Geotechnical | Environmental | Residential | Pavements | Investigations & Design



# Site: Merrifield Estate Stg 39, Mickleham

# Project No: 1120 0151-1



Prepared for BMD Urban January 2020



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Revision C	Chart					
Version	Description	Author	Reviewer	Release Approval	Release Date	Client Copy
0	Level 1 Inspection and Testing Report	ΥZ	ΤA	ΤA	17/01/2020	Soft copy (email)

### **Project Contributors**

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January 2020



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### 1. Introduction

This report presents the results of the Level 1 Inspection and Testing for the construction of the fill platforms located in Merrifield Estate Stage 39, Mickleham.

### 2. Project Summary

It is understood that BMD Urban requires the Merrifield Stage 39 to be backfilled under Level 1 Inspection and Testing undertaken by a Geotechnical Inspection and Testing Authority (GITA).

Level 1 Inspection and Testing, as defined in AS3798-2007 "Guidelines on Earthworks for Commercial and Residential Development," provides for full time inspection of the construction of controlled fill and field and laboratory testing in accordance with AS1289 "Methods of Testing Soils for Engineering Purposes".

The Level 1 Inspection and Testing was undertaken by a Senior Geotechnician from A&Y Associates over a period of fourteen (14) working days from

- 17<sup>th</sup> -20<sup>th</sup> September 2019
- 23<sup>rd</sup> -25<sup>th</sup> September 2019
- 30<sup>th</sup> September 2019 2<sup>nd</sup> October 2019
- 18<sup>th</sup> October 2019
- 21<sup>st</sup> October 2019
- 11<sup>th</sup> November 2019
- 3<sup>rd</sup> December 2019

This report is applicable for fill placed by BMD Urban for the following locations in Merrifield, Stage 39 as shown in Appendix A - Site Plan.

### 3. Project Specifications

A&Y ASSOCIATES

GEOTECHNICAL ENGINEERING CONSULTAN

No specification has been provided for the construction works in Merrifield Stage 39. The supervision and inspections were performed based on AS3798. A short summary of the requirements outlined in AS3798 is provided below:

- All filling in excess of 300mm depth within the building envelope of allotments shall be undertaken to specifications satisfying the requirements of AS3798.
- Material to be used for fill construction shall satisfy the requirements of AS23798-2007 "Guidelines on Earthworks for Commercial and residential Developments". Material used shall be free of:
  - Organic soils, such as topsoils, severely root affected subsoil and peat;
  - Contaminated soils;
  - 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;
  - Fill that contains wood, metal, plastic, boulders or other deleterious material, in sufficient proportions to affect the required performance of fill;
  - The maximum particle size of any rocks or other lump, within the layer, has not exceeded two-thirds (2/3) of the compacted layer thickness.
- Compaction is required to achieve density ratio of at least 95% Standard for the **Residential Lots** and 98% standard for the **Pavements**.



#### 4. Subgrade Assessment

The subgrade was assessed by A&Y Associates following the topsoil removal and before any fill was placed. The subgrade assessment was undertaken on the 16<sup>th</sup> September 2019 as mentioned in report *1120-0151-1* (*SSI1*).

The exposed subgrade was rolled by a 20 tonne compactor. The exposed subgrade material comprised natural silty clay. No wet or soft patches were found during the inspection. No evidence of deleterious material was found during the inspection.

#### 5. Earthworks

The earthworks for this project included stripping of topsoil, removing of tree roots, proof rolling the subgrade and placement and compaction of fill to construct engineered platforms.

Based on design plans and site inspection, it appears that the average fill thickness placed is as follows:

Wetlands:

• Approximately 4000mm

#### 6. Fill Material

The fill material used for the platform consisted of Site Derived Clay.



### 7. Testing

Field density testing was undertaken on the compacted fill at a frequency of a minimum of 3 tests per day's production (AS3798 Table 8.1).

Test were performed using Nuclear Density Gauge for field density determination as per AS 1289.5.8.1. Testing was completed at a minimum rate of 3 field density test per day's production based on the minimum requirements of AS 3798-2007 and taken from each layer of fill placed.

A total of 56 field density tests were performed during the earthworks. All of the test results met the specified compaction requirement of 95% Standard for the residential lots and 98% standard for the pavements. The locations of the 56 field density tests are shown in Appendix B - Test Locations. A summary of the test results obtained from the filed density testing is presented in Appendix C – Test Results Summary. The laboratory test reports of the field density tests are presented in Appendix D – NATA Test Results.

#### 8. Conclusion

On the completion of the earthworks and after analysing the materials used, it has been concluded that the filling procedure conducted by BMD Urban appears to be consistent with the requirements of AS 3798 in regards to the placement of fill materials on a project under Level 1 Supervision and in accordance with the project specification as provided to A & Y Associates.

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 A & Y Associates if it is altered in any way, or not reproduced in full.



