



Level 1 Geotechnical Inspection, Testing and Assessment Cherrybrook Stages 4 & 8

11512/P/762

Prepared for fgf Developments Pty Ltd

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Document History

Effective Date	Description of Revision	Prepared By	Reviewed By	Approved By
24/05/2019	Rev-2	Craig Wilson	Peter Gode	Peter Gode

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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 Pty Ltd** to provide Level 1 inspection and testing services for the placement of fill at the residential development:-

PROJECT: Cherrybrook Stages 4 & 8

ADDRESS: Cherrybrook Estate – Bentley Park QLD 4869

The earthworks were carried out from 23/10/2018 to 27/11/2018

Lots 406, 407, 408, 409, 410, 801, 803, 804 and 805 had fill placed during the earthworks.

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 as determined by AS1289.5.7.1 (standard compaction).

Site Works

The Cherrybrook Stage 4 & 8 project was a small scale cut to fill operation with approximately 504m³ of fill placed.

The area to be filled was stripped and proof rolled in accordance with the specification requirements. The fill material generally comprised of Sandy silty 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 4 field density tests were carried out throughout the earthworks. The average density ratio was 98.0 % with a standard deviation of **1.27 %**.

Conclusion

It is considered that the placement of fill at, Cherrybrook Estate – Bentley Park QLD 4869 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*'.



Craig Wilson

LABORATORY MANAGER
CONSTRUCTION SCIENCES



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Table 1-1 Summary of field density test results - **Cherrybrook Stages 4 & 8**

Date	Lot no.	Density ratio (1)
23/10/2018	409	96.5
1/11/2018	408	97.5
1/11/2018	410	98.0
27/11/2018	801	100.0

No. of tests:	4	Mean:	98.0 %	Standard Dev:	1.27 %
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Notes:

1. Standard laboratory compaction used, AS1289.5.7.1.

Appendix A – Field Density Test Results

WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/22206-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180901 - Cherrybrook Estate Stages 4 & 8	Lot Number:	Various
Location:	Cairns	Internal Test Request:	11512/T/11379
Component:	Field Densities	Client Reference/s:	MTR 433
Area Description:	Cherrybrook Estate Stages 4 & 8	Report Date / Page:	8/11/2018 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/57705	11512/S/57706	11512/S/57707	
ID / Client ID	NS-1	NS-2	NS-3	
Lot Number	Lot 1002/1003	Lot 902/903	Lot 409	
Date / Time Tested	23/10/2018	23/10/2018	23/10/2018	
Material Source	Onsite	Onsite	Onsite	
Material Type	Ground Surface Treatment	Ground Surface Treatment	Ground Surface Treatment	
Sampling Method	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)	150 / GST / GST	150 / GST / GST	150 / GST / GST	
Standard or Modified	Standard	Standard	Standard	
Lot No.	Lots 1002 & 1003	Lots 902 & 903	Lot 409	
Location	Centreline	Centreline	Centreline	
	10m From Back Boundary of Lot	12m From Back Boundary of Lot	Centre of Lot	
RL	Natural Surface	Natural Surface	Natural Surface	
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	
Sample Oversize (%)	0	0	0	
Compaction Sample Number	11512/S/57705	11512/S/57706	11512/S/57707	
Sample Description	Brown Clayey Silt	Brown Clayey Silt	Brown Clayey Silt	
Moisture Test Results:				
Field Moisture Content (%)	10.3	10.6	8.9	
Adjusted / Moisture Variation (%)	4.0	4.0	4.0	
Optimum Moisture Content (%)	14.0	14.5	13.0	
Moisture Variation from OMC	(Drier than OMC)	(Drier than OMC)	(Drier than OMC)	
Moisture Ratio (%)	72.5	72.5	69.0	
Density Test Results:				
Field Wet Density (t/m³)	1.94	1.92	1.90	
Adj/Peak Conv Wet Density (t/m³)	1.94	1.92	1.96	
Density Ratio Required (%)	95	95	95	
Hilf Density Ratio (%)	100.5	99.5	96.5	

