

Springbrook Estate Stage 19

11512/P/762

Prepared for fgf Developments
31/10/2018

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Introduction

Construction Sciences is the largest private provider of construction materials testing services across Australia. We have a total staff of over 600 staff in 48 permanent offices/laboratories.

We have provided QA testing services to some of the largest road and mining infrastructure projects in these states, as well as overseas.

Over the last 3 to 4 years, Construction Sciences has established more site laboratories for road, rail, mining, and other large infrastructure projects than any other company.

We benefit our clients with the following clear differentiators;

- > **Staff Mobilisation:** Construction Sciences' geographic expansion and mobility allow for teams to be available when required, and currently we have the lion's share of major projects in Australia.
- > **Quality Management:** Construction Sciences' purpose-built software, COMPLY provides our clients with confidence, by knowing project data is securely stored. COMPLY has a built-in secure audit trail and a fully tracked Quality system. We are also ISO9001 compliant and certified.
- > **Client Relationships:** We listen to your needs and respond with innovative solutions that are tailored for your business. We believe in building relationships with our staff and local community.
- > **Safety:** At Construction Sciences we embrace a 'safety' culture and it is a key consideration with every project. Currently we are over 2 years LTI (lost time injury) free.

Construction Sciences Pty Ltd was commissioned by **fgf Developments** to provide Level 1 inspection and testing services for the placement of fill at the residential development:-

PROJECT: Springbrook Estate Stage 19

The earthworks were carried out from 11/07/2018 to 23/08/2018

Lots 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909 and 1910 were filled to finished surface level.

Specification Requirements

Filling was carried out in accordance with AS3798-2007 '*Guidelines on earthworks for commercial and residential developments*' and with the project specification prepared for the project.

The specification requirements were that all fill was to be placed and compacted in layers to a density ratio of not less than 95% of the maximum density ratio as determined by AS1289.5.7.1 (standard compaction).

Site Works

The Springbrook Estate Stage 19 project was a small scale cut to fill operation with approximately 1868m³ of fill placed. The fill material generally comprised of gravelly sandy clay.

Compaction Control Testing

Compaction control tests were carried out at regular intervals throughout the placement of fill in accordance with the minimum test frequency recommendations included in AS3798-2007 '*Guidelines on earthworks for commercial and residential developments*'. All test results are included in the Appendix A. A summary of the test results is included as Table 1. A total of 9 field density tests were carried out throughout the earthworks. The average density ratio was 98.9 %.

Conclusion

It is considered that the placement of fill on lots 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909 and 1910 at Springbrook Estate Stage 19 was carried out in a controlled manner and the fill was compacted to a density ratio not less than the specified requirement. It is concluded that the fill may be deemed to be '*controlled fill*' in accordance with AS2870 – 2011 '*Residential Slabs & Footings*'.

CONSTRUCTION SCIENCES PTY LTD



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Table 1-1 Summary of field density test results - **Springbrook Estate Stage 19**

Date	Lot no.	Density ratio			
11/07/2018	Lot 1909	100.0			
11/07/2018	Lot 1907	98.5			
11/07/2018	Lot 1905	101.0			
11/07/2018	Lot 1901	100.5			
26/07/2018	Lot 1904	98.5			
26/07/2018	Lot 1908	99.5			
26/07/2018	Lot 1909	97.0			
23/08/2018	Lot 1901	97.0			
23/08/2018	Lot 1906	98.5			
No. of tests:	9	Mean:	98.9%	Standard Dev:	1.42 %

Notes:

1. Standard laboratory compaction used, AS1289.5.7.1.

Springbrook Estate
Stage 19

APPENDIX

A

FIELD DENSITY TEST RESULTS



WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/20268-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180601 - Springbrook Estate Stage 19	Lot Number:	Various
Location:	Cairns	Internal Test Request:	11512/T/10614
Component:	Field Density	Client Reference/s:	MTR-325
Area Description:	GST	Report Date / Page:	25/07/2018 Page 1 of 1