# Appendix A – Site Plan



PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	17/01/2020	
LOCATION:	PROJECT No:		GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	1120 0151-1	SITE PLAN SKETCH—NOT TO SCALE	





PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	17/01/2020	
LOCATION:	PROJECT No:		GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	1120 0151-1	SITE PLAN SKETCH—NOT TO SCALE	



# Appendix B – Test Locations





PROJECT:	CLIENT:	DATE:	
Merri ield Estate Stage 39	BMD Urban	17/01/2020	A&Y ASSOCIATES PTV ITD
LOCATION:	PROJECT No:		GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	1120 0151-1	1-1 SITE PLAN SKETCH—NOT TO SCALE	



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PROJECT:	CLIENT:	DATE:	
Merri ield Estate Stage 39	BMD Urban	17/01/2020	A&Y ASSOCIATES PTY ITD
LOCATION:	PROJECT No:		GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	1120 0151-1	SITE PLAN SKETCH—NOT TO SCALE	



# Appendix C – Test Results Summary



Project No	1120 0151-1	Client	BMD Urban		
Project Name	Merrifield Estate Stage 39 - Level 1		Specification	Density Ratio ≥ 95% of Peak Wet Density	
Location	Mickleham	Specification		Density Ratio ≥ 98% of Peak Wet Density	

Test No	Potost of Tost	Data	Location	Laver	Oversize	Density	Moisture	Moisture	Dass / Fail	Potost
TEST NO	Recess of Test	Date	LOCATION	Layei	Oversize	Ratio	Ratio	Variation	r ass / 1 ali	Refest
#	#		Lot #	#	%	%	%	%		Pass / Fail
1	-	17/09/2019	Refer to Plan	1	0.0	99.5	103	0.5	Pass	-
2	-	17/09/2019	Refer to Plan	1	0.0	98	102.5	0.5	Pass	-
3	-	17/09/2019	Refer to Plan	2	0.0	99.5	100	0	Pass	-
4	-	17/09/2019	Refer to Plan	2	0.0	98.0	98.5	-0.5	Pass	-
5	-	18/09/2019	Refer to Plan	3	0.0	99.5	100.5	0.5	Pass	-
6	-	18/09/2019	Refer to Plan	3	0.0	99.0	100	0	Pass	-
7	-	18/09/2019	Refer to Plan	3	0.0	99.5	102.5	0.5	Pass	-
8	-	19/09/2019	Refer to Plan	4	0.0	100.5	101	0.5	Pass	-
9	-	19/09/2019	Refer to Plan	4	0.0	99.5	99	0	Pass	-
10	-	19/09/2019	Refer to Plan	4	0.0	100.0	102	0.5	Pass	-
11	-	20/09/2019	Refer to Plan	5	0.0	99.5	99	-0.5	Pass	-
12	-	20/09/2019	Refer to Plan	5	0.0	101.0	88	-2.5	Pass	-
13	-	20/09/2019	Refer to Plan	5	0.0	98.5	100	0	Pass	-
14	-	23/09/2019	Refer to Plan	6	0.0	101.0	99.5	-0.5	Pass	-
15	-	23/09/2019	Refer to Plan	6	0.0	100.0	98	0	Pass	-
16	-	23/09/2019	Refer to Plan	6	0.0	100.5	103.5	-3	Pass	-
17	-	23/09/2019	Refer to Plan	1	0.0	103.5	100.5	-0.5	Pass	-
18	-	23/09/2019	Refer to Plan	1	0.0	98.0	100	-0.5	Pass	-
19	-	23/09/2019	Refer to Plan	1	0.0	99.5	101	-0.5	Pass	-
20	-	24/09/2019	Refer to Plan	FSL	0.0	101.5	88.5	-2.5	Pass	-
21	-	24/09/2019	Refer to Plan	7	0.0	99.5	88	-2.5	Pass	-
22	-	24/09/2019	Refer to Plan	2	0.0	98.5	100	0	Pass	-
23	-	24/09/2019	Refer to Plan	2	0.0	101.0	88	-2.5	Pass	-
24	-	24/09/2019	Refer to Plan	2	0.0	99.5	98.5	0	Pass	-
** Negativ	e (-) value indica	ates that the fiel	d moisture conten	t is drier than the c	ptimum moist	ture content	(OMC)			
** Positive	(+) value indica	tes that the field	l moisture content	is wetter than the	optimum moi	sture conten	t (OMC)			

