

LEVEL 1 INSPECTION & TESTING

| Geotechnical | Environmental | Residential | Pavements | Investigations & Design |



A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Site: Merrifield Estate - Stage 68, Mickleham

Project No: 11200192-1



Prepared for:
BMD Urban
December 2020

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Revision Chart

Version	Description	Author	Reviewer	Release Approval	Release Date	Client Copy
0	Level 1 Inspection & Testing Report	YZ	AT	AT	9/12/2020	Soft copy (email)

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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 68, Mickleham.

2. Project Summary

It is understood that BMD Urban require the fill platform within Merrifield Estate - Stage 68 to be constructed 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 was undertaken by a Geotechnician from A&Y Associates over a period of 6 working days on 7th of September 2020 to 9th of September 2020 and 5th November 2020 to 7th November 2020.

This report is applicable for fill placed by BMD Urban to backfill the existing swale drains and following allotments located in Merrifield Estate - Stage 68, Mickleham as shown in Appendix A - Site Plan.

- Existing swale drains
- Lot 6814 to Lot 6830

3. Project Specifications

No specification has been provided for the construction works in Merrifield Estate - Stage 68, Mickleham. 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 AS3798-2007 "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 to achieve a density ratio of at least 95% Standard.

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 4th of September 2020 and 4th November 2020 as mentioned in report 1120 0192-1 (SS11). The exposed subgrade material comprised 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:

- Approximately 300mm to 600mm in Lot 6814 to Lot 6830.
- Approximately 900mm of fill was used to backfill the existing drainage swale

6. Fill Material

The fill material used for the platform consisted of site-derived material. The site-derived material was predominantly comprising of Clay.

7. Testing

Field density testing was undertaken on the compacted fill at a frequency of a minimum of 3 tests per lot (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 18 field density tests were performed during the earthworks. All of the test results met the specified compaction requirement of 95% Standard Compaction.

The locations of the 18 field density tests are shown in Appendix B - Test Locations. A summary of the test results obtained from the field 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. Exclusion

A & Y Associates was not involved in monitoring and testing the following works and as such are not included in the Level 1 report.

- Any trenches excavated and backfilled on site for the installation of underground services such as sewers, electrical conduits, water mains etc.
- Footpaths in front of the lots that may be excavated and filled after the Level 1 supervision conducted by A & Y Associates.
- Uncontrolled fill and topsoil that may have been placed as part of the landscaping of the site following the completion of the engineered fill construction.

9. Conclusion

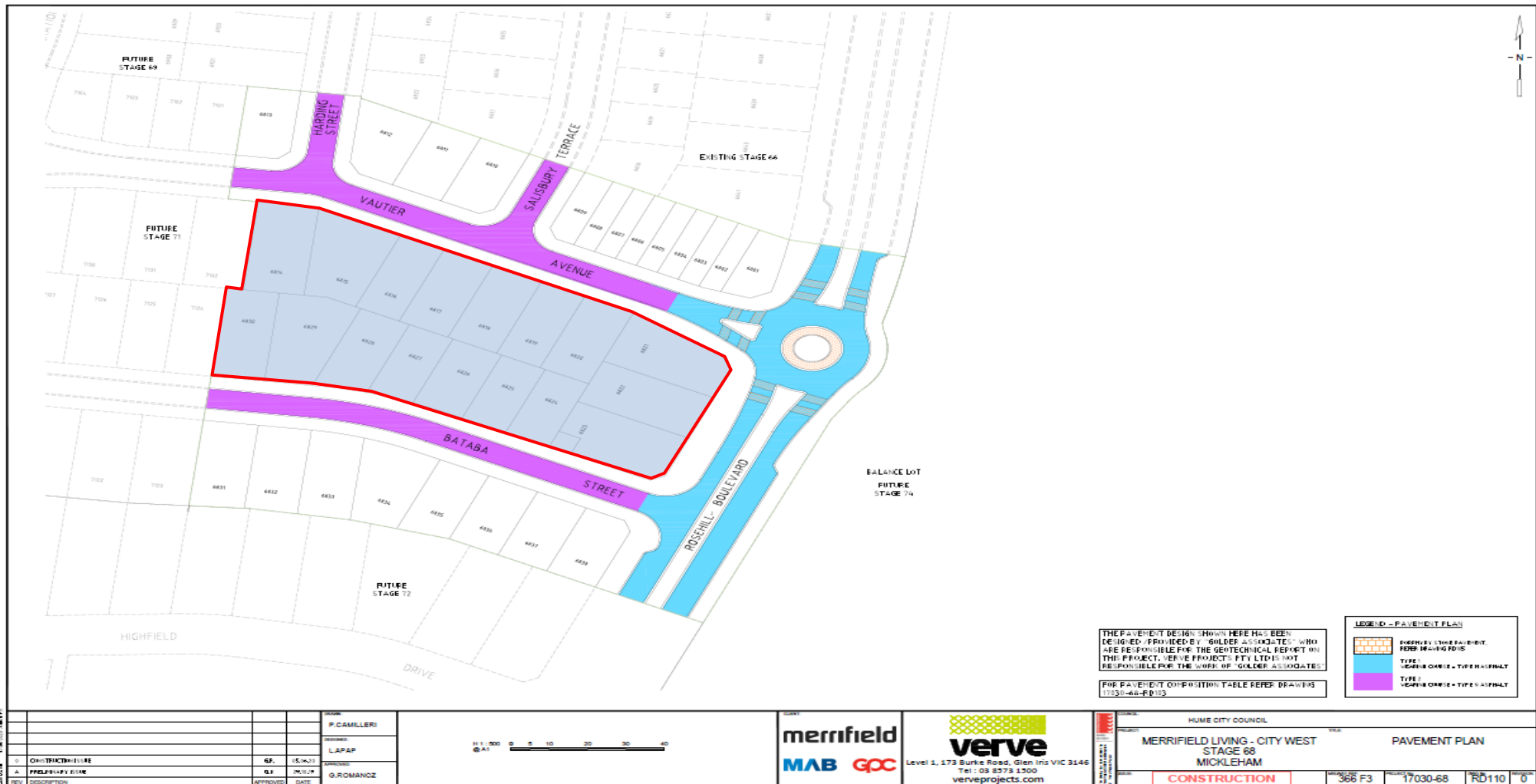
On the completion of the earthworks and after analysing the materials used, it has been concluded that the filling procedure conducted by BMD Urban appears to be consistent with the requirements of AS 3798 in regards to the placement of fill materials on a project under Level 1 Supervision and in accordance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

