LEVEL 1 INSPECTION & TESTING

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

A&Y ASSOCIATES

GEOTECHNICAL ENGINEERING CONSULTANTS

Site: Merrifield Estate - Stage 66, Mickleham

Project No: 1120 0180-1

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	4/12/2020	Soft copy (email)

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ENGINEERS AUSTRALIA

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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 66, Mickleham.

2. Project Summary

It is understood that BMD Urban require the fill platforms within Merrifield Estate - Stage 66, Mickleham 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 5 working days on 16th of June 2020, 17th of June 2020, 6th of July 2020, 7th of July 2020 and 5th of August 2020.

This report is applicable for fill placed by BMD Urban for the following lots and open channel located in Merrifield Estate - Stage 66, Mickleham as shown in Appendix A - Site Plan.

- Open Channel
- Lot 6602 to Lot 6607
- Lot 6621 to Lot 6639

3. Project Specifications

No specification has been provided for the construction works in Merrifield Estate - Stage 66, 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 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 dry density ratio of at least 95% Standard, as the project was classified as **Residential.**

4. Subgrade Assessment

The subgrade was assessed by A&Y Associates following the topsoil removal and before any fill was placed. The subgrade assessment were undertaken on the 15th June 2020 and 6th July 2020 as mentioned in report *1120 0180-1 (SSI1).*

The exposed subgrade material comprised silty clay. No deleterious material, wet,a nd soft patches were 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 approximately 300mm to 2400mm. It should be noted that the overall fill depths are estimated using onsite visualmethods and may not be a true representation of fill depths as site conditions may change over time.

6. Fill Material

The fill material used for the platform consisted of on-site boxed out material. The stockpiled material was predominantly comprising of Clay fill.

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 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. 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.

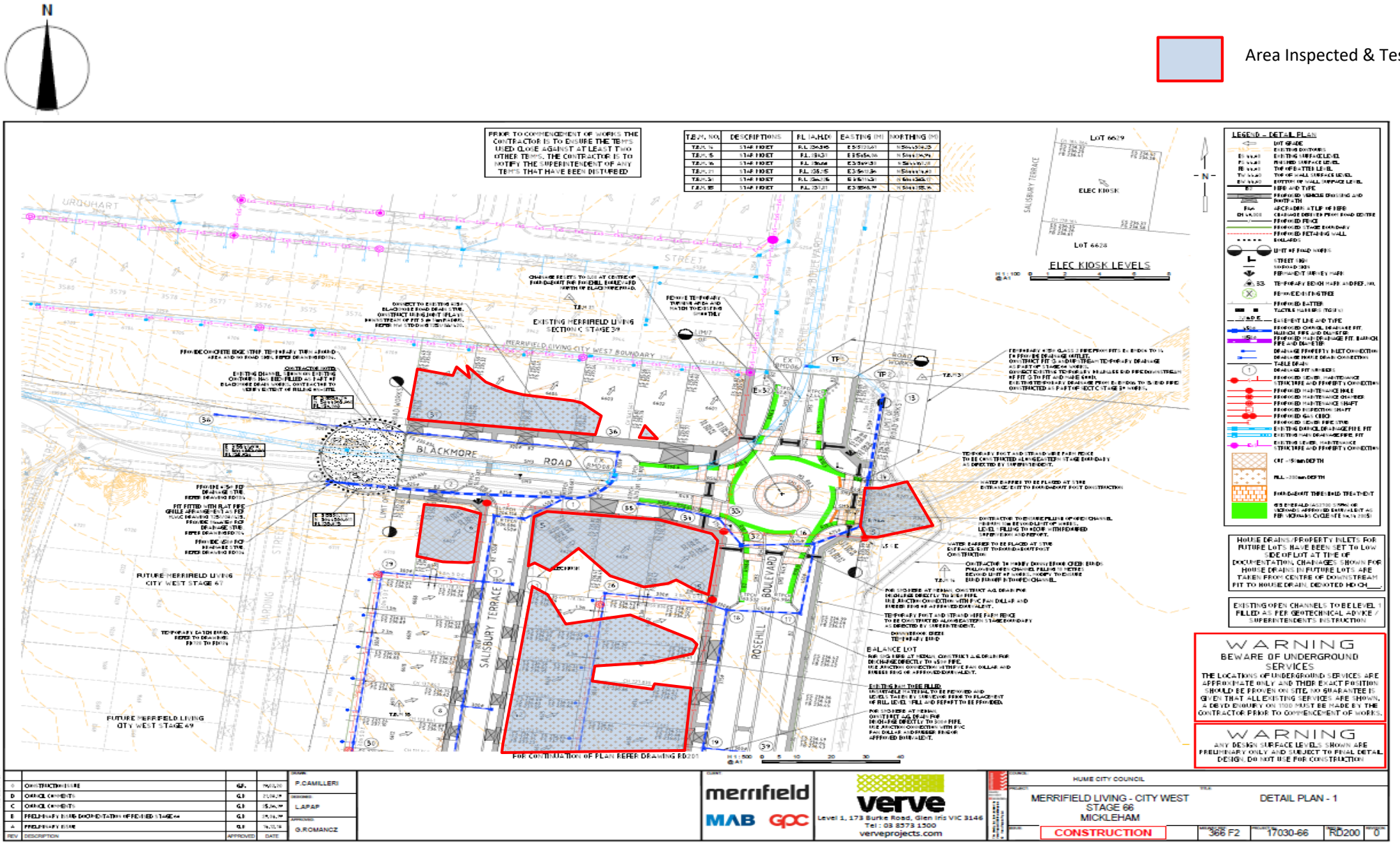
- Any trenches excavated and backfilled on site for the installation of underground services such as sewers, electrical conduits, water mains etc.
- Footpaths in front of the lots that may be excavated and filled after the Level 1 supervision conducted by A & Y Associates.
- Uncontrolled fill and topsoil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