25	-	25/09/2019	Refer to Plan	FSL	0.0	100.5	88.5	-2.5	Pass	-
26	-	25/09/2019	Refer to Plan	3	0.0	99.0	100.5	0	Pass	-
27	-	25/09/2019	Refer to Plan	3	0.0	100.5	88.5	-2.5	Pass	-
28	-	25/09/2019	Refer to Plan	3	0.0	99.0	100	0	Pass	-
29	-	30/09/2019	Refer to Plan	1	0.0	98.5	99	-0.5	Pass	-
30	-	30/09/2019	Refer to Plan	2	0.0	99.0	98	-0.5	Pass	-
31	-	30/09/2019	Refer to Plan	5	0.0	99.5	97.5	-0.5	Pass	-
32	-	1/10/2019	Refer to Plan	3	0.0	99.0	99	-0.5	Pass	-
33	-	1/10/2019	Refer to Plan	4	0.0	98.5	102.5	0.5	Pass	-
34	-	1/10/2019	Refer to Plan	4	0.0	99.0	98.5	0	Pass	-
35	-	2/10/2019	Refer to Plan	1	0.0	100.0	99	0	Pass	-
36	-	2/10/2019	Refer to Plan	FSL	0.0	98.5	103	0.5	Pass	-
37	-	2/10/2019	Refer to Plan	5	0.0	99.5	88.5	-2	Pass	-
38	-	2/10/2019	Refer to Plan	2	0.0	98.5	99.5	-0.5	Pass	-
39	-	2/10/2019	Refer to Plan	6	0.0	98.5	101.5	0.5	Pass	-
40	-	2/10/2019	Refer to Plan	3	0.0	99.0	100	0	Pass	-
41	-	18/10/2019	Refer to Plan	5	0.0	98.5	89	-2.5	Pass	-
42	-	18/10/2019	Refer to Plan	6	0.0	99.5	88.5	-2.5	Pass	-
43	-	18/10/2019	Refer to Plan	7	0.0	98.5	89	-3	Pass	-
44	-	18/10/2019	Refer to Plan	8	0.0	98.0	88.5	-2.5	Pass	-
45	-	21/10/2019	Refer to Plan	1	0.0	98.5	88.5	-3	Pass	-
46	-	21/10/2019	Refer to Plan	2	0.0	99.5	90.5	-2	Pass	-
47	-	21/10/2019	Refer to Plan	3	0.0	99.5	85.5	-2.5	Pass	-
48	-	21/10/2019	Refer to Plan	4	0.0	98.5	86	-3	Pass	-
49	-	11/11/2019	Refer to Plan	9	0.0	98.5	100	0	Pass	-
50	-	11/11/2019	Refer to Plan	10	0.0	100.5	88.5	-2.5	Pass	-
51	-	11/11/2019	Refer to Plan	11	0.0	98.5	98	-0.5	Pass	-
52	-	11/11/2019	Refer to Plan	12	0.0	98.0	89	-2.5	Pass	-
53	-	11/11/2019	Refer to Plan	13	0.0	98.0	99.5	0	Pass	-
54	-	3/12/2019	Refer to Plan	FSL	0.0	98.5	98.5	0	Pass	-
55	-	3/12/2019	Refer to Plan	FSL	0.0	98.5	99.5	0	Pass	-
** Negative (-) value indicates that the field moisture content is drier than the optimum moisture content (OMC)										
** Positive (+) value indicates that the field moisture content is wetter than the optimum moisture content (OMC)										

56	-	3/12/2019	Refer to Plan	FSL	0.0	99.0	99.5	-0.5	Pass	-
** Negative (-) value indicates that the field moisture content is drier than the optimum moisture content (OMC)										
** Positive	** Positive (+) value indicates that the field moisture content is wetter than the optimum moisture content (OMC)									



# Appendix D – NATA Test Results



Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	1
Location:		Merrifield					
		·		<del></del>		<del>.</del>	1
Sample No		1	2	3	4		
Date Tested		17/09/2019	17/09/2019	17/09/2019	17/09/2019		
Time Tested		AM	AM	PM	PM		
Test Location		Lot No: 3901	North West Corner of Reserve	Lot No: 3902	Lot No: 3923		
Level/Layer		1	1	2	2		
Layer Thickness	mm	200	300	200	300		
Test Depth	mm	175	275	175	275		
Field Wet Density	t/m³	2.005	2.003	1.997	2.012		
Field Moisture Content	%	21.1	22.5	24.5	23.6		
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay		
			r	- 1	T	т <u>т</u>	T
Oversize Material	WET, %	0.0	0.0	0.0	0.0	<b></b>	
Sieve Size	mm	19	19	19	19	<b></b>	
Peak Converted Wet Density	t/m³	2.02	2.04	2.01	2.05		
Optimum Moisture Content	%	20.5	22	24.5	24		
	0/	102	102 5	100	00 F	T	
Moisture Katio	% %	103	102.5	100	98.5		
from OMC	70	Wetter	Wetter	OMC	Drier		
Density Ratio	%	99.5	98.0	99.5	98.0		
Specification:	95% STD				Test Selection:		/A
Notes:	Ref: 1120	0151-1 (SI01)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1			Sampling Method:	AS 1289 1	2.1 6.4(b)
NATA	NATA Accre Accreditatio The results	edited Laboratory No. 2 on for compliance with of tests, calibrations a	20172 ⊨ISO/IEC 17025 - Tes⊧ and/or measurements	ting included	Approved Signatory:	David	Burns
WORLD RECOGNISED	in this docu	iment, are traceable to	Australian / National	Standards	Date:	30/09	9/2019





PROJECT:	CLIENT:	DATE:	ASY ASSOCIATES PTV ITD
Merrifield Estate Stage 39	BMD Urban	17/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-1	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS



Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	2
Location:		Merrifield					
		·	1	r	1	1	1
Sample No	1	5	6	7			
Date Tested	1	18/09/2019	18/09/2019	18/09/2019			
Time Tested		PM	PM	PM			
		r	1	1	1		
Test Location		Dam Backfill	Dam Backfill	Dam Backfill			
		Lot No: 3902 & 3901	Lot No: 3902 & 3901	Lot No: 3902 & 3901			
Level/Layer		3	3	3			
Layer Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m³	1.988	2.015	2.006			
Field Moisture Content	%	24.1	22.5	22.5			
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay			
			·	•	•		•
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m³	2.00	2.04	2.02			
Optimum Moisture Content	%	24	22.5	22			
			1				
Moisture Ratio	%	100.5	100	102.5			
Moisture Variation	%	0.5	0.0	0.5			
from OMC	04	Wetter		Wetter			
Density Ratio	70	53.5	99.0	5.5			
Specification:	95% STD				Test Selection:		N/A
Notes:	Ref: 1120	0151-1 (SI02)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	L		Sampling Method:	AS 1289	1.2.1 6.4(b)
NATA	NATA Accredited Laboratory No. 20172 Approved Signatory: Accreditation for compliance with ISO/IEC 17025 - Testing The results of tests, calibrations and/or measurements included				Davie	d Burns	
WORLD RECOGNISED	in this document, are traceable to Australian / National Standards Date:				30/0	9/2019	





PROJECT:	CLIENT:	DATE:	A & Y A SSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	18/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-2	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_22_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39	Report:	3		
Location:		Merrifield					
				1	•	•	
Sample No		8	9	10			
Date Tested		19/09/2019	19/09/2019	19/09/2019			
Time Tested		PM	PM	PM			
			1				
Test Location		Lot No: 3901	Lot No: 3902	Lot No: 3970			
Level/Layer		4	4	4			
Laver Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m³	1.989	2.009	2.018			
Field Moisture Content	%	19.2	25.2	26.5			
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay			
		J					
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m <sup>3</sup>	1.98	2.02	2.02			
Optimum Moisture Content	%	19	25.5	26			
Moisture Ratio	%	101	99	102			
Moisture Variation	%	0.5	0.0	0.5			
from OMC		Wetter	ОМС	Wetter			
Density Ratio	%	100.5	99.5	100.0			ļ
Specification:	95% STD				Test Selection:		N/A
Notes:	Ref: 1120	0151-1 (SI03)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	l		Sampling Method:	AS 1289	1.2.1 6.4(b)
NATA	NATA Accre	dited Laboratory No. 2	20172		Approved Signatory:	D	
	The results	of tests, calibrations a	and/or measurements	included			
	in this docu	The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards Date:				Davio 30/0	d Burns 9/2019

![](_page_23_Picture_1.jpeg)

![](_page_23_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	19/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-3	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_24_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	4
Location:		Merrifield					
				1	1		
Sample No	1	11	12	13			
Date Tested		20/09/2019	20/09/2019	20/09/2019			
Time Tested		РМ	PM	PM			
			1	I	1	r	1
Test Location		Lot No: 3902	Lot No: 3901	Lot No: 3923			
	1						
Level/Layer		5	5	5			
Laver Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m³	2.01	2.004	2.012			
Field Moisture Content	%	22.3	18.5	24.1			
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay			
	I	l					ļ
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m³	2.02	1.99	2.04			
Optimum Moisture Content	%	22.5	21	24			
Moisture Ratio	%	99	88	100			
Moisture Variation	%	-0.5	-2.5	0.0			
from OMC		Drier	Drier	OMC			
Density Ratio	%	99.5	101.0	98.5			
Specification:	95% STD				Test Selection:	I	N/A
Notes:	Ref: 1120	0151-1 (SI04)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	L		Sampling Method:	AS 1289	1.2.1 6.4(b)
$\sim$					$\hat{D}$		
NATA	NATA Accre	dited Laboratory No. 2	20172	• _	Approved Signatory:	UL	
	Accreditatio	on for compliance with	ISO/IEC 1/025 - rest	ting Included			
WORLD RECOGNISED	in this docu	iment, are traceable to	) Australian / National	Standards	Date:	Davio 30/0	d Burns 9/2019

![](_page_25_Picture_1.jpeg)

![](_page_25_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	20/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-4	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_26_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	5
Location:		Merrifield					
			<del></del>	1	<del></del>	1	1
Sample No		14	15	16	17	18	19
Date Tested		23/09/2019	23/09/2019	23/09/2019	23/09/2019	23/09/2019	23/09/2019
Time Tested		AM	AM	AM	PM	PM	PM
Test Location		Lot No: 3901	Lot No: 3902	North West Corner of Reserve	South Corner of Reserve	Ingrams Way CH:138	Ingrams Way CH:50
Level/Layer		6	6	6	1	1	1
Layer Thickness	mm	300	300	300	300	300	300
Test Depth	mm	275	275	275	275	275	275
Field Wet Density	t/m³	2.02	2.018	2.015	2.008	2.005	2.001
Field Moisture Content	%	24.1	25.5	20.9	21.3	22.6	21.6
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay
Oversize Material	WET, %	0.0	0.0	0.0	0.0	0.0	0.0
Sieve Size	mm	19	19	19	19	19	19
Peak Converted Wet Density	t/m³	2.00	2.02	2.01	1.94	2.04	2.01
Optimum Moisture Content	%	24.5	25.5	24	21.5	23	22
							•
Moisture Ratio	%	98	100	87	99	98	98.5
Moisture Variation	%	-0.5	0.0	-3.0	-0.5	-0.5	-0.5
from OMC	0/	Drier	100.0	Drier	Drier	Drier	Drier
Density Ratio	<sup>%0</sup>	101.0	100.0	100.5	103.5	98.0	99.5
Specification:	95% for R	esidential Lots and 9	8% for Roadworks		Test Selection:	N	I/A
Notes:	Ref: 1120	0151-1 (SI05)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	1		Sampling Method:	AS 1289 1	2.1 6.4(b)
NATA	NATA Accre Accreditatic The results	ATA Accredited Laboratory No. 20172 Areditation for compliance with ISO/IEC 17025 - Testing e results of tests, calibrations and/or measurements included			David	Burns	
WORLD RECOGNISED	in this document, are traceable to Australian / National Standards Dat				Date:	30/09	)/2019