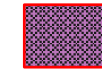
Appendix A – Site Plan



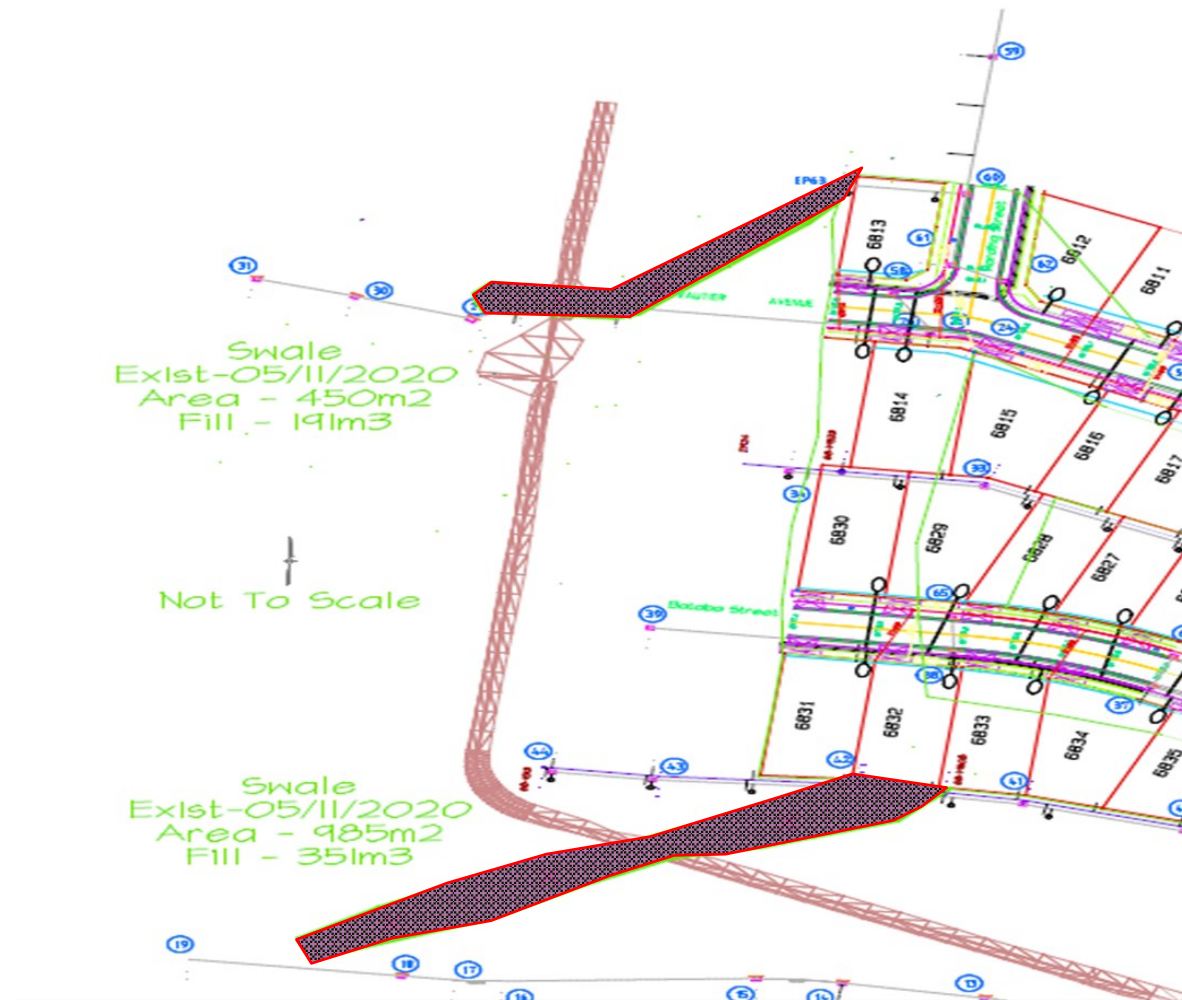
Area Inspected & Tested



PROJECT: Merrifield Estate - Stage 68	CLIENT: BMD Urban	SITE PLAN SKETCH—NOT TO SCALE	 A&Y ASSOCIATES GEOTECHNICAL ENGINEERING CONSULTANTS
LOCATION: Mickleham	PROJECT NO: 1120 0192-1		