Test Procedures:	AS1289.5.7.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	11512/S/53715	11512/S/53716	11512/S/53717	11512/S/53718
ID / Client ID	-	-	-	-
Lot Number	1909	1907	1905	1901
Date / Time Tested	11/07/2018 14:50	11/07/2018 14:50	11/07/2018 14:50	11/07/2018 14:50
Material Source	Onsite	Onsite	Onsite	Onsite
Material Type	Insitu Material	Insitu Material	Insitu Material	Insitu Material
Sampling Method	AS1289.1.2.1 CI 6.4b	AS1289.1.2.1 CI 6.4b	AS1289.1.2.1 CI 6.4b	AS1289.1.2.1 CI 6.4b
Depths: Test / Nom / Actual (mm)	125 / 150 / -	125 / 150 / -	125 / 150 / -	125 / 150 / -
Standard or Modified	Standard	Standard	Standard	Standard
Lot No.	1909	1907	1905	1901
Location	Centre of Lot	Centre of Lot	Centre of Lot	Centre of Lot
RL	21.23	21.30	21.060	22.70
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	< 19.0 mm
Sample Oversize (%)	0	2	2	4
Compaction Sample Number	11512/S/53715	11512/S/53716	11512/S/53717	11512/S/53718
Sample Description	Gravelly Clay, orange brown	Gravelly Clay, orange brown	Orange-Brown Gravelly Silty Clay	Gravelly Clay, orange brown
Moisture Test Results:				
Field Moisture Content (%)	15.9	12.3	9.9	12.5
Adjusted / Moisture Variation (%)	0.0	0.5	2.5	2.0
Optimum Moisture Content (%)	16.0	12.5	12.0	14.5
Moisture Variation from OMC	(Wetter than OMC)	(Drier than OMC)	(Drier than OMC)	(Drier than OMC)
Moisture Ratio (%)	100.5	97.5	81.0	85.5
Density Test Results:				
Field Wet Density (t/m³)	2.18	2.14	2.08	2.16
Adj/Peak Conv Wet Density (t/m³)	2.17	2.17	2.06	2.15
Density Ratio Required (%)	95	95	95	95
Hilf Density Ratio (%)	100.0	98.5	101.0	100.5

Remarks



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

Accreditation Number: 1986
Corporate Site Number: 11512



Approved Signatory: Craig Wilson
Form ID: W5ASRep Rev 2

DRY DENSITY RATIO / MOISTURE RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/20603-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180601 - Springbrook Estate Stage 19	Lot Number:	Various
Location:	Cairns	Internal Test Request:	11512/T/10702
Component:	Field density	Client Reference/s:	MTR-327
Area Description:	Springbrook Estate Stage 19	Report Date / Page:	13/08/2018 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	11512/S/54245	11512/S/54246	11512/S/54247	
ID / Client ID	MTR-327	MTR-327	MTR-327	
Lot Number	1904	1908	1909	
Date / Time Tested	26/07/2018 10:35	26/07/2018 10:40	26/07/2018 10:46	
Material Source	Onsite	Onsite	Onsite	
Material Type	Cut / Fill	Cut / Fill	Cut / Fill	
Sampling Method	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)	125 / 150mm / -	125 / 150mm / -	125 / 150mm / -	
Standard or Modified	Standard	Standard	Standard	
Stabilised Material Curing Time	-	-	-	
Lot No.	1904	1908	1909	
Location	Centre of Lot	Centre of Lot	Centre of Lot	
RL				
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	
Sample Oversize Wet (%)	0	0	0	
Sample Oversize Dry (%)	0	0	0	
MDR Sample Number	11512/S/54245	11512/S/54246	11512/S/54247	
MDR Sample Date / Update	26/07/2018	26/07/2018	26/07/2018	
Assigned MDR (Yes / No)	No	No	No	
Moisture Test Results:				
Field Moisture Content (%)	11.7	10.3	10.4	
Optimum Moisture Content (%)	16.5	15.5	16.0	
Variation from OMC (%)	4.5% Drier than OMC	5.5% Drier than OMC	5.5% Drier than OMC	
Moisture Ratio (%)	71.5	66.0	65.0	
Density Test Results:				
Field Dry Density (t/m³)	1.77	1.82	1.76	
Maximum Dry Density (t/m³)	1.80	1.83	1.82	
Dry Density Ratio Required (%)	95	95	95	
Dry Density Ratio (%)	98.5	99.5	97.0	