![](_page_27_Picture_1.jpeg)

![](_page_27_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	23/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-5	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_28_Figure_0.jpeg)

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PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	23/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844—5(B)	SITE PLAN SKETCH—NOT TO SCALE	Geotechnical Engineering Consultants

![](_page_29_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	te Stage 39			Report:	6
Location:		Merrifield					
				. <u></u>	1		
Sample No		20	21	22	23	24	
Date Tested		24/09/2019	24/09/2019	24/09/2019	24/09/2019	24/09/2019	
Time Tested		AM	AM	PM	PM	PM	
	ĺ			<u></u>			
Test Location		Lot No: 3901/3902	Lot No: 3970	South Corner	Ingrams Way	Ingrams Way	
		5901/5902		of Reserve	CH-120		
					CI1.120	CI1.70	
Level/Layer		FSL	7	2	2	2	
Layer Thickness	mm	300	300	300	300	300	
Test Depth	mm	275	275	275	275	275	
Field Wet Density	t/m³	1.987	1.991	2.004	1.999	2.005	
Field Moisture Content	%	19.5	18.5	22.5	19.8	23.6	
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	
Oversize Material	WET, %	0.0	0.0	0.0	0.0	0.0	
Sieve Size	mm	19	19	19	19	19	
Peak Converted Wet Density	t/m³	1.96	2.00	2.03	1.98	2.01	
Optimum Moisture Content	%	22	21	22.5	22.5	24	
Moisture Ratio	%	88.5	88	100	88	98.5	
Moisture Variation	%	-2.5	-2.5	0.0	-2.5	0.0	
from OMC		Drier	Drier	OMC	Drier	OMC	
Density Ratio	%	101.5	99.5	98.5	101.0	99.5	
Specification:	95%STD fo	or Residential Lots a	nd 98% for Roadworl	<s< td=""><td>Test Selection:</td><td>N,</td><td>/A</td></s<>	Test Selection:	N,	/A
Notes:	Ref: 1120	0151-1 (SI06)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	1		Sampling Method:	AS 1289 1	.2.1 6.4(b)
NATA	NATA Accre Accreditatio	Approved Signatory itation for compliance with ISO/IEC 17025 - Testing				A	
	in this docu	e results of tests, calibrations and/or measurements included this document, are traceable to Australian / National Standards Date				David 30/09	Burns /2019

![](_page_30_Picture_1.jpeg)

![](_page_30_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	24/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-6	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_31_Figure_0.jpeg)

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PROJECT: Merrifield Estate Stage 39	CLIENT: BMD Urban	DATE:	
LOCATION:	PROJECT No:	24/05/2015	A&Y ASSOCIATES PTY LTD GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	BMD844—6(B)	SITE PLAN SKETCH—NOT TO SCALE	

![](_page_32_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	te Stage 39			Report:	7
Location:		Merrifield					
	ſ		<del></del>	<del></del>	<del>.</del>	<b>,</b>	<del></del>
Sample No		25	26	27	28		
Date Tested		25/09/2019	25/09/2019	25/09/2019	25/09/2019		
Time Tested		AM	PM	PM	PM		
	١	·	<del>.</del>	<del>.</del>	<b></b>	T	<del>.</del>
Test Location		Lot No: 3923/3970	Ingrams Way	Ingrams Way	South Corner		
		552575576	СН-80	СН-140			
		1		C11.1-10			
Level/Layer		FSL	3	3	3		
Layer Thickness	mm	300	300	300	300		
Test Depth	mm	275	275	275	275		
Field Wet Density	t/m³	1.998	2.001	1.989	1.993		
Field Moisture Content	%	19.5	21.1	19.5	22.5		
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay		
	•			<u> </u>		!	<b></b>
Oversize Material	WET, %	0.0	0.0	0.0	0.0		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m³	1.99	2.02	1.98	2.01		
Optimum Moisture Content	%	22	21	22	22.5		
	I		-		•		
Moisture Ratio	%	88.5	100.5	88.5	100		
Moisture Variation	%	-2.5	0.0	-2.5	0.0		
from OMC	0/	Drier	OMC	Drier	OMC		
Density Ratio	%	100.5	99.0	100.5	99.0		
Specification:	95%STD fr	or Residential Lots a	nd 98% for Roadworl	ks	Test Selection:	: N	I/A
Notes:	Ref: 1120	0151-1 (SI07)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	L		Sampling Method:	AS 1289 1	2.1 6.4(b)
NATA	NATA Accre Accreditatic	dited Laboratory No. :	20172 1 ISO/IEC 17025 - Tes	ting	Approved Signatory:	R	
	The results in this docu	of tests, calibrations a ment, are traceable to	and/or measurements o Australian / National	included Standards	Date:	David : 30/09	Burns 9/2019