Area Inspected & Tested



PROJECT:
Merrifield Estate - Stage 68

CLIENT:
BMD Urban

LOCATION:
Mickleham

PROJECT NO:
1120 0192-1

SITE PLAN SKETCH—NOT TO SCALE

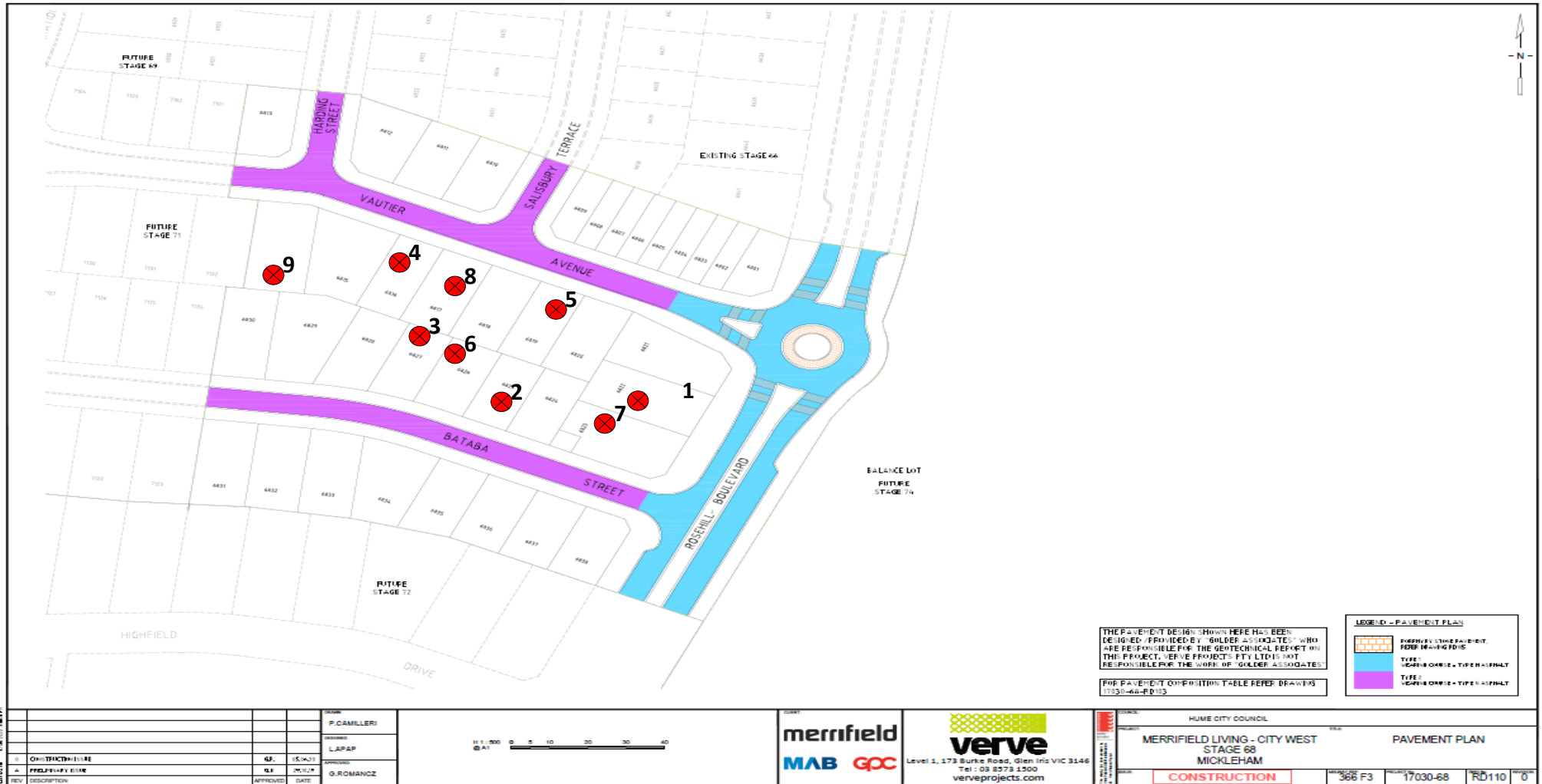


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Appendix B – Test Locations



Indicative Test Locations



PROJECT:
Merrifield Estate - Stage 68

CLIENT:
BMD Urban

LOCATION:
Mickleham

PROJECT NO:
1120 0192-1

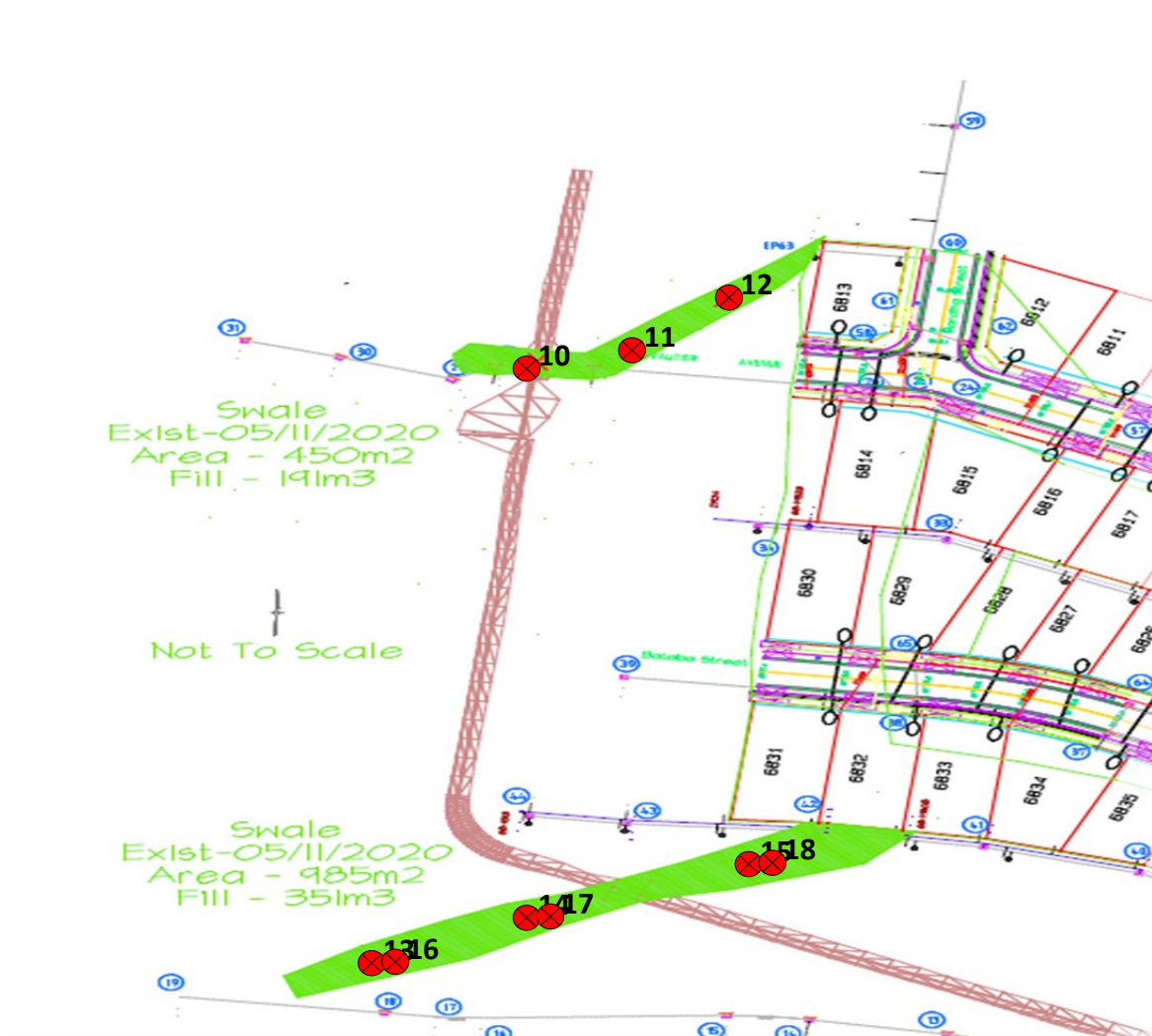
SITE PLAN SKETCH—NOT TO SCALE



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Indicative Test Locations



PROJECT:
Merrifield Estate - Stage 68

CLIENT:
BMD Urban

LOCATION:
Mickleham


PROJECT NO:
1120 0192-1

SITE PLAN SKETCH—NOT TO SCALE



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Appendix C – Test Results Summary