Remarks



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Form ID: W27ASRep Rev 1

WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/21010-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180601 - Springbrook Estate Stage 19	Lot Number:	Various
Location:	Cairns	Internal Test Request:	11512/T/10917
Component:	Density Testing	Client Reference/s:	MTR-537
Area Description:	Subdivision	Report Date / Page:	31/08/2018 Page 1 of 1

Test Procedures:	AS1289.5.7.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	11512/S/55388	11512/S/55389		
ID / Client ID	5	6		
Lot Number	Lot 1901	Lot 1906		
Date / Time Tested	23/08/2018 10:45	23/08/2018 10:45		
Material Source	Onsite	Onsite		
Material Type	General Fill	General Fill		
Sampling Method	AS1289.1.2.1 Cl 6.4b	AS1289.1.2.1 Cl 6.4b		
Depths: Test / Nom / Actual (mm)	275 / 300 / -	275 / 300 / -		
Standard or Modified	Standard	Standard		
Allotment No	1901	1906		
Chainage	16	14		
Offset	C/L	C/L		
Level	Finished	Finished		
Test Fraction (mm)	< 19.0 mm	< 19.0 mm		
Sample Oversize (%)	0	0		
Compaction Sample Number	11512/S/55388	11512/S/55389		
Sample Description	Type 2.3	Brown Silty Gravel		
Moisture Test Results:				
Field Moisture Content (%)	9.5	12.9		
Adjusted / Moisture Variation (%)	4.5	3.0		
Optimum Moisture Content (%)	14.0	15.5		
Moisture Variation from OMC	(Drier than OMC)	(Drier than OMC)		
Moisture Ratio (%)	69.0	82.0		
Density Test Results:				
Field Wet Density (t/m³)	1.98	2.02		
Adj/Peak Conv Wet Density (t/m³)	2.04	2.05		
Density Ratio Required (%)	95	95		
Hilf Density Ratio (%)	97.0	98.5		