PROJECT: Merrifield Estate—Stage 66	**CLIENT:** BMD Urban
LOCATION: Mickleham	**PROJECT NO:** 1120 0180–1

SITE PLAN SKETCH—NOT TO SCALE

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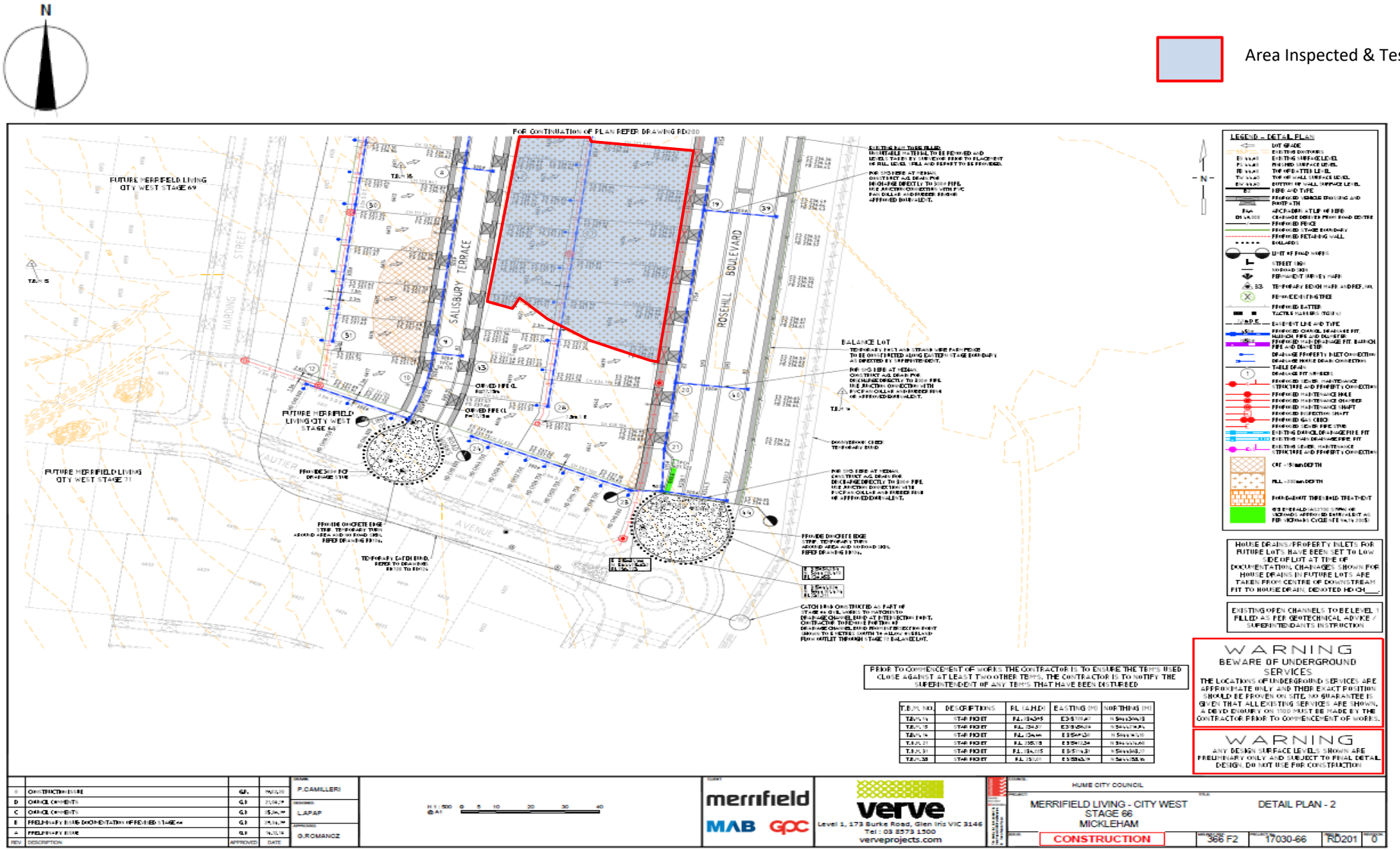

PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1**

SITE PLAN SKETCH—NOT TO SCALE

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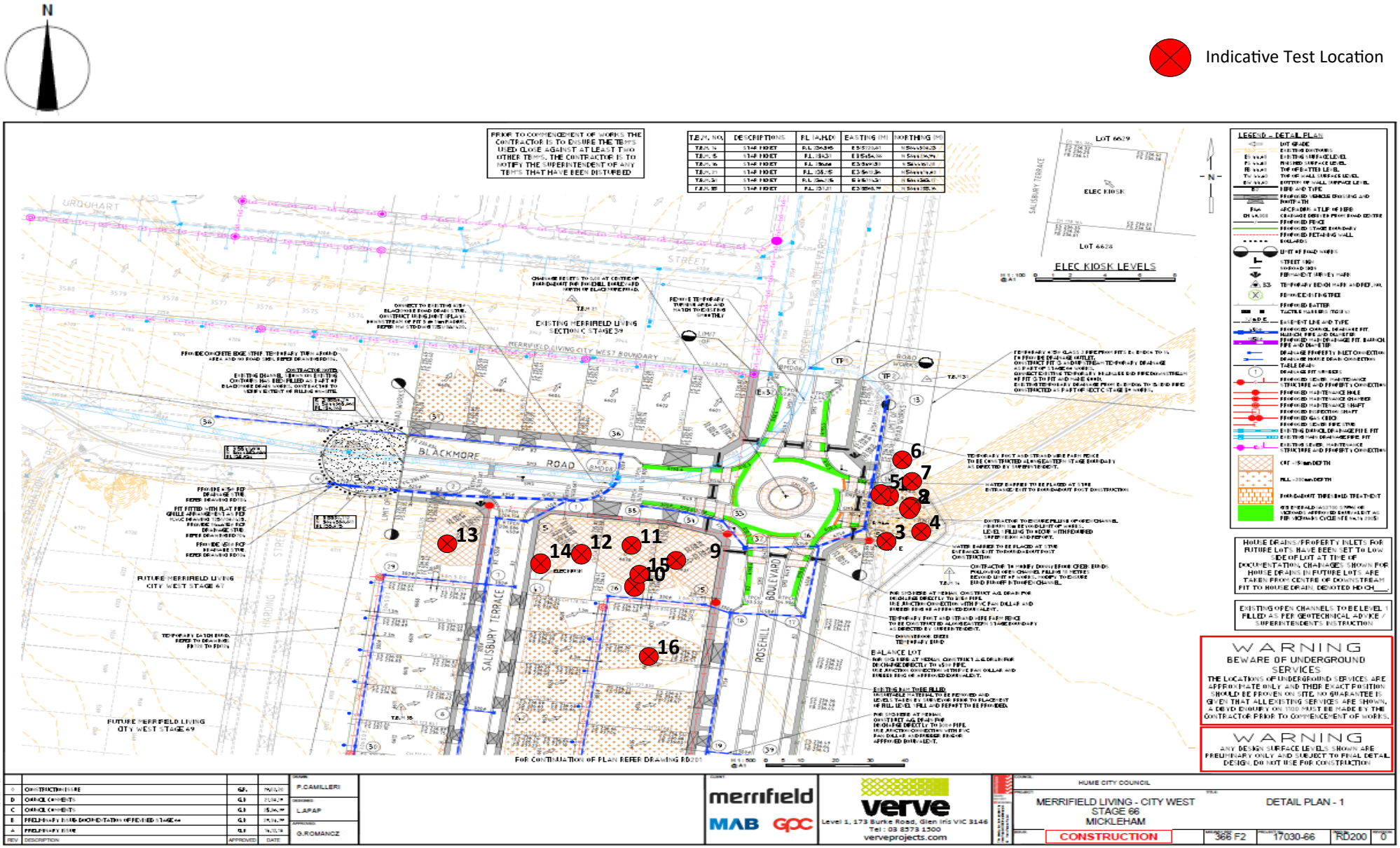
Appendix B – Test Locations