Project No		1120 0192-1			Client	BMD Urban				
Project Name		Merrifield Estate - Stage 68			Specification			Density Ratio \geq 95% of Peak Wet Density		
Location		Mickleham								
Test No	Retest of Test	Date	Location	Layer	Oversize	Density Ratio	Moisture Ratio	Moisture Variation	Pass / Fail	Retest
#	#		Lot #	#	%	%	%	%		Pass / Fail
1	-	7/09/2020	-	1	8.2	95.5	85.0	-2.5	Pass	-
2	-	7/09/2020	-	1	9.3	95.0	86.0	-3.0	Pass	-
3	-	7/09/2020	-	1	10.5	95.5	87.0	-2.5	Pass	-
4	-	8/09/2020	-	1	8.3	95.0	86.0	-3.0	Pass	-
5	-	8/09/2020	-	1	10.8	98.5	88.0	-2.5	Pass	-
6	-	8/09/2020	-	2	11.0	95.0	86.5	-2.5	Pass	-
7	-	9/09/2020	-	2	11.5	95.0	87.5	-2.5	Pass	-
8	-	9/09/2020	-	2	14.7	100.0	86.5	-2.5	Pass	-
9	-	9/09/2020	-	2	12.3	97.5	88.5	-2.5	Pass	-
10	-	5/11/2020	-	1	0.0	97.5	98.5	-0.5	Pass	-
11	-	5/11/2020	-	2	0.0	100.5	99.0	0.0	Pass	-
12	-	5/11/2020	-	3	0.0	97.5	98.0	-0.5	Pass	-
13	-	6/11/2020	-	1	0.0	98.0	96.5	-1.0	Pass	-
14	-	6/11/2020	-	2	0.0	99.5	99.0	-0.5	Pass	-
15	-	6/11/2020	-	2	0.0	98.5	98.5	-0.5	Pass	-
16	-	7/11/2020	-	3	0.0	98.5	96.0	-1.0	Pass	-
17	-	7/11/2020	-	3	0.0	98.0	97.5	-0.5	Pass	-
18	-	7/11/2020	-	3	0.0	99.0	96.5	-0.5	Pass	-
<div> <div>** Negative (-) value indicates that the field moisture content is drier than the optimum moisture content (OMC)</div> <div>** Positive (+) value indicates that the field moisture content is wetter than the optimum moisture content (OMC)</div> </div>										
										

Appendix D – NATA Test Results

Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	1		
Location:	Mickleham						



Sample No	1	2	3			
Date Tested	7/09/2020	7/09/2020	7/09/2020			
Time Tested	AM	PM	PM			

Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	1	1	1			
Layer Thickness	mm 300	mm 300	mm 300			
Test Depth	mm 275	mm 275	mm 275			
Field Wet Density	t/m ³ 1.978	t/m ³ 1.922	t/m ³ 1.99			
Field Moisture Content	% 17.9	% 18.9	% 18.7			
Material:	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			

Oversize Material	WET, % 8.2	WET, % 9.3	WET, % 10.5			
Sieve Size	mm 19	mm 19	mm 19			
Peak Converted Wet Density	t/m ³ 2.08	t/m ³ 2.00	t/m ³ 2.04			
Optimum Moisture Content	% 21	% 22	% 21.5			

Moisture Ratio	% 85	% 86	% 87			
Moisture Variation from OMC	% -2.5 Drier	% -3.0 Drier	% -2.5 Drier			
Density Ratio	% 95.5	% 95.0	% 95.5			

Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (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)

 <p>NATA WORLD RECOGNISED ACCREDITATION</p>	<p>NATA Accredited Laboratory No. 20172</p> <p>Accreditation for compliance with ISO/IEC 17025 - Testing</p> <p>The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards</p>	<p>Approved Signatory:</p>  <p>David Burns</p> <p>Date: 16/09/2020</p>
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Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	2		
Location:	Mickleham						



Sample No	4	5	6			
Date Tested	8/09/2020	8/09/2020	8/09/2020			
Time Tested	AM	AM	PM			

Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	1	1	2			
Layer Thickness	mm 300	300	300			
Test Depth	mm 275	275	275			
Field Wet Density	t/m ³ 1.939	1.971	1.954			
Field Moisture Content	% 19.8	19.4	17.7			
Material:	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			

Oversize Material	WET, %	8.3	10.8	11.0		
Sieve Size	mm	19	19	19		
Peak Converted Wet Density	t/m ³	2.02	1.95	1.99		
Optimum Moisture Content	%	23	22	20.5		