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

WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/22182-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180901 - Cherrybrook Estate Stages 4 & 8	Lot Number:	
Location:	Cairns	Internal Test Request:	11512/T/11445
Component:	Field Densities	Client Reference/s:	TR 437
Area Description:	Cherrybrook Estate	Report Date / Page:	8/11/2018 Page 1 of 2

Test Procedures:	AS1289.5.7.1, AS1289.5.8.1, AS1289.2.1.1
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Sample Number	11512/S/58092	11512/S/58093	11512/S/58094	11512/S/58095
ID / Client ID	GF 10	GF 9	GF 8	GF 7
Lot Number	-	-	-	-
Date / Time Tested	1/11/2018 11:01	1/11/2018 11:11	1/11/2018 11:33	1/11/2018 11:49
Material Source	Onsite	Onsite	Onsite	Onsite
Material Type	General Fill	General Fill	General Fill	General Fill
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)	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200
Standard or Modified	Standard	Standard	Standard	Standard
	GF 10	GF 9	GF 8	GF 7
	Lot 408	Lot 410	Lot 904	Lot 1003
	Centre of Lot	Centre of Lot	Centre of Lot	Centre of Lot
	RL 55.4	RL 55.0	RL 60.0	RL 58.5
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	< 19.0 mm
Sample Oversize (%)	2	4	3	4
Compaction Sample Number	11512/S/58092	11512/S/58093	11512/S/58094	11512/S/58095
Sample Description	Silty clay, rock gravel	Red Gravelly Clay	Silty clay, rock gravel	Silty clay, rock gravel
Moisture Test Results:				
Field Moisture Content (%)	8.8	7.8	9.0	8.2
Adjusted / Moisture Variation (%)	3.5	3.5	4.0	3.5
Optimum Moisture Content (%)	12.5	11.5	13.0	12.0
Moisture Variation from OMC	(Drier than OMC)	(Drier than OMC)	(Drier than OMC)	(Drier than OMC)
Moisture Ratio (%)	70.5	67.0	70.0	69.0
Density Test Results:				
Field Wet Density (t/m ³)	2.06	2.05	2.16	2.15
Adj/Peak Conv Wet Density (t/m ³)	2.11	2.09	2.12	2.11
Density Ratio Required (%)	95	95	95	95
Hilf Density Ratio (%)	97.5	98.0	102.0	102.0

Remarks



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WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/22182-1
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180901 - Cherrybrook Estate Stages 4 & 8	Lot Number:	
Location:	Cairns	Internal Test Request:	11512/T/11445
Component:	Field Densities	Client Reference/s:	TR 437
Area Description:	Cherrybrook Estate	Report Date / Page:	8/11/2018 Page 2 of 2

Test Procedures:	AS1289.5.7.1, AS1289.5.8.1
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Sample Number	11512/S/58096			
ID / Client ID	GF 6			
Lot Number	-			
Date / Time Tested	1/11/2018 12:12			
Material Source	Onsite			
Material Type	General Fill			
Sampling Method	AS1289.1.2.1 CI 6.4b			
Depths: Test / Nom / Actual (mm)	175 / 200 / 200			
Standard or Modified	Standard			
	GF 6			
	Lot 609			
	Centre of Lot			
	RL 56.4			
Test Fraction (mm)	< 19.0 mm			
Sample Oversize (%)	0			
Compaction Sample Number	11512/S/58096			
Sample Description	Red silty clay, rock material			
Moisture Test Results:				
Field Moisture Content (%)	-			
Adjusted / Moisture Variation (%)	5.0			
Optimum Moisture Content (%)	-			
Moisture Variation from OMC	-			
Moisture Ratio (%)	-			
Density Test Results:				
Field Wet Density (t/m³)	1.95			
Adj/Peak Conv Wet Density (t/m³)	2.06			
Density Ratio Required (%)	95			
Hilf Density Ratio (%)	95.0			