PROJECT: Merrifield Estate—Stage 66	**CLIENT:** BMD Urban
LOCATION: Mickleham	**PROJECT NO:** 1120 0180–1

SITE PLAN SKETCH—NOT TO SCALE

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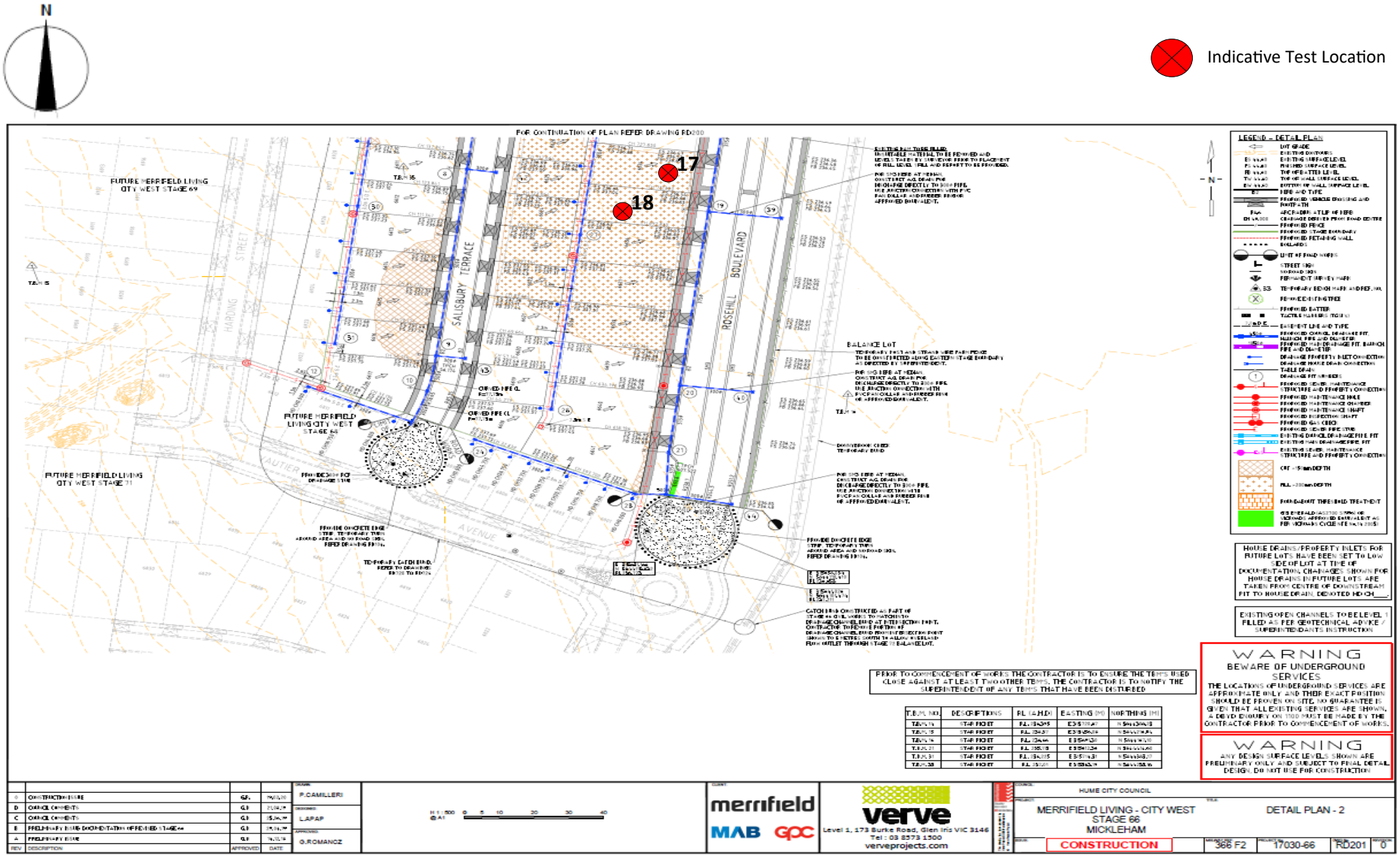

PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1**

SITE PLAN SKETCH—NOT TO SCALE

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Appendix B – Test Results Summary