![](_page_33_Picture_1.jpeg)

![](_page_33_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY LTD
Merrifield Estate Stage 39	BMD Urban	25/09/2019	
LOCATION: Merrifield	PROJECT No: BMD844-7	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_34_Figure_0.jpeg)

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PROJECT: Merrifield Estate Stage 39	CLIENT: BMD Urban	DATE:	
LOCATION:	PROJECT No:	SITE PLAN SKETCH—NOT TO SCALE	A&Y ASSOCIATES PTY LTD
Merrifield	BMD844—7(B)		GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_35_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	8
Location:		Merrifield					
					1		-
Sample No		29	30	31			_
Date Tested		30/09/2019	30/09/2019	30/09/2019			
Time Tested		AM	PM	PM			
Test Location		Southeast Corner of Reserve	Southeast Corner of Reserve	Southwest Corner of Reserve			
Level/Layer		1	2	5			
Layer Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m³	1.928	1.946	1.987			
Field Moisture Content	%	18.8	19.1	21.0			
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay			
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m³	1.96	1.97	2.00			
Optimum Moisture Content	%	19	19.5	21.5			
							•
Moisture Ratio	%	99	98	97.5			
Moisture Variation	%	-0.5	-0.5	-0.5			
from OMC		Drier	Drier	Drier			
Density Ratio	%	98.5	99.0	99.5			
Specification:	95% STD				Test Selection:		N/A
Notes:	Ref: 1120	0151-1 (SI08)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1			Sampling Method:	AS 1289	9 1.2.1 6.4(b)
NATA	NATA Accre Accreditatic The results	edited Laboratory No. 20172 Approved Signatory: ion for compliance with ISO/IEC 17025 - Testing s of tests, calibrations and/or measurements included			Dav	id Burns	
WORLD RECOGNISED	in this docu	ment, are traceable to	Australian / National	Standards	Date:	1/1	0/2019

Test Location

![](_page_36_Figure_2.jpeg)

PROJECT: Merrifield Estate Stage 39	CLIENT: BMD Urban	DATE:	
LOCATION:	PROJECT No:		A&Y ASSOCIATES PTY LTD GEOTECHNICAL ENGINEERING CONSULTANTS
Merrifield	BMD844-8	SITE PLAN SKETCH—NOT TO SCALE	

![](_page_37_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39		Report:	9	
Location:		Merrifield	-			-	
Sample No		32	33	34			
Date Tested		1/10/2019	1/10/2019	1/10/2019			
Time Tested		AM	PM	PM			
	ſ	Southeast	Southeast	Southeast	1		-1
Test Location		Corner of Reserve	Corner of Reserve	Corner of Reserve			
Level/Layer		3	4	4			
Layer Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m³	1.969	2.018	1.983			
Field Moisture Content	%	16.8	21.5	17.7			
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay			
							-
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m³	1.99	2.05	2.00			
Optimum Moisture Content	%	17	21	18			
Moisture Ratio	0/0	99	102 5	98.5			
Moisture Variation	%	-0.5	0.5	0.0			
from OMC		Drier	Wetter	OMC			
Density Ratio	%	99.0	98.5	99.0			
Specification:	95% STD				Test Selection:		N/A
Notes:	Ref: 1120	0151-1 (SI09)					
Test Method	AS1289 5.8	8.1, 5.7.1, 2.1.1, 1.1			Sampling Method:	AS 1289	9 1.2.1 6.4(b)
NATA	NATA Accre Accreditatic The results	Accredited Laboratory No. 20172 Approved Signato litation for compliance with ISO/IEC 17025 - Testing			Approved Signatory:		id Burne
WORLD RECOGNISED	in this docu	ment, are traceable to	Australian / National	Standards	Date:	1/1	10/2019