Remarks



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Accreditation Number: 1986

Corporate Site Number: 11512



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WET DENSITY RATIO REPORT

Client:	fgf Developments	Report Number:	11512/R/22420-2
Client Address:	PO Box 6665, Cairns	Project Number:	11512/P/762
Project:	180901 - Cherrybrook Estate Stages 4 & 8	Lot Number:	
Location:	Cairns	Internal Test Request:	11512/T/11547
Component:	Field Densities	Client Reference/s:	TR 445 27/11/2018
Area Description:	Lots 801/1201/1203	Report Date / Page:	10/01/2019 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/58713	11512/S/58714	11512/S/58715	
ID / Client ID	GF 17 Retest	GF 18	GF 19	
Lot Number	-	-	-	
Date / Time Tested	27/11/2018 10:33	27/11/2018 10:45	27/11/2018 11:01	
Material Source	Onsite	Onsite	Onsite	
Material Type	General Fill	General Fill	General Fill	
Sampling Method	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)	175 / 200 / 200	175 / 200 / 200	175 / 200 / 200	
Standard or Modified	Standard	Standard	Standard	
	Lot 801	Lot 1201	Lot 1203	
	Centre of Lot	Centre of Lot	Centre of Lot	
	2m West of East Side			
	General Fill	General Fill	General Fill	
Test Fraction (mm)	< 19.0 mm	< 19.0 mm	< 19.0 mm	
Sample Oversize (%)	4	1	3	
Compaction Sample Number	11512/S/58713	11512/S/58714	11512/S/58715	
Sample Description	Red/Brown Silty Gravelly Clay	Brown Gravelly Silty Clay	Red Gravelly Sandy Clay	
Moisture Test Results:				
Field Moisture Content (%)	9.5	9.8	10.3	
Adjusted / Moisture Variation (%)	2.0	2.0	0.5	
Optimum Moisture Content (%)	11.5	12.0	11.0	
Moisture Variation from OMC	(Drier than OMC)	(Drier than OMC)	(Drier than OMC)	
Moisture Ratio (%)	83.5	83.0	94.5	
Density Test Results:				
Field Wet Density (t/m³)	2.19	2.16	2.18	
Adj/Peak Conv Wet Density (t/m³)	2.19	2.08	2.19	
Density Ratio Required (%)	95	95	95	
Hilf Density Ratio (%)	100.0	104.0	99.5	