Project No	1120 0180-1				Client	BMD Urban				
Project Name	Merrifield Estate-Stage 66				Specification			Density Ratio ≥ 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	-	16/06/2020		1	16.4	98.0	97.5	-0.5	Pass	-
2	-	16/06/2020	-	2	14.9	99.0	99.0	0.0	Pass	-
3	-	16/06/2020	-	3	14.3	98.5	101.0	0.0	Pass	-
4	-	16/06/2020	-	4	16.0	99.0	100.5	0.0	Pass	-
5	-	17/06/2020	-	5	14.5	96.0	97.0	-0.5	Pass	-
6	-	17/06/2020	-	6	19.4	98.5	99.0	0.0	Pass	-
7	-	17/06/2020	-	7	15.2	97.5	96.0	-1.0	Pass	-
8	-	17/06/2020	-	8	12.9	97.5	96.5	-1.0	Pass	-
9	-	6/07/2020	-	1	7.2	98.5	98.5	-0.5	Pass	-
10	-	6/07/2020	-	2	0.0	98.5	99.0	-0.5	Pass	-
11	-	6/07/2020	-	3	0.0	97.5	98.5	-0.5	Pass	-
12	-	6/07/2020	-	4	0.0	95.0	98.5	0.0	Pass	-
13	-	7/07/2020	-	5	12.4	98.5	98.0	-0.5	Pass	-
14	-	7/07/2020	-	6	15.8	97.0	97.5	-0.5	Pass	-
15	-	7/07/2020	-	7	13.1	99.0	98.5	-0.5	Pass	-
16	-	5/08/2020	-	1	18.0	100.0	96.5	-0.5	Pass	-
17	-	5/08/2020	-	2	12.2	98.5	96.0	-0.5	Pass	-
18	-	5/08/2020	-	3	0.0	101.5	97.0	-0.5	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)

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Appendix D – NATA Test Results

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Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
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info@ayassociates.com.au

Client:		BMD Urban			**Job No:**	BMD1200	
Project:		Merrifield Estate - Stage 66			**Report:**	1	
Location:		Mickleham					
Sample No		1	2	3	4		
Date Tested		16/06/2020	16/06/2020	16/06/2020	16/06/2020		
Time Tested		AM	PM	PM	PM		
Test Location		Refer To Plan	Refer To Plan	Refer To Plan	Refer To 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/m^3	2.01	1.992	1.954	1.97		
Field Moisture Content	%	19.5	22.3	22.2	23.6		
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill		
Oversize Material	WET, %	16.4	14.9	14.3	16.0		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m^3	2.04	2.00	1.97	1.97		
Optimum Moisture Content	%	20	22.5	22	23.5		
Moisture Ratio	%	97.5	99	101	100.5		
Moisture Variation from OMC	%	-0.5 Drier	0.0 OMC	0.0 OMC	0.0 OMC		
Density Ratio	%	98.0	99.0	98.5	99.0		

Specification:	95% STD	**Test Selection:**	N/A
Notes:	1120 0180-1 (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)

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Accreditation for compliance with ISO/IEC 17025 - Testing