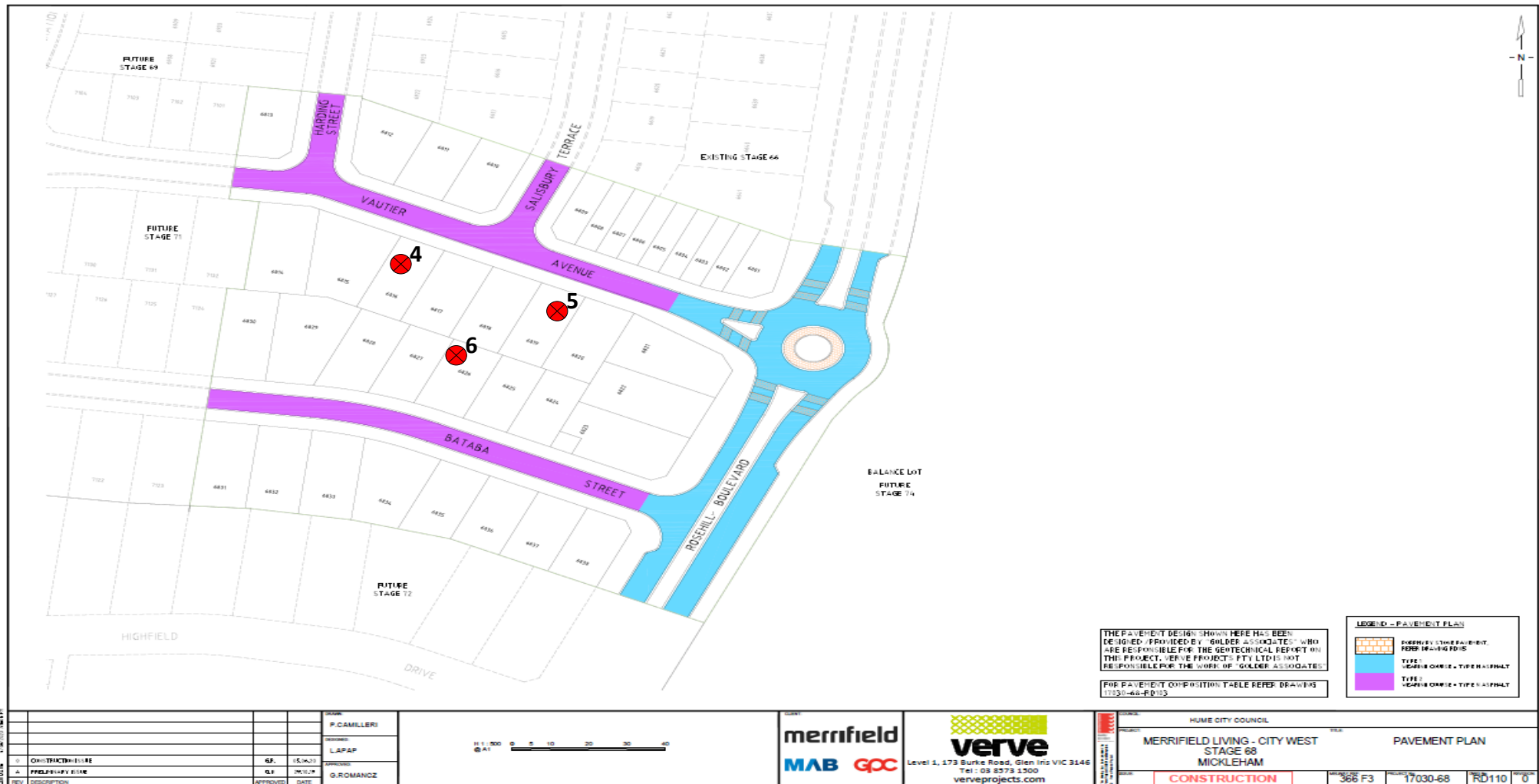
Moisture Ratio	%	86	88	86.5		
Moisture Variation from OMC	%	-3.0 Drier	-2.5 Drier	-2.5 Drier		
Density Ratio	%	95.0	98.5	95.0		

Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (SI02)		
Test Method	AS1289 5.8.1, 5.7.1, 2.1.1, 1.1	Sampling Method:	AS 1289 1.2.1 6.4(b)

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	Accreditation for compliance with ISO/IEC 17025 - Testing	
	The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards	



Test Location



PROJECT:
Merrifield Estate - Stage 68 (Level 1)

CLIENT:
BMD Urban

DATE:
8/09/2020

LOCATION:
Mickleham

PROJECT NO:
1120 0192-1 (SI02)

SITE PLAN SKETCH—NOT TO SCALE



Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	3		
Location:	Mickleham						



Sample No	7	8	9			
Date Tested	9/09/2020	9/09/2020	9/09/2020			
Time Tested	AM	PM	PM			

Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	2	2	2			
Layer Thickness	mm 300	mm 300	mm 300			
Test Depth	mm 275	mm 275	mm 275			
Field Wet Density	t/m ³ 1.939	t/m ³ 1.924	t/m ³ 1.955			
Field Moisture Content	% 19.2	% 18.2	% 18.1			
Material:	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			

Oversize Material	WET, %	11.5	14.7	12.3		
Sieve Size	mm	19	19	19		
Peak Converted Wet Density	t/m ³	2.01	2.02	2.01		
Optimum Moisture Content	%	22	21	20.5		

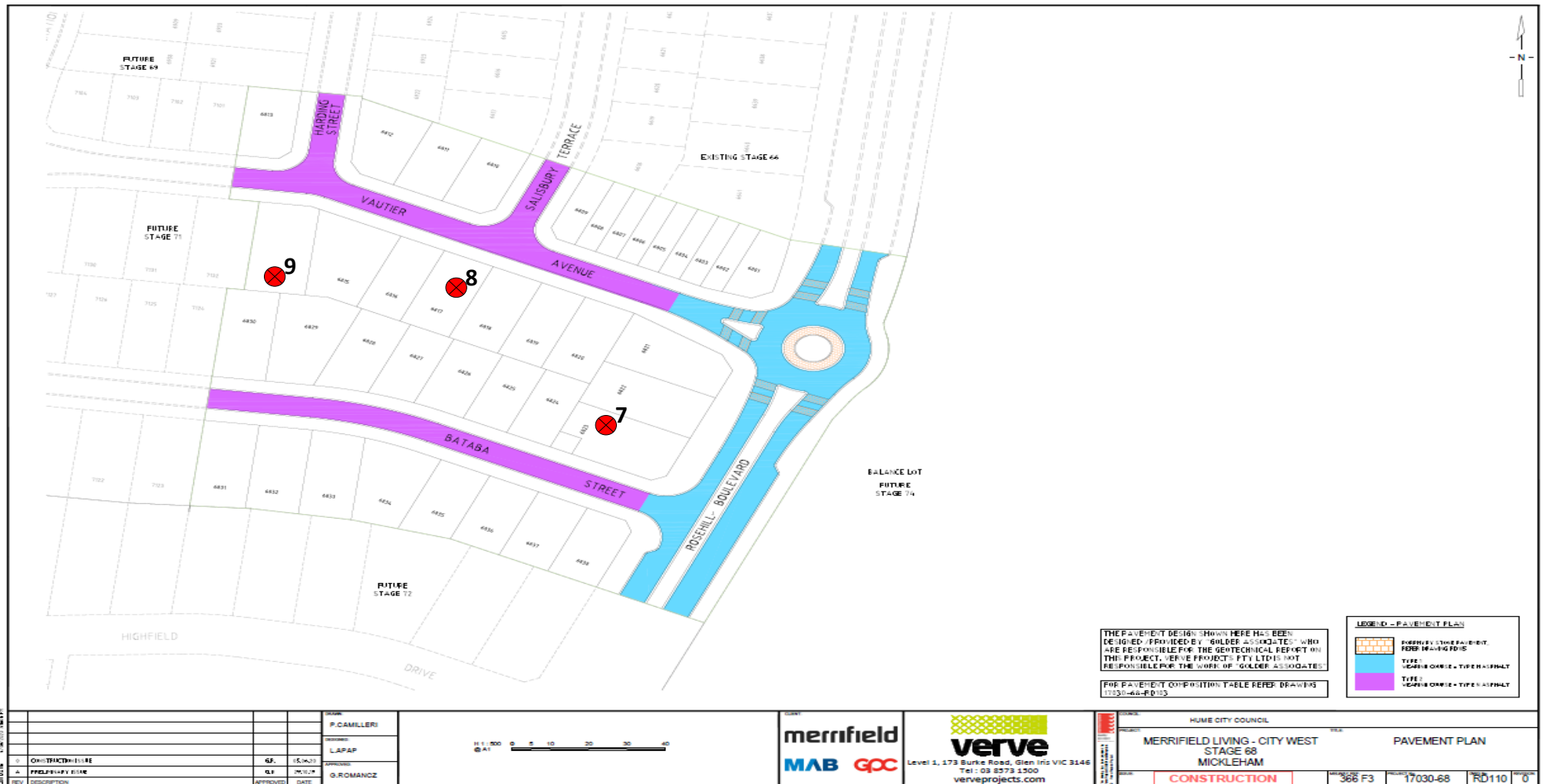
Moisture Ratio	%	87.5	86.5	88.5		
Moisture Variation	%	-2.5	-2.5	-2.5		
from OMC		Drier	Drier	Drier		
Density Ratio	%	95.0	100.0	97.5		

Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (SI03)		
Test Method	AS1289 5.8.1, 5.7.1, 2.1.1, 1.1	Sampling Method:	AS 1289 1.2.1 6.4(b)

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Test Location



PROJECT:
Merrifield Estate - Stage 68 (Level 1)

CLIENT:
BMD Urban

DATE:
9/09/2020

LOCATION:
Mickleham

PROJECT NO:
1120 0192-1 (SI03)

SITE PLAN SKETCH—NOT TO SCALE



Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	4		
Location:	Mickleham						



Sample No	10	11	12			
Date Tested	5/11/2020	5/11/2020	5/11/2020			
Time Tested	PM	PM	PM			

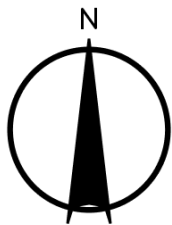
Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	1	2	3			
Layer Thickness	mm 300	300	300			
Test Depth	mm 275	275	275			
Field Wet Density	t/m ³ 1.93	1.91	1.90			
Field Moisture Content	% 23.1	23.3	22.5			
Material:	Site Derived Clay	Site Derived Clay	Site Derived Clay			

Oversize Material	WET, %	0.0	0.0	0.0		
Sieve Size	mm	19	19	19		
Peak Converted Wet Density	t/m ³	1.98	1.90	1.95		
Optimum Moisture Content	%	23.5	23.5	23		

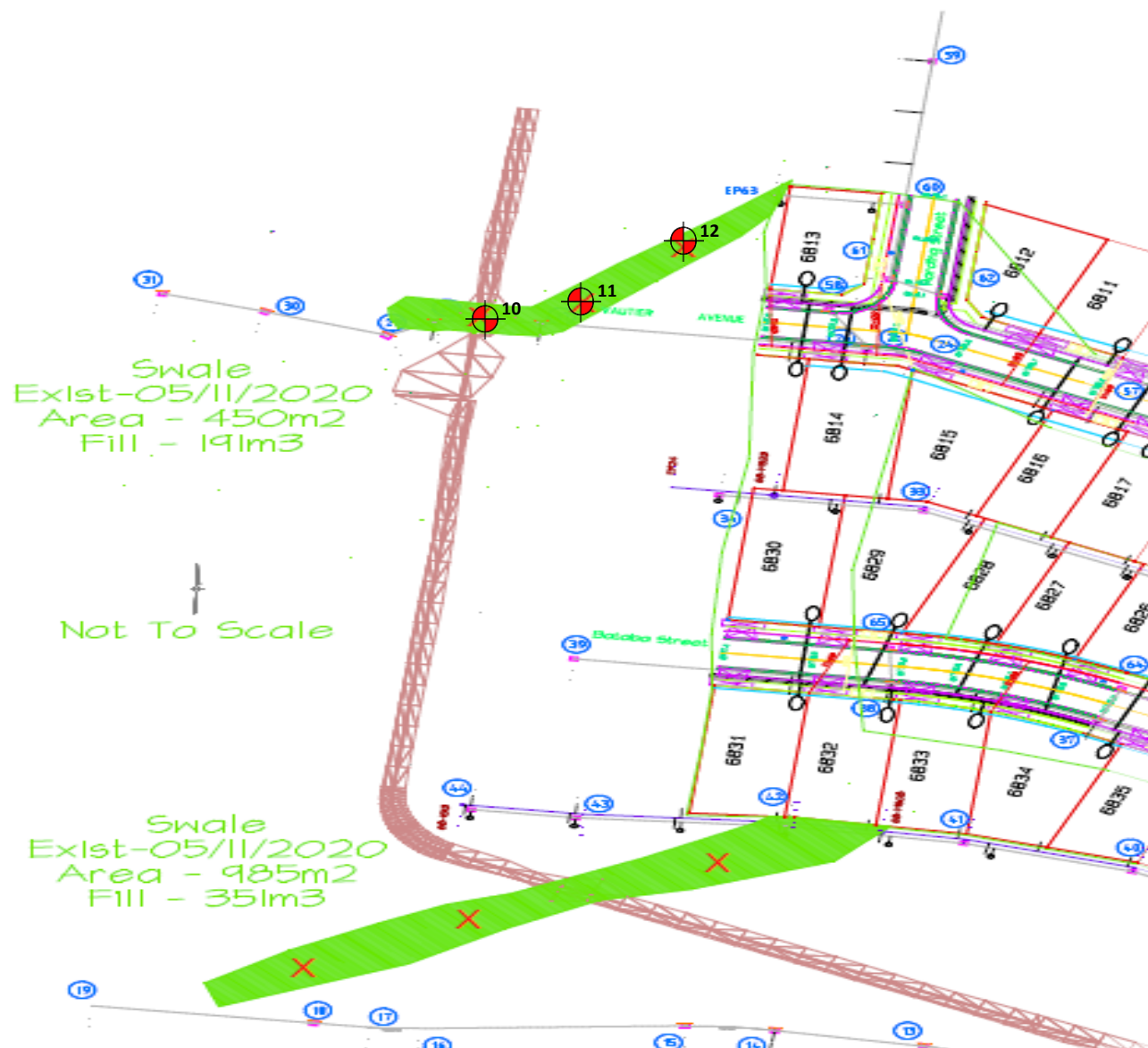
Moisture Ratio	%	98.5	99	98		
Moisture Variation from OMC	%	-0.5 Drier	0.0 OMC	-0.5 Drier		
Density Ratio	%	97.5	100.5	97.5		


Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (SI04)		
Test Method	AS1289 5.8.1, 5.7.1, 2.1.1, 1.1	Sampling Method:	AS 1289 1.2.1 6.4(b)

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Test Location



PROJECT: Merrifield Estate – Stage 68 (Level 1)	CLIENT: BMD Urban	DATE: 5/11/2020	 A&Y ASSOCIATES GEOTECHNICAL ENGINEERING CONSULTANTS
LOCATION: Mickleham	PROJECT No: 1120 0192-1 (SI04)	SITE PLAN SKETCH—NOT TO SCALE	

Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	5		
Location:	Mickleham						



Sample No	13	14	15			
Date Tested	6/11/2020	6/11/2020	6/11/2020			
Time Tested	PM	PM	PM			

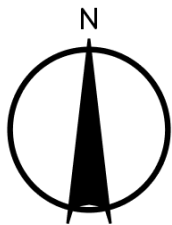
Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	1	2	2			
Layer Thickness	mm 300	300	300			
Test Depth	mm 275	275	275			
Field Wet Density	t/m ³ 2.00	1.93	1.92			
Field Moisture Content	% 26.0	24.2	25.6			
Material:	Site Derived Clay	Site Derived Clay	Site Derived Clay			

Oversize Material	WET, %	0.0	0.0	0.0		
Sieve Size	mm	19	19	19		
Peak Converted Wet Density	t/m ³	2.05	1.94	1.95		
Optimum Moisture Content	%	27	24.5	26		

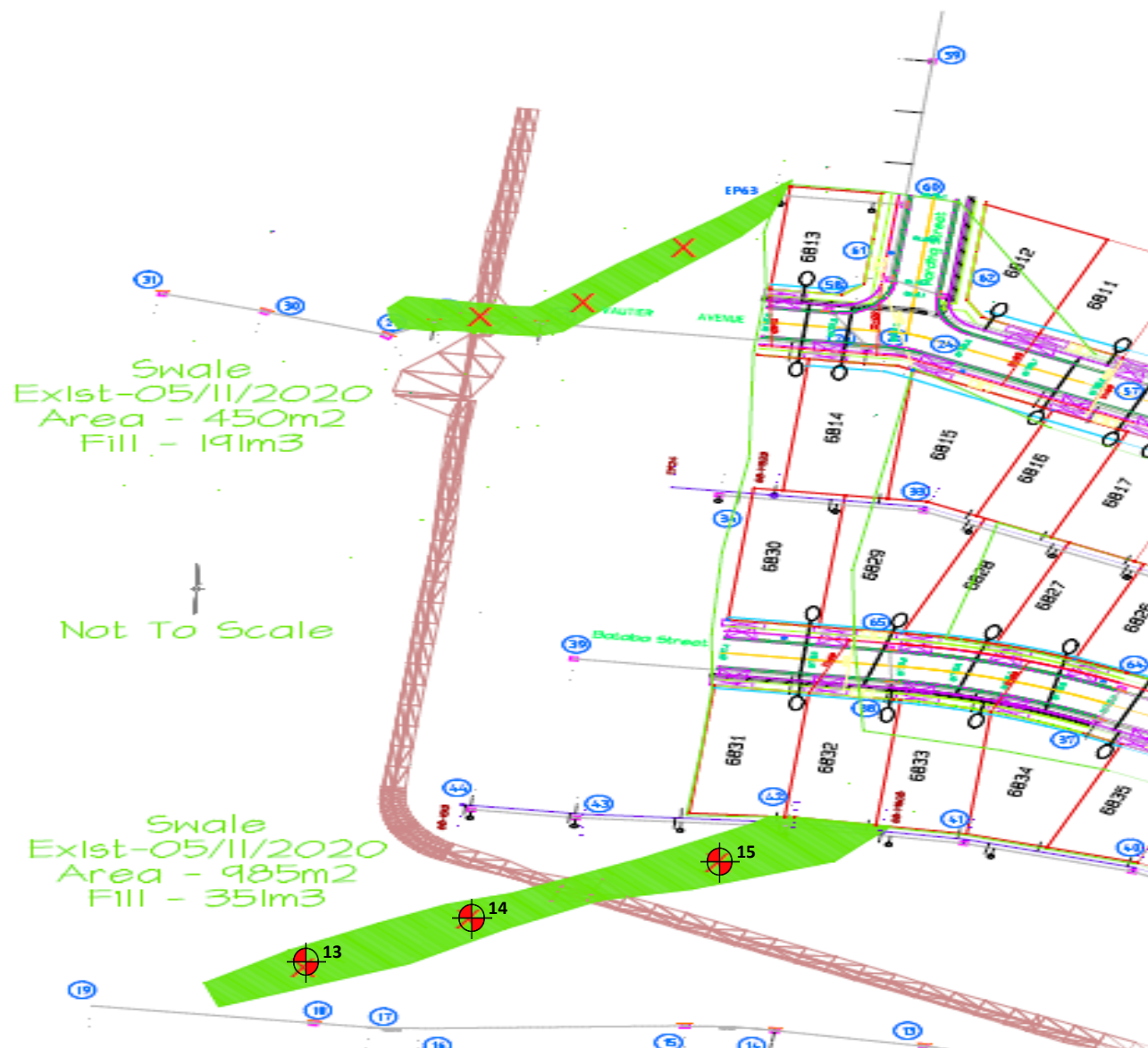
Moisture Ratio	%	96.5	99	98.5		
Moisture Variation	%	-1.0	-0.5	-0.5		
from OMC		Drier	Drier	Drier		
Density Ratio	%	98.0	99.5	98.5		


Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (SI05)		
Test Method	AS1289 5.8.1, 5.7.1, 2.1.1, 1.1	Sampling Method:	AS 1289 1.2.1 6.4(b)