Test Location

![](_page_38_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTV ITD
Merrifield Estate Stage 39	BMD Urban	1/10/2019	
LOCATION: Merrifield	PROJECT No: BMD844-9	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_39_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	te Stage 39			Report:	10
Location:		Merrifield					
	I						Г <u>(</u>
Sample No		35	36	37	38	39	40
Date Tested		2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019
Time Tested		AM	AM	PM	PM	PM	PM
Test Location		Northeast Corner of Reserve	Southwest Corner of Reserve	Southeast Corner of Reserve	Northeast Corner of Reserve	Southeast Corner of Reserve	Northeast Corner of Reserve
Level/Layer		1	FSL	5	2	6	3
Layer Thickness	mm	300	300	300	300	300	300
Test Depth	mm	275	275	275	275	275	275
Field Wet Density	t/m³	1.978	2.008	1.913	2.01	1.956	1.999
Field Moisture Content	%	19.3	22.1	18.6	22.4	21.3	21.0
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay
Oversize Material	WET, %	0.0	0.0	0.0	0.0	0.0	0.0
Sieve Size	mm	19	19	19	19	19	19
Peak Converted Wet Density	t/m³	1.97	2.04	1.93	2.04	1.99	2.02
Optimum Moisture Content	%	19.5	21.5	21	22.5	21	21
Moisture Ratio	%	99	103	88.5	99.5	101.5	100
Moisture Variation	%	0.0	0.5	-2.0	-0.5	0.5	0.0
from OMC		OMC	Wetter	Drier	Drier	Wetter	OMC
Density Ratio	%	100.0	98.5	99.5	98.5	98.5	99.0
Specification:	95% STD				Test Selection:	N,	/A
Notes:	Ref: 1120	0151-1 (SI10)					
Test Method	AS1289 5.8	8.1, 5.7.1, 2.1.1, 1.1	1		Sampling Method:	AS 1289 1	.2.1 6.4(b)
NATA	NATA Accre Accreditatio The results	ccredited Laboratory No. 20172 Approved S tation for compliance with ISO/IEC 17025 - Testing			Approved Signatory:	David	Prime
	in this docu	ment, are traceable to	) Australian / National	Standards	Date:	3/10,	/2019

![](_page_40_Picture_1.jpeg)

![](_page_40_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	02/10/2019	
LOCATION: Merrifield	PROJECT No: BMD844-10	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_41_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estat	e Stage 39			Report:	11
Location:		Merrifield					
	ĺ	, <b></b>	1	1		T	<b>.</b>
Sample No		41	42	43	44		
Date Tested		18/10/2019	18/10/2019	18/10/2019	18/10/2019		
Time Tested		AM	AM	PM	PM		
	ſ	·	<u> </u>	-	-	1	1
Test Location		Refer	Refer	Refer	Refer		
		to	to	to	to		
		Plan	Plan	Plan	Plan		
Level/Layer		5	6	7	8		
Layer Thickness	mm	300	300	300	300		
Test Depth	mm	275	275	275	275		
Field Wet Density	t/m³	1.936	1.908	1.912	1.891		
Field Moisture Content	%	23.2	19.5	22.3	19.9		
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay		
						-	-
Oversize Material	WET, %	0.0	0.0	0.0	0.0		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m³	1.96	1.92	1.94	1.93		
Optimum Moisture Content	%	26	22	25	22.5		
Moisture Ratio	%	89	88.5	89	88.5		
Moisture Variation	%	-2.5	-2.5 Drion	-3.0	-2.5 Drion		
from OMC	96	Drier		OR 5			
Density katio	70	90.5	99.0	90.0	90.0		
Specification:	95% STD				Test Selection:	: 1	N/A
Notes:	Ref: 1120	0151-1 (SI11)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	L		Sampling Method	AS 1289	1.2.1 6.4(b)
NATA	NATA Accre Accreditatio	edited Laboratory No. 2 on for compliance with	20172 1 ISO/IEC 17025 - Test	ting	Approved Signatory:	D	
	in this docu	iment, are traceable to	› Australian / National	Standards	Date	Davic : 22/1	l Burns 0/2019

Test Location

![](_page_42_Figure_2.jpeg)

PROJECT: Merrifield Estate Stage 39	CLIENT: BMD Urban	DATE: 18/10/2019	ASY ASSOCIATES PTY ITD
LOCATION: Merrifield	PROJECT No: BMD844-11	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_43_Picture_0.jpeg)

Client:		BMD Urban				Job No:	BMD844
Project:		Merrifield Estate Stage 39					12
Location:		Merrifield					
			1	1	1	1	
Sample No		45	46	47	48		
Date Tested		21/10/2019	21/10/2019	21/10/2019	21/10/2019		
Time Tested		AM	AM	PM	PM		
			1			1	1
Test Location		Refer	Refer	Refer	Refer		
		to	to	to	to		
		Plan	Plan	Plan	Plan		
Level/Layer		1	2	3	4		
Layer Thickness	mm	300	300	300	300		
Test Depth	mm	275	275	275	275		
Field Wet Density	t/m³	1.881	1.904	1.916	1.9		
Field Moisture Content	%	21.2	19.5	15.4	18.9		
Material:		Site Derived Clay	Site Derived Clay	Site Derived Clay	Site Derived Clay		
Oversize Material	WET, %	0.0	0.0	0.0	0.0		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m³	1.91	1.92	1.92	1.93		
Optimum Moisture Content	%	24	21.5	18	22		
Moisture Ratio	%	88.5	90.5	85.5	86		-
Moisture Variation	%	-3.0	-2.0	-2.5	-3.0		
from OMC	<b>o</b> (	Drier	Drier	Drier	Drier		
Density Ratio	%	98.5	99.5	99.5	98.5		
Specification:	95% STD				Test Selection:	:	N/A
Notes:	Ref: 1120	0151-1 (SI12)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	l		Sampling Method	AS 1289	1.2.1 6.4(b)
NATA	NATA Accre Accreditatio	edited Laboratory No. 2 on for compliance with of tests, calibrations a	20172 ) ISO/IEC 17025 - Test and/or measurements	ting	Approved Signatory:	D	
	in this docu	ment, are traceable to	Australian / National	Standards	Date	Davio : 22/1	а Burns 0/2019