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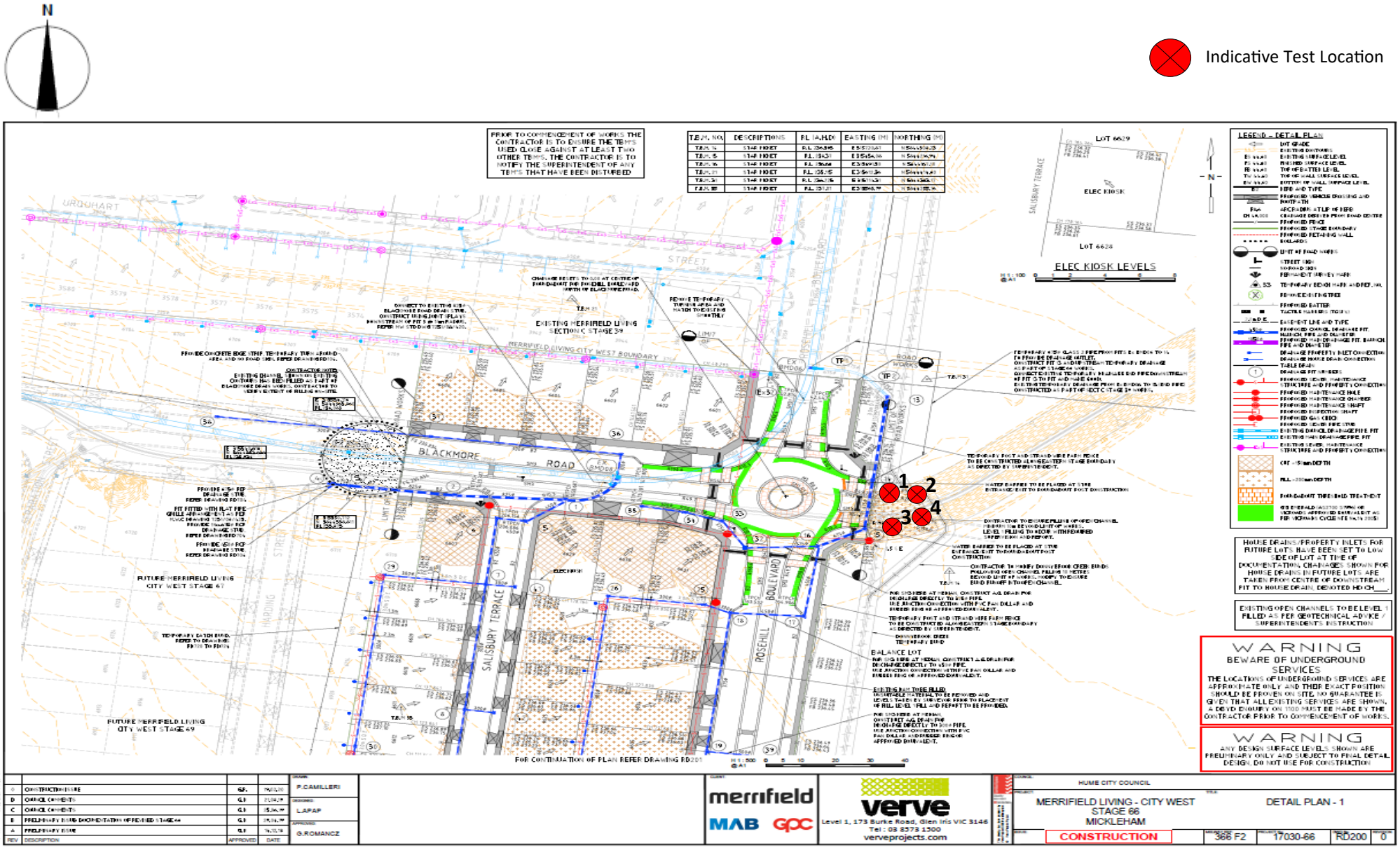
Approved Signatory:

David Burns

Date: 16/07/2020



PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**	**DATE:** **16/6/2020**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1 (SI01)**	**SITE PLAN SKETCH—NOT TO SCALE**

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Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
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Client:		BMD Urban			**Job No:**	BMD1200	
Project:		Merrifield Estate - Stage 66			**Report:**	2	
Location:		Mickleham					
Sample No		5	6	7	8		
Date Tested		17/06/2020	17/06/2020	17/06/2020	17/06/2020		
Time Tested		AM	AM	AM	PM		
Test Location		Refer To Plan	Refer To Plan	Refer To Plan	Refer To 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/m^3	1.926	1.979	1.983	1.995		
Field Moisture Content	%	19.9	21.3	25.4	21.2		
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill		
Oversize Material	WET, %	14.5	19.4	15.2	12.9		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m^3	1.98	1.98	2.02	2.03		
Optimum Moisture Content	%	20.5	21.5	26.5	22		
Moisture Ratio	%	97	99	96	96.5		
Moisture Variation from OMC	%	-0.5 Drier	0.0 OMC	-1.0 Drier	-1.0 Drier		
Density Ratio	%	96.0	98.5	97.5	97.5		

