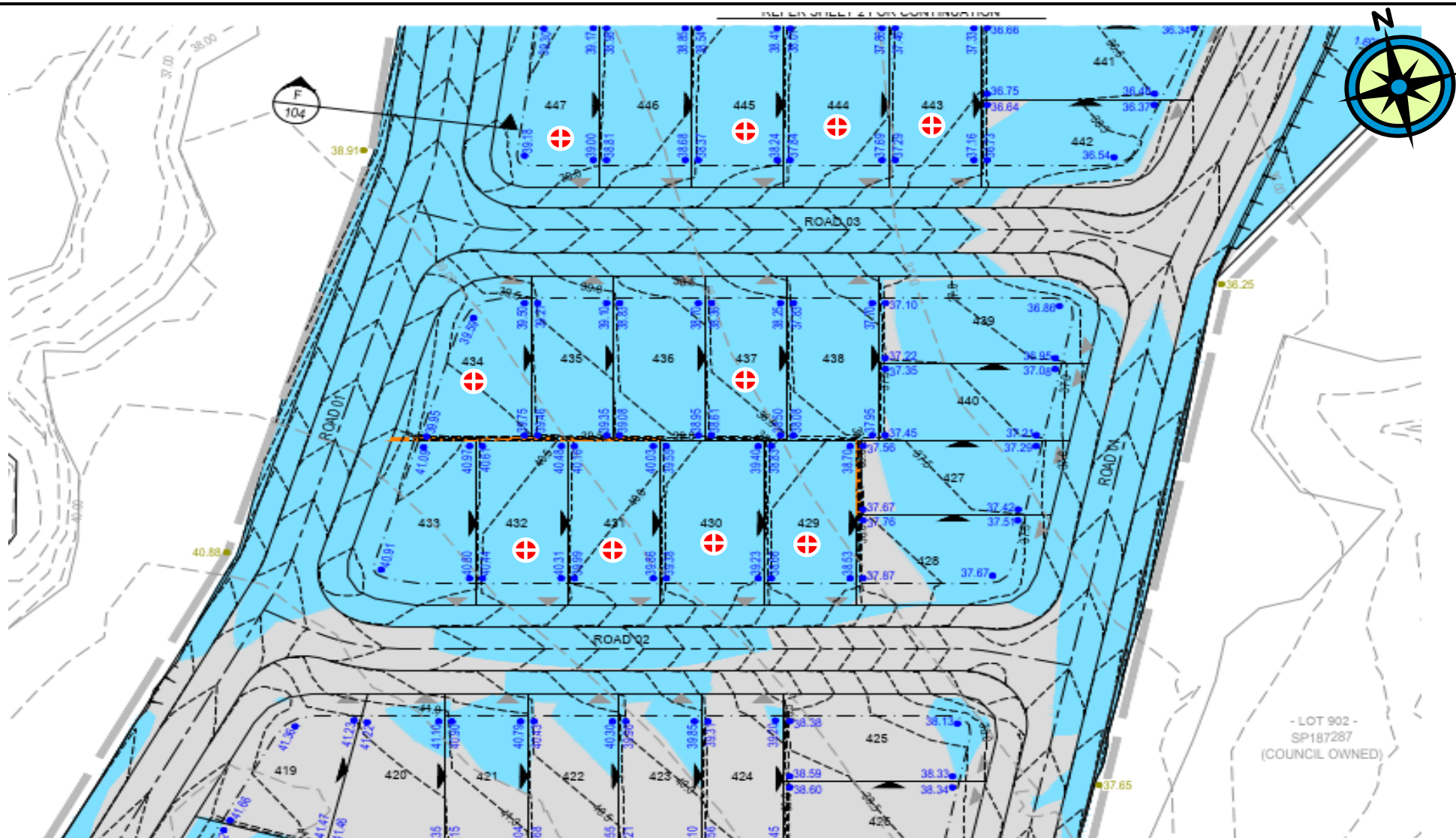
- (a) Our representative was in full time site attendance whilst bulk earthworks filling was in progress between 4th April and 25th May 2020 at Binnies Road, Aurora Estate.
- (b) Pre – fill ground preparation was carried out in accordance with the specifications and site instruction given.
- (c) The structural filling placed to design levels during the term of our engagement on a "Level 1" basis can be termed "controlled filling".
- (d) The results of the compaction control testing indicate that the fill placed during the term of our site attendance, was compacted to at least the minimum specified wet density ratio.
- (e) All test results pertaining to the development are included within appendix A of this report.