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Test Location



PROJECT: Merrifield Estate – Stage 68 (Level 1)	CLIENT: BMD Urban	DATE: 6/11/2020	 A&Y ASSOCIATES GEOTECHNICAL ENGINEERING CONSULTANTS
LOCATION: Mickleham	PROJECT No: 1120 0192-1 (SI05)	SITE PLAN SKETCH—NOT TO SCALE	

Field Density Test Results AS1289.5.7.1

Client:	BMD Urban			Job No:	BMD1279		
Project:	Merrifield Estate - Stage 68 (Level 1)			Report:	6		
Location:	Mickleham						



Sample No	16	17	18			
Date Tested	7/11/2020	7/11/2020	7/11/2020			
Time Tested	PM	PM	PM			

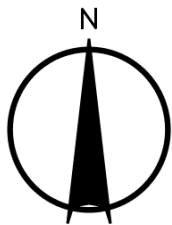
Test Location	Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer	3	3	3			
Layer Thickness	mm 300	mm 300	mm 300			
Test Depth	mm 275	mm 275	mm 275			
Field Wet Density	t/m ³ 1.98	t/m ³ 2.00	t/m ³ 1.91			
Field Moisture Content	% 20.2	% 19.5	% 17.4			
Material:	Site Derived Clay	Site Derived Clay	Site Derived Clay			

Oversize Material	WET, % 0.0	WET, % 0.0	WET, % 0.0			
Sieve Size	mm 19	mm 19	mm 19			
Peak Converted Wet Density	t/m ³ 2.01	t/m ³ 2.05	t/m ³ 1.93			
Optimum Moisture Content	% 21	% 20	% 18			

Moisture Ratio	% 96	% 97.5	% 96.5			
Moisture Variation from OMC	% -1.0 Drier	% -0.5 Drier	% -0.5 Drier			
Density Ratio	% 98.5	% 98.0	% 99.0			

Specification:	95% STD	Test Selection:	N/A
Notes:	Ref: 1120 0192-1 (SI06)		
Test Method	AS1289 5.8.1, 5.7.1, 2.1.1, 1.1	Sampling Method:	AS 1289 1.2.1 6.4(b)

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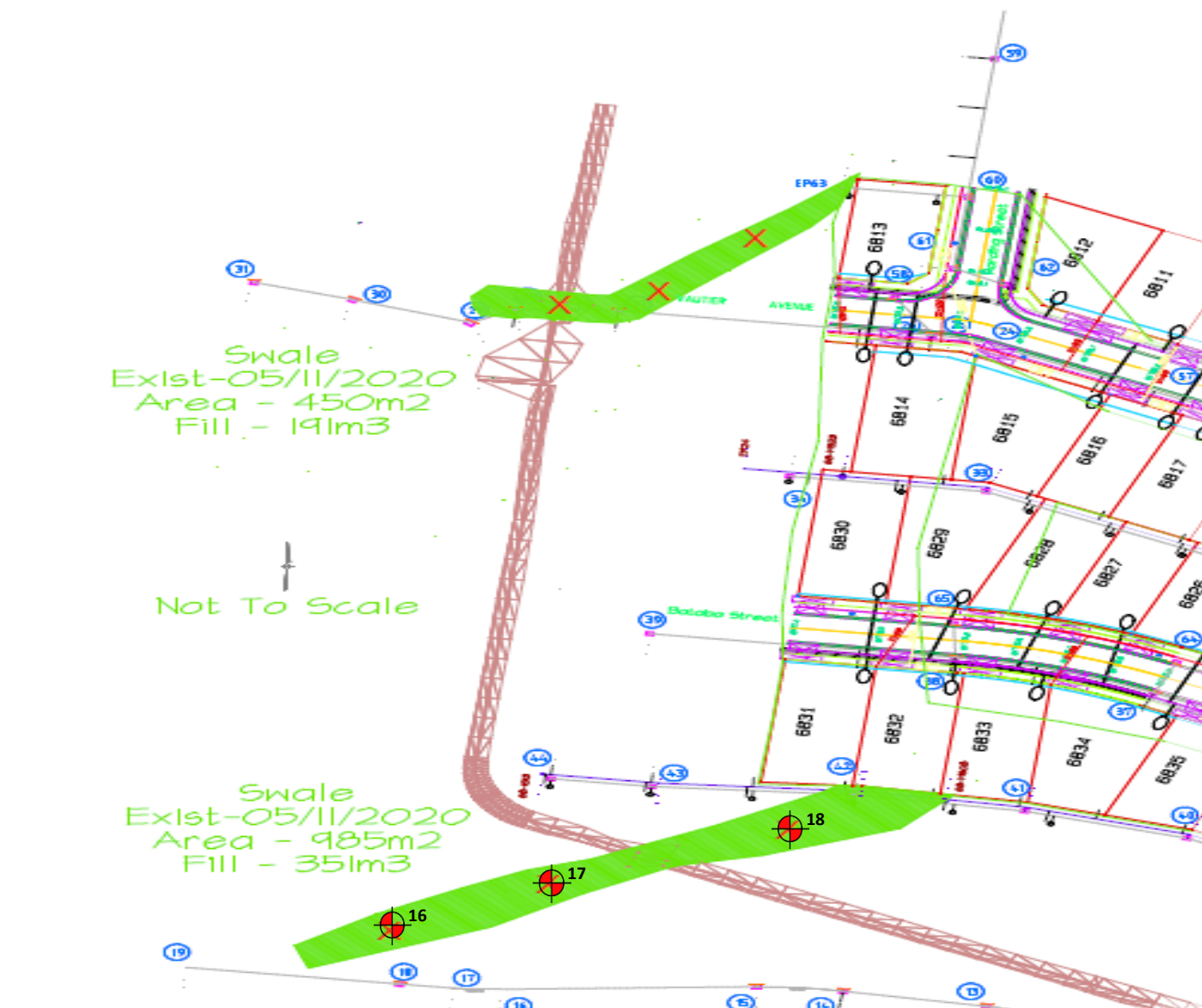



Test Location

Swale
Exist-05/11/2020
Area - 450m²
Fill - 191m³

Not To Scale

Swale
Exist-05/11/2020
Area - 985m²
Fill - 351m³



PROJECT: Merrifield Estate – Stage 68 (Level 1)	CLIENT: BMD Urban	DATE: 7/11/2020	 A&Y ASSOCIATES <small>GEOTECHNICAL ENGINEERING CONSULTANTS</small>
LOCATION: Mickleham	PROJECT No: 1120 0192-1 (SI06)	SITE PLAN SKETCH—NOT TO SCALE	