Test Location

![](_page_44_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	21/10/2019	
LOCATION: Merrifield	PROJECT No: BMD844-12	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_45_Picture_0.jpeg)

Client: BMD Urban					Job No:	BMD844	
Project: Merrifield Estate Stage 39					Report:	13	
Location:		Merrifield					
		r	1	1	1		
Sample No	ļ	49	50	51	52	53	
Date Tested	ļ	11/11/2019	11/11/2019	11/11/2019	11/11/2019	11/11/2019	
Time Tested		AM	AM	PM	PM	PM	
		·		I _			· · · · ·
Test Location	ļ	Refer	Refer	Refer	Refer	Refer _	
		To	To	To	To	To	
		Plan	Plan	Plan	Plan	Plan	
Level/Layer		9	10	11	12	13	
Layer Thickness	mm	300	300	300	300	300	
Test Depth	mm	275	275	275	275	275	
Field Wet Density	t/m³	1.963	2.012	1.941	1.897	2.001	
Field Moisture Content	%	19.5	21.2	20.6	19.5	22.3	
Material:		Imported Clay Fill	Imported Clay Fill	Imported Clay Fill	Imported Clay Fill	Imported Clay Fill	
					•		
Oversize Material	WET, %	0.0	0.0	0.0	0.0	0.0	
Sieve Size	mm	19	19	19	19	19	
Peak Converted Wet Density	t/m³	2.00	2.00	1.97	1.94	2.04	
Optimum Moisture Content	%	19.5	24	21	22	22.5	
				•	• • • • • • • • • • • • • • • • • • •		
Moisture Ratio	%	100	88.5	98	89	99.5	
Moisture Variation	%	0.0	-2.5	-0.5	-2.5	0.0	
from OMC		OMC	Drier	Drier	Drier	OMC	
Density Ratio	%	98.5	100.5	98.5	98.0	98.0	
Specification:	95% STD				Test Selection:	N,	/Α
Notes:	Ref: 1120	Ref: 1120 0151-1 (SI13)					
Test Method	AS1289 5.	8.1, 5.7.1, 2.1.1, 1.1	L		Sampling Method:	AS 1289 1	.2.1 6.4(b)
NATA Accredited Laboratory No. 20172 Accreditation for compliance with ISO/IEC				ting included	Approved Signatory:	A	
	in this document, are traceable to Australian / National Standards Date:			David 21/11	Burns /2019		

![](_page_46_Picture_1.jpeg)

![](_page_46_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	
Merrifield Estate Stage 39	BMD Urban	11/11/2019	
LOCATION: Merrifield	PROJECT No: BMD844-13	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS

![](_page_47_Picture_0.jpeg)

Client: BMD Urban				Job No:	BMD844				
Project:	Merrifield Estat	e Stage 39			Report:	14			
Location:		Merrifield							
			1		1	1			
Sample No		54	55	56					
Date Tested		3/12/2019	3/12/2019	3/12/2019					
Time Tested		PM	PM	PM					
Test Location		Refer	Refer	Refer					
		То	То	To					
		Plan	Plan	Plan					
Level/Layer		FSL	FSL	FSL					
Layer Thickness	mm	300	300	300					
Test Depth	mm	275	275	275					
Field Wet Density	t/m³	2.005	1.947	2.031					
Field Moisture Content	%	15.2	20.9	20.4					
Material:		Imported Clay Fill	Imported Clay Fill	Imported Clay Fill					
					ļ				
Oversize Material	WET, %	0.0	0.0	0.0					
Sieve Size	mm	19	19	19					
Peak Converted Wet Density	t/m³	2.04	1.97	2.05					
Optimum Moisture Content	%	15.5	21	20.5					
Moisture Ratio	%	98.5	99.5	99.5					
Moisture Variation	%	0.0	0.0	-0.5					
from OMC		OMC	OMC	Drier					
Density Ratio	%	98.5	98.5	99.0					
Specification:	95% STD				Test Selection:		N/A		
Notes:	Ref: 1120	20 0151-1 (SI14)							
Test Method	AS1289 5.	289 5.8.1, 5.7.1, 2.1.1, 1.1 Sampling Method:			AS 1289	1.2.1 6.4(b)			
NATA	NATA Accre Accreditation	edited Laboratory No. 2 on for compliance with of tests, calibrations a	20172 ISO/IEC 17025 - Test and/or measurements	ting included	Approved Signatory:	D	D		
	in this document, are traceable to Australian / National Standards Date:			Dav 13/0	David Burns 13/01/2020				

Test Location

![](_page_48_Figure_2.jpeg)

PROJECT:	CLIENT:	DATE:	A&Y ASSOCIATES PTY ITD
Merrifield Estate Stage 39	BMD Urban	03/12/2019	
LOCATION: Merrifield	PROJECT No: BMD844-14	SITE PLAN SKETCH—NOT TO SCALE	GEOTECHNICAL ENGINEERING CONSULTANTS