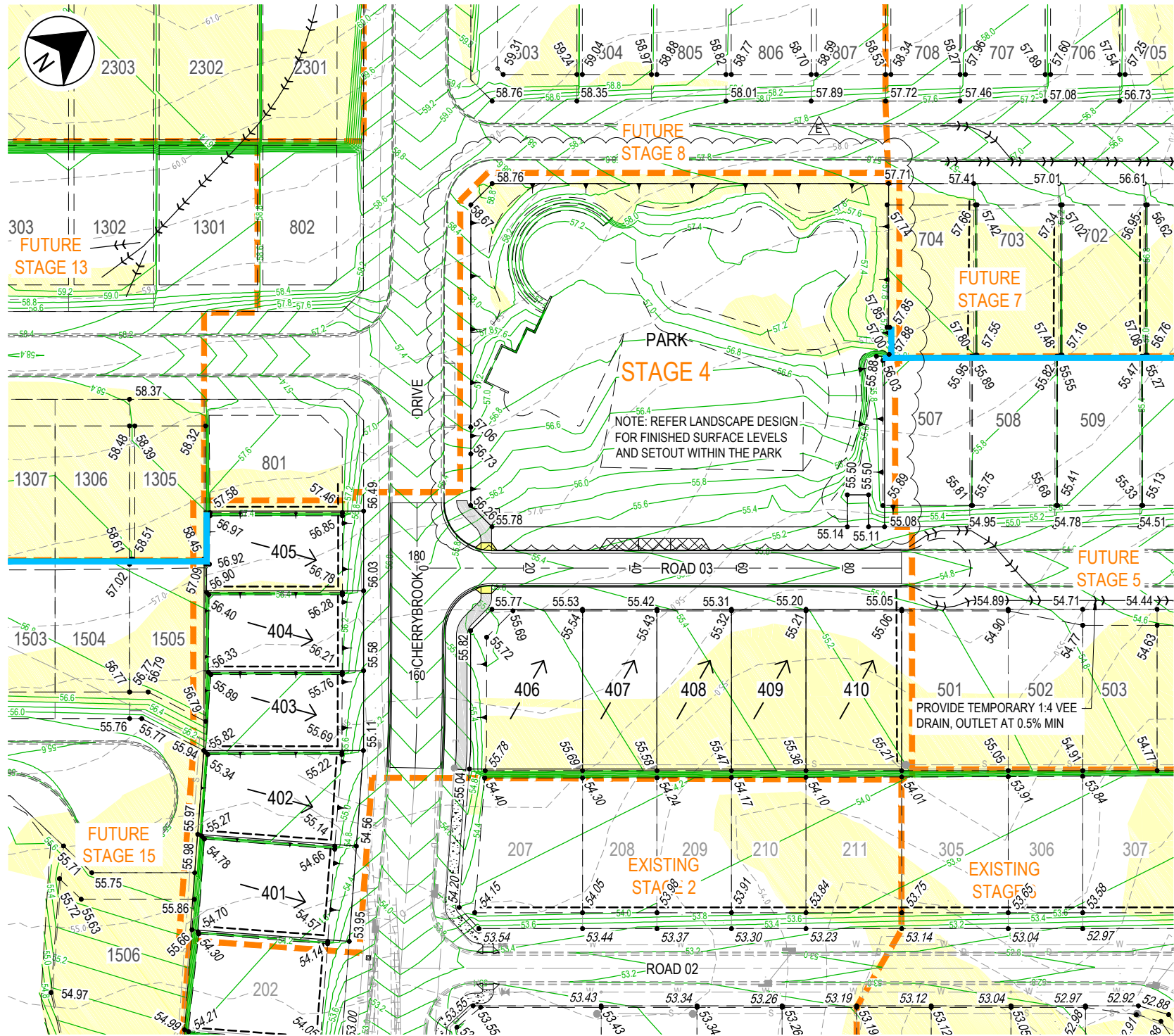
Remarks	Re-Issued Report Replaces Report No 11512/R/22420-1 (reason:).
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	Accreditation Number:	1986	
	Corporate Site Number:	11512	
	Approved Signatory: Craig Wilson		Form ID: W5ASRep Rev 2

Appendix B – Allotment Fill Map

DATE: 16/10/2018 2:22:04 PM NAME: MASHFORD, PAUL LOCATION: C:\Users\pmashford\AppData\Local\Temp\proj\jacobson_anz_460145184\IH035500-CI-DG-0403_Earthworks.dwg