WAYNE GORMAN
LABORATORY MANAGER
Construction Sciences



CLIENT:	CCA Winslow	JOB No.:	P1880
PROJECT:	BINNIES ROAD (AURORA ESTATE)	SKETCH No.:	SK1
TEST ITEM:	PHOTOS	DATE ISSUED:	01/07/2020



⛶ Denotes Approximate Density Location

Client:	CCA Winslow	Date Range:	4/04/2020 to 25/05/2020
Project:	1979/P/1880 - Binnies Road	Material Source:	Onsite
Sub-Project:	Aurora Estate	Material Type:	Bulk Fill

Sample Client Reference	Sample Number	Sample Date/Time	Source	Material	Location 1	Location 2	Location 3	Location 4	Dry Density Ratio	Moisture Ratio
EW-04	1979/S/134044	11:43	On-Site	Bulk Fill	4805.01	12908.5	38.5	Lot 429	99.0	94.5
EW-05	1979/S/134045	11:54	On-Site	Bulk Fill	4789.7	12911.21	39.13	Lot 430	99.0	82.0
EW-06	1979/S/134046	12:03	On-Site	Bulk Fill	4774.50	12913.92	34.7	Lot 431	99.0	85.5
EW-07	1979/S/134047	12:14	On-Site	Bulk Fill	4762.83	12918.40	40.06	Lot 432	100.0	94.0
EW-08	1979/S/134048	13:10	On-Site	Bulk Fill	5m East x 10m South	From N/W Corner		Lot 455	99.0	89.5
EW-09	1979/S/134049	13:22	On-Site	Bulk Fill	6m East x 12m South	From N/W Corner		Lot 456	98.5	86.0
EW-10	1979/S/134050	13:31	On-Site	Bulk Fill	7m East x 15m South	From N/W Corner		Lot 462	99.0	86.5
EW-11	1979/S/134051	13:45	On-Site	Bulk Fill	10m East x 10m South	From N/W Corner		Lot 461	98.0	85.5
EW-12	1979/S/134073	10:00	On-Site	Bulk Fill	10m East	4m South	FSL	Lot 434	100.0	100.0
EW-13	1979/S/134074	10:08	On-Site	Bulk Fill	6m East	9m south	FSL	Lot 437	99.5	102.5
EW-14	1979/S/134075	10:12	On-Site	Bulk Fill	4841.110	12991.114	36.89	Lot 447	98.0	83.0
EW-15	1979/S/134076	10:19	On-Site	Bulk Fill	4840.920	12991.732	37.95	Lot 445	98.5	91.5
EW-16	1979/S/134077	10:24	On-Site	Bulk Fill	4820.160	12982.645	37.43	Lot 444	98.0	99.0
EW-17	1979/S/134078	10:30	On-Site	Bulk Fill	4840.010	12981.104	36.89	Lot 443	98.0	103.0
EW-18	1979/S/137163	09:45	On-Site	Bulk Fill	6m Off North Boundary	2m Off East Boundary	FL	Lot 459	99.5	85.5
EW-19	1979/S/137164	09:57	On-Site	Bulk Fill	4m Off North Boundary	4m Off East Boundary	FL	Lot 458	98.5	83.0
EW-20	1979/S/137165	01:01	On-Site	Bulk Fill	0m Off South Boundary	5m Off East Boundary	FL	Lot 460	98.0	82.0
EW-21	1979/S/137166	10:20	On-Site	Bulk Fill	4m Off South Boundary	5m Off East Boundary	FL	Lot 449	98.5	83.0
EW-22	1979/S/137167	10:28	On-Site	Bulk Fill	4m Off South Boundary	5m Off East Boundary	FL	Lot 451	97.5	80.5

TABLE 1

APPENDIX

A

BULK EARTHWORKS
FILL





DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/48922-2
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/26602
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 1 of 1