Specification:	95% STD	**Test Selection:**	N/A
Notes:	1120 0180-1 (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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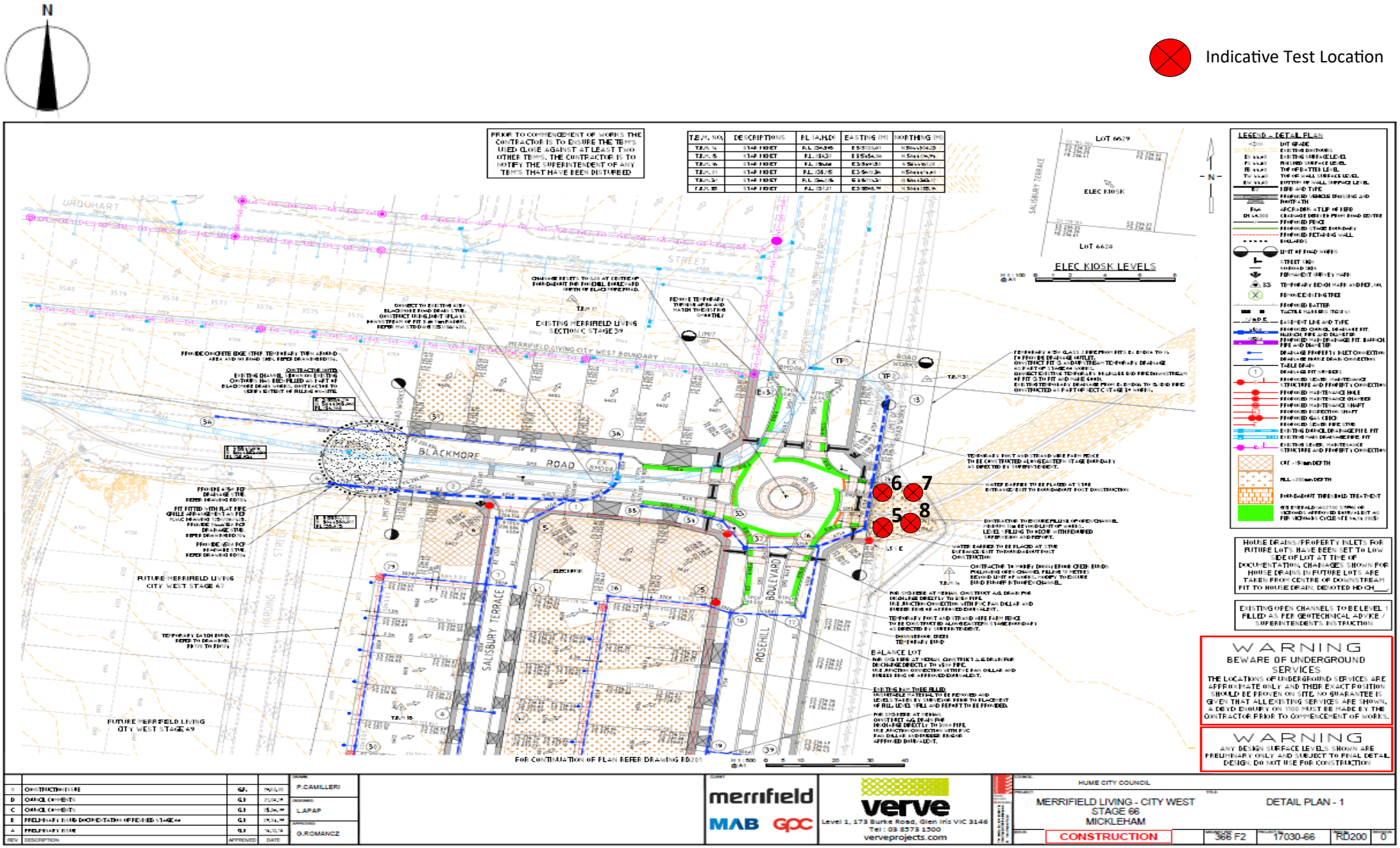
Approved Signatory:

David Burns

Date: 16/07/2020



PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**	**DATE:** **17/6/2020**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1 (SI02)**	**SITE PLAN SKETCH—NOT TO SCALE**

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Field Density Test Results
AS1289.5.7.1

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Client:	BMD Urban				**Job No:**	BMD1200
Project:	Merrifield Estate - Stage 66				**Report:**	3
Location:	Mickleham					

Sample No		9	10	11	12		
Date Tested		6/07/2020	6/07/2020	6/07/2020	6/07/2020		
Time Tested		AM	PM	PM	PM		
Test Location		Refer To Plan	Refer To Plan	Refer To Plan	Refer To 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/m^3	1.97	1.984	1.928	1.934		
Field Moisture Content	%	23.6	25.2	21.2	26.5		
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill		
Oversize Material	WET, %	7.2	0.0	0.0	0.0		
Sieve Size	mm	19	19	19	19		
Peak Converted Wet Density	t/m^3	1.98	2.02	1.98	2.03		
Optimum Moisture Content	%	24	25.5	21.5	27		
Moisture Ratio	%	98.5	99	98.5	98.5		
Moisture Variation from OMC	%	-0.5 Drier	-0.5 Drier	-0.5 Drier	0.0 OMC		
Density Ratio	%	98.5	98.5	97.5	95.0		