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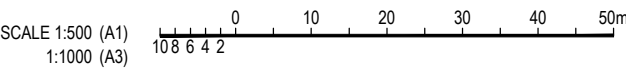
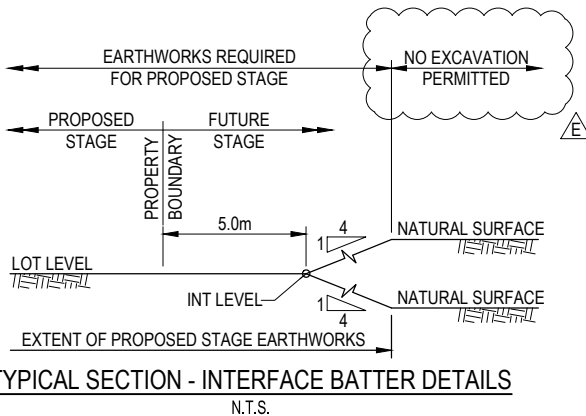
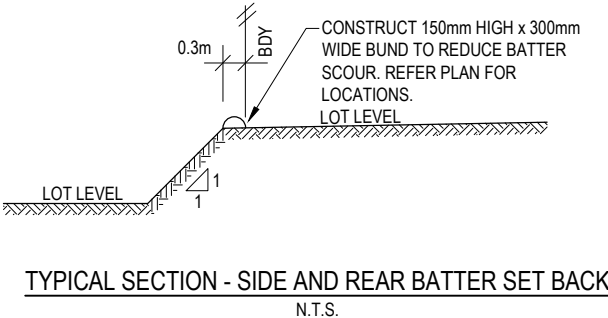
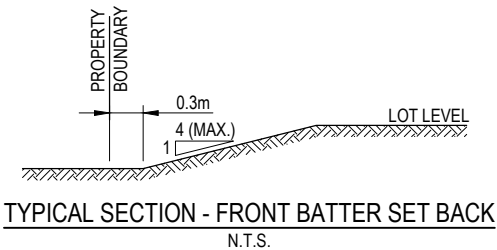


NOTES

- FOR NOTES REGARDING EXISTING SERVICES REFER DRG. DG-0402.
- ALL BATTERS TO ROAD FRONTAGES OF LOTS ARE 1 ON 5 OR FLATTER. ALL OTHER BATTERS ARE 1 ON 1 U.N.O.
- FOR STORMWATER PIT LOCATIONS REFER DRG. DG-0408.
- BATTERS TO BE ADJUSTED LOCALLY AROUND SEWER MANHOLES. REFER DRG. DG-0410 FOR DETAILS.
- UPON COMPLETION ALL BATTERS STEEPER THAN 1 IN 2 AND HIGHER THAN 1.5m SHALL REQUIRE CERTIFICATION OF STABILITY BY A GEOTECHNICAL ENGINEER.
- REFER TO "TYPICAL SECTION - INTERFACE BATTER DETAILS" FOR EXTENT OF EXCAVATION. NO EXCAVATION IS PERMITTED IN FUTURE STAGES.
- FILLING FOR EACH DISTINCT FOOTPRINT MUST BE COMPLETED AND REHABILITATED PRIOR TO COMMENCING FILLING ON THE OTHER PARTS OF THE SITE.
- REFER TO DG-0404 FOR ALTERNATE BATTER/RETAINING WALL DETAIL.

LEGEND

- AREAS OF FILL
- FINISHED SURFACE LEVEL
- NATURAL SURFACE LEVEL
- FALL OF LOTS
- CONCRETE PATHWAY (2m WIDE U.N.O.)
- TEMPORARY CUT-OFF DRAIN
- BATTER
- STAGE BOUNDARY
- DESIGN SURFACE CONTOURS (0.2m INTERVAL)
- BATTER BUND
- RETAINING WALL (CONCRETE SLEEPERS, DESIGN BY OTHERS)
- EXISTING SURFACE CONTOURS (0.5m INTERVAL)
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER



REV	DATE	DRAWN	REV'D	APP'D	REVISION	DRAWING NUMBER	REFERENCE DRAWING TITLE
E	09.10.18	PAM	RJC	DMc	EARTHWORKS REVISED IN PARK		
D	19.10.17	PAM	RJC	DMc	REDUCED CUT WITHIN THE PARK		
C	24.07.17	PAM	RJC	DMc	EARTHWORKS REVISED AT STAGE 13-15 INTERFACE		
B	22.06.17	PAM	RJC	DMc	PADMOUNT LOCATION UPDATED		
A	26.05.17	JAH	RJC	DMc	INITIAL ISSUE		