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/134044	1979/S/134045	1979/S/134046	1979/S/134047
ID / Client ID	EW-04	EW-05	EW-06	EW-07
Lot Number	-	-	-	-
Date / Time Tested	15/05/2020 11:43	15/05/2020 11:54	15/05/2020 12:03	15/05/2020 12:14
Material Source	On-Site	On-Site	On-Site	On-Site
Material Type	Bulk Fill	Bulk Fill	Bulk Fill	Bulk Fill
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b
Depths: Test / Nom / Actual (mm)	275 / 300 / 300	275 / 300 / 300	250 / 300 / 300	275 / 300 / 300
Standard or Modified	Standard	Standard	Standard	Standard
Stabilised Material Curing Time	-	-	-	-
Easting: m	4805.01	4789.7	4774.50	4762.83
Northing m	12908.5	12911.21	12913.92	12918.40
RL: m	38.5	39.13	34.7	40.06
Allotment:	Lot 429	Lot 430	Lot 431	Lot 432
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	< 19.0 mm
Sample Oversize Wet (%)	0	0	0	0
Sample Oversize Dry (%)	0	0	0	0
MDR Sample Number	1979/S/134044	1979/S/134045	1979/S/134046	1979/S/134047
MDR Sample Date / Update	15/05/2020	15/05/2020	15/05/2020	15/05/2020
Assigned MDR (Yes / No)	No	No	No	No
Moisture Test Results:				
Field Moisture Content (%)	10.0	8.3	8.8	11.0
Optimum Moisture Content (%)	10.5	10.0	10.5	11.5
Variation from OMC (%)	0.5% Drier than OMC	2.0% Drier than OMC	1.5% Drier than OMC	0.5% Drier than OMC
Moisture Ratio (%)	94.5	82.0	85.5	94.0
Density Test Results:				
Field Dry Density (t/m³)	1.98	1.98	1.89	1.90
Maximum Dry Density (t/m³)	2.00	2.00	1.91	1.90
Dry Density Ratio Required (%)	98	98	98	98
Dry Density Ratio (%)	99.0	99.0	99.0	100.0

Remarks	Re-Issued Report Replaces Report No 1979/R/48922-1 (reason: Amended to update information.).
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	Corporate Site Number:	1979	
	Approved Signatory: Matthew Ketchup		Form ID: W27ASRep Rev 1



DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/48923-2
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/26648
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 1 of 1

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/134048	1979/S/134049	1979/S/134050	1979/S/134051
ID / Client ID	EW-08	EW-09	EW-10	EW-11
Lot Number	-	-	-	-
Date / Time Tested	20/05/2020 13:10	20/05/2020 13:22	20/05/2020 13:31	20/05/2020 13:45
Material Source	On-Site	On-Site	On-Site	On-Site
Material Type	Bulk Fill	Bulk Fill	Bulk Fill	Bulk Fill
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b
Depths: Test / Nom / Actual (mm)	275 / 300 / 300	275 / 300 / 300	275 / 300 / 300	275 / 300 / 300
Standard or Modified	Standard	Standard	Standard	Standard
Stabilised Material Curing Time	-	-	-	-
LOCATION	5m East x 10m South From N/W Corner	6m East x 12m South From N/W Corner	7m East x 15m South From N/W Corner	10m East x 10m South From N/W Corner
Test Fraction (mm)	Lot 455 < 19.0 mm	Lot 456 < 19.0 mm	Lot 462 < 19.0 mm	Lot 461 < 19.0 mm
Sample Oversize Wet (%)	0	0	0	0
Sample Oversize Dry (%)	0	0	0	0
MDR Sample Number	1979/S/134048	1979/S/134049	1979/S/134050	1979/S/134051
MDR Sample Date / Update	20/05/2020	20/05/2020	20/05/2020	20/05/2020
Assigned MDR (Yes / No)	No	No	No	No
Moisture Test Results:				
Field Moisture Content (%)	13.5	11.6	10.4	11.3
Optimum Moisture Content (%)	15.0	13.5	12.0	13.0
Variation from OMC (%)	1.5% Drier than OMC	2.0% Drier than OMC	1.5% Drier than OMC	2.0% Drier than OMC
Moisture Ratio (%)	89.5	86.0	86.5	85.5
Density Test Results:				
Field Dry Density (t/m ³)	1.74	1.78	1.84	1.80
Maximum Dry Density (t/m ³)	1.76	1.82	1.86	1.84
Dry Density Ratio Required (%)	98	98	98	98
Dry Density Ratio (%)	99.0	98.5	99.0	98.0