Remarks



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Springbrook Estate
Stage 19

APPENDIX

B

ALLOTMENT FILL
MAP



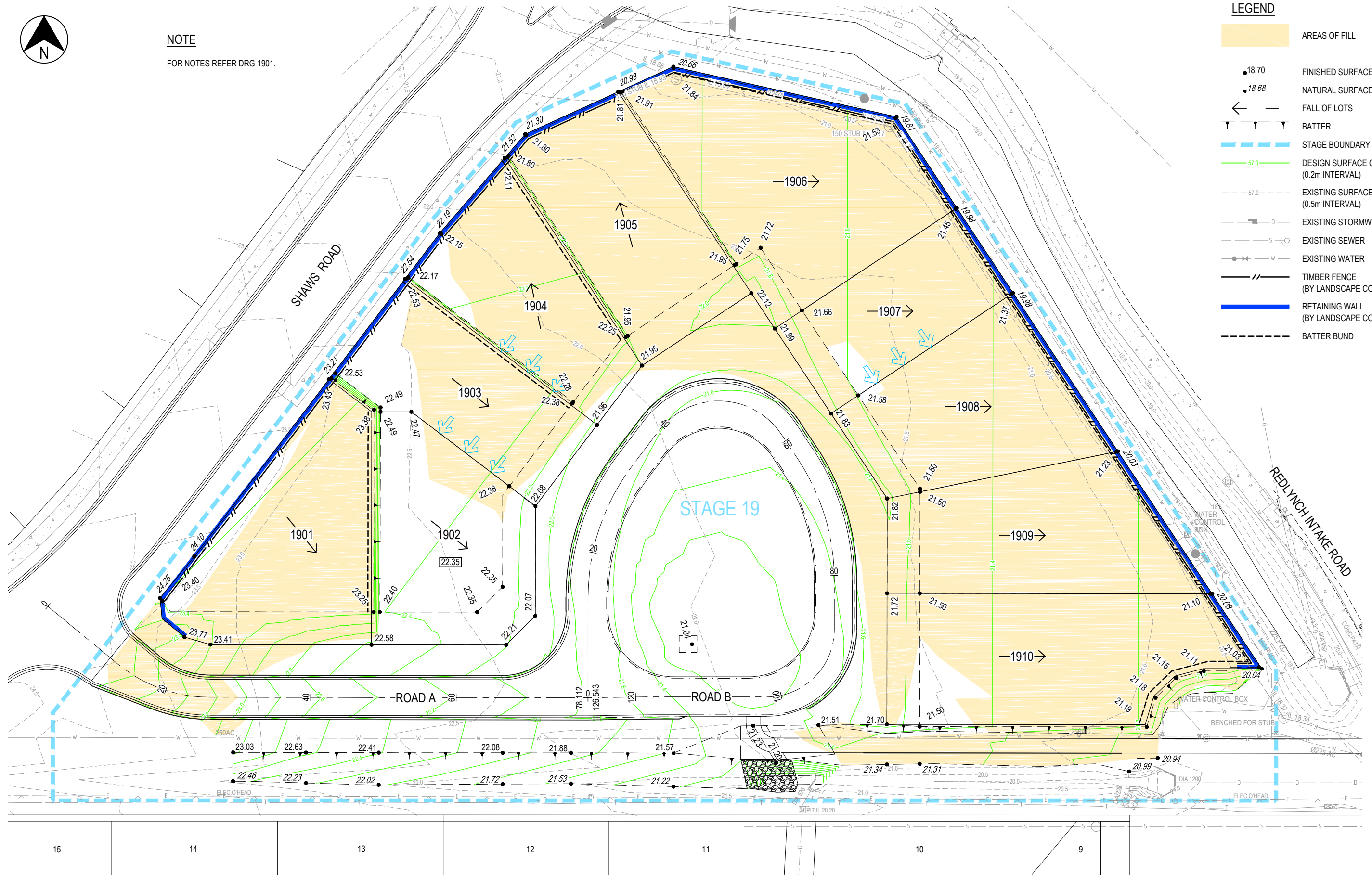


NOTE

FOR NOTES REFER DRG-1901.

LEGEND

- AREAS OF FILL
- FINISHED SURFACE LEVEL
- NATURAL SURFACE LEVEL
- FALL OF LOTS
- BATTER
- STAGE BOUNDARY
- DESIGN SURFACE CONTOURS (0.2m INTERVAL)
- EXISTING SURFACE CONTOURS (0.5m INTERVAL)
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER
- TIMBER FENCE (BY LANDSCAPE CONTRACTOR)
- RETAINING WALL (BY LANDSCAPE CONTRACTOR)
- BATTER BUND



REV	DATE	DRAWN	REVD	APPD	REVISION
C	03.07.18	PAM	RJB	RJC	ISSUED FOR CONSTRUCTION
B	17.05.18	PAM	RJB	RJC	ROAD A & B REVISED
A	29.03.18	PAM	RJB	RJC	INITIAL ISSUE

DRAWING NUMBER	REFERENCE DRAWING TITLE



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PROJECT SPRINGBROOK ESTATE - STAGE 19			
DRAWN LD	DRAWING CHECK RJB	REVIEWED R.J.BIMROSE	APPROVED [Signature]
DESIGNED PAM	DESIGN REVIEW RJC	DATE 29.03.18	DATE 03.07.18

TITLE EARTHWORKS		
SCALE 1:500 (A3)	DRAWING No IH035800-CI-DRG-1903	REV C

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