JACOBS

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CLIENT WALKER ROAD PTY LTD
PROJECT CHERRYBROOK - STAGE 4

DRAWN JAH
DESIGNED PAM
DRAWING CHECK RJB
DESIGN REVIEW RJC

REVIEWED D.McEWAN
DATE 26.05.17






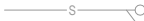



APPROVED
DATE 09.10.18

TITLE EARTHWORKS

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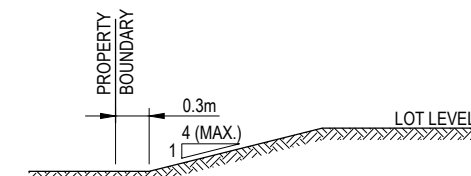
REV E



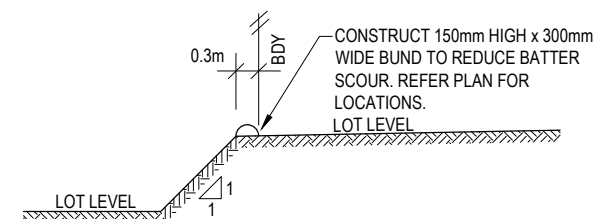
- | AREAS OF FILL | |
|--|---|
| ● 18.68 | FINISHED SURFACE LEVEL |
| ● 18.68 | NATURAL SURFACE LEVEL |
| ← — | FALL OF LOTS |
|  | CONCRETE PATHWAY (2m WIDE U.N.O.) |
| → → → → | TEMPORARY CUT-OFF DRAIN |
| ┴ ┴ ┴ | BATTER |
|  | STAGE BOUNDARY |
|  57.0 | DESIGN SURFACE CONTOURS
(0.2m INTERVAL) |
| — — — — — | BATTER BUND |
|  57.0 | EXISTING SURFACE CONTOURS
(0.5m INTERVAL) |
|  D | EXISTING STORMWATER |
|  S | EXISTING SEWER |
|  W | EXISTING WATER |
|  | RETAINING WALL (CONCRETE SLEEPERS,
DESIGN BY OTHERS) |
|  | RETAINING WALL TO ERGON PADMOUNT (IN
ACCORDANCE WITH ERGON SPECIFICATIONS) |

NOTES

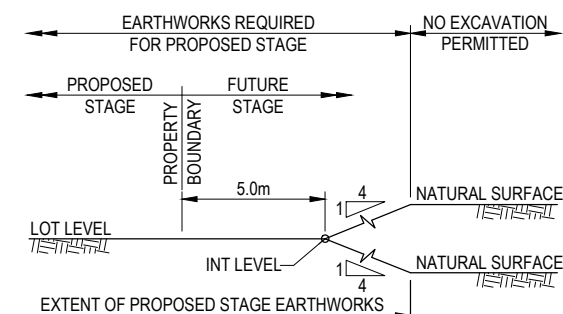
1. FOR NOTES, REFER DRG. DG-0502.



TYPICAL SECTION - FRONT BATTER SET BACK
N.T.S.



TYPICAL SECTION - SIDE AND REAR BATTER SET BACK
N.T.S.



TYPICAL SECTION - INTERFACE BATTER DETAILS
N.T.S.

SCALE 1:500 (A1)
1:1000 (A3)

0 10 20 30 40 50m

10 8 6 4 2


[illegible]

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Web: www.jacobs.com

CLIENT	WALKER ROAD PTY LTD
PROJECT	CHERRYBROOK - STAGES 5 TO 10

DRAWN JAH	DRAWING CHECK RJB	REVIEWED D.McEWAN	APPROVED  DATE 09.10.18
DESIGNED PAM	DESIGN REVIEW RJC		DATE 16.06.17

TITLE	EARTHWORKS
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SCALE 1:500 (A1)	DRAWING No IH035500-CI-DG-0504
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REV	8
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