Remarks	Re-Issued Report Replaces Report No 1979/R/48923-1 (reason: Amended to update information.).
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DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/49140-2
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/26653
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 1 of 2

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/134073	1979/S/134074	1979/S/134075	1979/S/134076
ID / Client ID	EW-12	EW-13	EW-14	EW-15
Lot Number	-	-	-	-
Date / Time Tested	21/05/2020 10:00	21/05/2020 10:08	21/05/2020 10:12	21/05/2020 10:19
Material Source	On-Site	On-Site	On-Site	On-Site
Material Type	Bulk Fill	Bulk Fill	Bulk Fill	Bulk Fill
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b
Depths: Test / Nom / Actual (mm)	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200
Standard or Modified	Standard	Standard	Standard	Standard
Stabilised Material Curing Time	-	-	-	-
Easting: m	10m East	6m East	4841.110	4840.920
Northing m	4m South	9m south	12991.114	12991.732
RL: m	FSL	FSL	36.89	37.95
Allotment:	Lot 434	Lot 437	Lot 447	Lot 445
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	< 19.0 mm
Sample Oversize Wet (%)	0	0	0	0
Sample Oversize Dry (%)	0	0	0	0
MDR Sample Number	1979/S/134073	1979/S/134074	1979/S/134075	1979/S/134076
MDR Sample Date / Update	21/05/2020	21/05/2020	21/05/2020	21/05/2020
Assigned MDR (Yes / No)	No	No	No	No
Moisture Test Results:				
Field Moisture Content (%)	16.2	17.0	9.4	15.2
Optimum Moisture Content (%)	16.0	16.5	11.5	16.5
Variation from OMC (%)	Field Moisture at OMC	0.5% Wetter than OMC	2.0% Drier than OMC	1.5% Drier than OMC
Moisture Ratio (%)	100.0	102.5	83.0	91.5
Density Test Results:				
Field Dry Density (t/m³)	1.76	1.73	1.84	1.74
Maximum Dry Density (t/m³)	1.75	1.74	1.87	1.78
Dry Density Ratio Required (%)	98	98	98	98
Dry Density Ratio (%)	100.0	99.5	98.0	98.5

Remarks	Re-Issued Report Replaces Report No 1979/R/49140-1 (reason: Amended to update information.).
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DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/49140-2
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/26653
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 2 of 2

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/134077	1979/S/134078		
ID / Client ID	EW-16	EW-17		
Lot Number	-	-		
Date / Time Tested	21/05/2020 10:24	21/05/2020 10:30		
Material Source	On-Site	On-Site		
Material Type	Bulk Fill	Bulk Fill		
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b		
Depths: Test / Nom / Actual (mm)	175 / 200 / 200	175 / 200 / 200		
Standard or Modified	Standard	Standard		
Stabilised Material Curing Time	-	-		
Easting: m	4820.160	4840.010		
Northing m	12982.645	12981.104		
RL: m	37.43	36.89		
Allotment:	Lot 444	Lot 443		
Test Fraction (mm)	< 19.0 mm	< 19.0 mm		
Sample Oversize Wet (%)	0	0		
Sample Oversize Dry (%)	0	0		
MDR Sample Number	1979/S/134077	1979/S/134078		
MDR Sample Date / Update	21/05/2020	21/05/2020		
Assigned MDR (Yes / No)	No	No		
Moisture Test Results:				
Field Moisture Content (%)	16.9	17.4		
Optimum Moisture Content (%)	17.0	17.0		
Variation from OMC (%)	0.0% Drier than OMC	0.5% Wetter than OMC		
Moisture Ratio (%)	99.0	103.0		
Density Test Results:				
Field Dry Density (t/m³)	1.71	1.70		
Maximum Dry Density (t/m³)	1.75	1.74		
Dry Density Ratio Required (%)	98	98		
Dry Density Ratio (%)	98.0	98.0		

Remarks	Re-Issued Report Replaces Report No 1979/R/49140-1 (reason: Amended to update information.).
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	Form ID: W27ASRep Rev 1		



DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/49501-1
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/27231
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 1 of 2

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/137163	1979/S/137164	1979/S/137165	1979/S/137166
ID / Client ID	EW-18	EW-19	EW-20	EW-21
Lot Number	-	-	-	-
Date / Time Tested	25/05/2020	25/05/2020	25/05/2020	25/05/2020
Material Source	On-Site	On-Site	On-Site	On-Site
Material Type	Bulk Fill	Bulk Fill	Bulk Fill	Bulk Fill
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b
Depths: Test / Nom / Actual (mm)	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200
Standard or Modified	Standard	Standard	Standard	Standard
Stabilised Material Curing Time	-	-	-	-
LOCATION	6m Off North Boundary 2m Off East Boundary FL Lot 459	4m Off North Boundary 4m Off East Boundary FL Lot 458	0m Off South Boundary 5m Off East Boundary FL Lot 460	4m Off South Boundary 5m Off East Boundary FL Lot 449
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	< 19.0 mm
Sample Oversize Wet (%)	0	0	0	0
Sample Oversize Dry (%)	0	0	0	0
MDR Sample Number	1979/S/137163	1979/S/137164	1979/S/137165	1979/S/137166
MDR Sample Date / Update	25/05/2020	25/05/2020	25/05/2020	25/05/2020
Assigned MDR (Yes / No)	No	No	No	No
Moisture Test Results:				
Field Moisture Content (%)	13.3	12.1	9.9	10.6
Optimum Moisture Content (%)	15.5	14.5	12.0	13.0
Variation from OMC (%)	2.5% Drier than OMC	2.5% Drier than OMC	2.0% Drier than OMC	2.0% Drier than OMC
Moisture Ratio (%)	85.5	83.0	82.0	83.0
Density Test Results:				
Field Dry Density (t/m³)	1.75	1.72	1.80	1.82
Maximum Dry Density (t/m³)	1.76	1.74	1.83	1.84
Dry Density Ratio Required (%)	95	95	95	95
Dry Density Ratio (%)	99.5	98.5	98.0	98.5

Remarks

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DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	CCA Winslow	Report Number:	1979/R/49501-1
Client Address:	1587 Ipswich Road, Rocklea	Project Number:	1979/P/1880
Project:	Aurora Estate	Lot Number:	-
Location:	Ripley	Internal Test Request:	1979/T/27231
Component:	Bulk Fill	Client Reference/s:	Earthworks
Area Description:	Allotment Fill	Report Date / Page:	1/07/2020 Page 2 of 2

Test Procedures:	AS1289.5.4.1, AS1289.5.1.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	1979/S/137167			
ID / Client ID	EW-22			
Lot Number	-			
Date / Time Tested	25/05/2020			
Material Source	On-Site			
Material Type	Bulk Fill			
Sampling Method	AS1289.1.2.1 Cl 6.4b			
Depths: Test / Nom / Actual (mm)	175 / 200 / 200			
Standard or Modified	Standard			
Stabilised Material Curing Time	-			
LOCATION	4m Off South Boundary 5m Off East Boundary FL Lot 451			
Test Fraction (mm)	< 19.0 mm			
Sample Oversize Wet (%)	0			
Sample Oversize Dry (%)	0			
MDR Sample Number	1979/S/137167			
MDR Sample Date / Update	25/05/2020			
Assigned MDR (Yes / No)	No			
Moisture Test Results:				
Field Moisture Content (%)	10.0			
Optimum Moisture Content (%)	12.5			
Variation from OMC (%)	2.5% Drier than OMC			
Moisture Ratio (%)	80.5			
Density Test Results:				
Field Dry Density (t/m ³)	1.80			
Maximum Dry Density (t/m ³)	1.85			
Dry Density Ratio Required (%)	95			
Dry Density Ratio (%)	97.5			

Remarks

 <p>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</p> <p>Accreditation Number: 1986 Corporate Site Number: 1979</p>	 <p>Approved Signatory: Matthew Ketchup Form ID: W27ASRep Rev 1</p>
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