Specification:	95% STD	**Test Selection:**	N/A
Notes:	1120 0180-1 (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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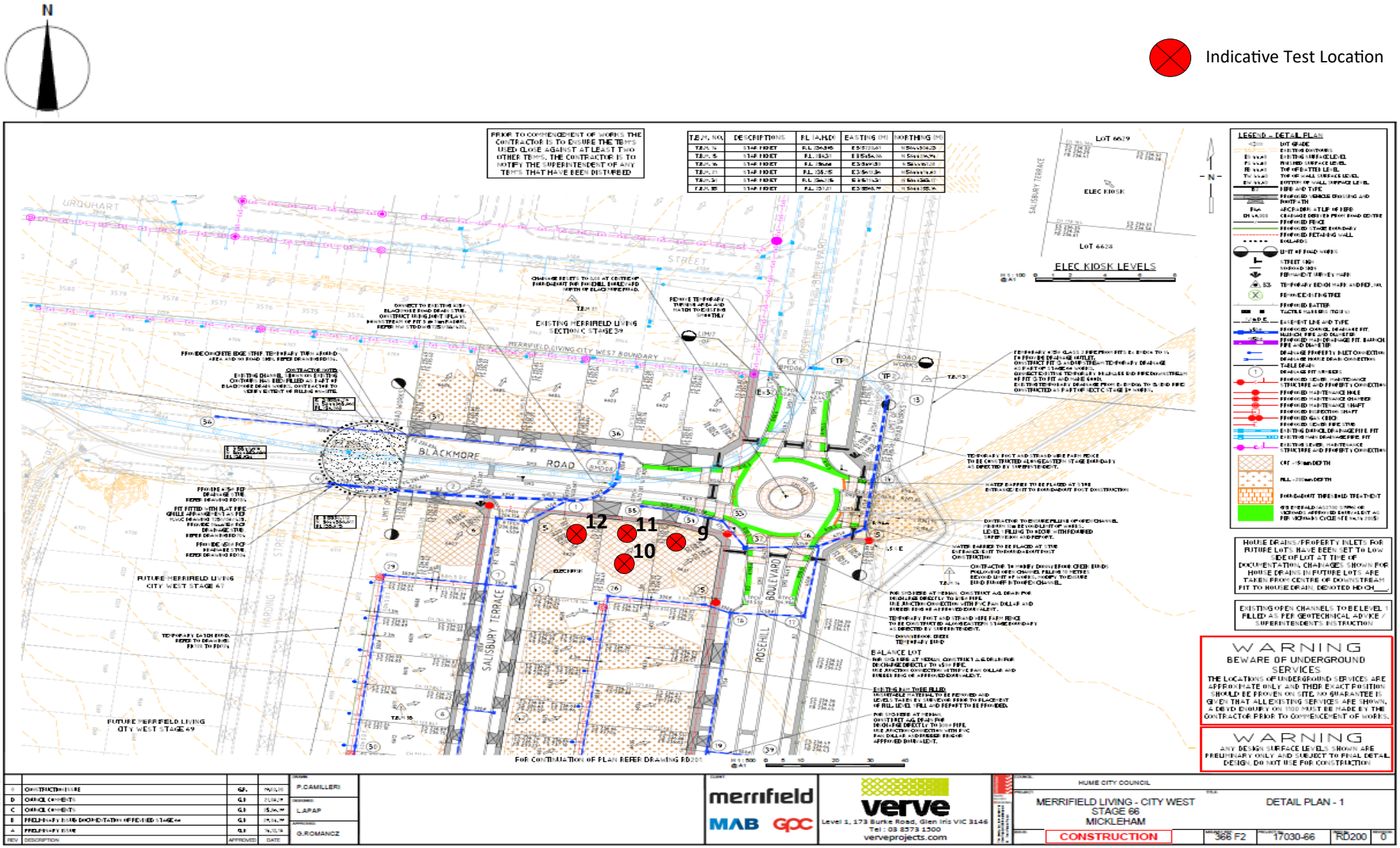
Approved Signatory:

David Burns

Date: 21/07/2020



PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**	**DATE:** **6/07/2020**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1 (SI03)**	**SITE PLAN SKETCH—NOT TO SCALE**

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Field Density Test Results
AS1289.5.7.1

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info@ayassociates.com.au

Client: BMD Urban **Job No:** BMD1200

Project: Merrifield Estate - Stage 66 **Report:** 4

Location: Mickleham

Sample No		13	14	15			
Date Tested		7/07/2020	7/07/2020	7/07/2020			
Time Tested		AM	PM	PM			
Test Location		Refer To Plan	Refer To Plan	Refer To Plan			
Level/Layer		5	6	7			
Layer Thickness	mm	300	300	300			
Test Depth	mm	275	275	275			
Field Wet Density	t/m^3	1.977	1.922	1.98			
Field Moisture Content	%	23.5	23.4	21.2			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	12.4	15.8	13.1			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	1.97	1.98	1.98			
Optimum Moisture Content	%	24	24	21.5			
Moisture Ratio	%	98	97.5	98.5			
Moisture Variation from OMC	%	-0.5 Drier	-0.5 Drier	-0.5 Drier			
Density Ratio	%	98.5	97.0	99.0			

Specification: 95% STD **Test Selection:** N/A

Notes: 1120 0180-1 (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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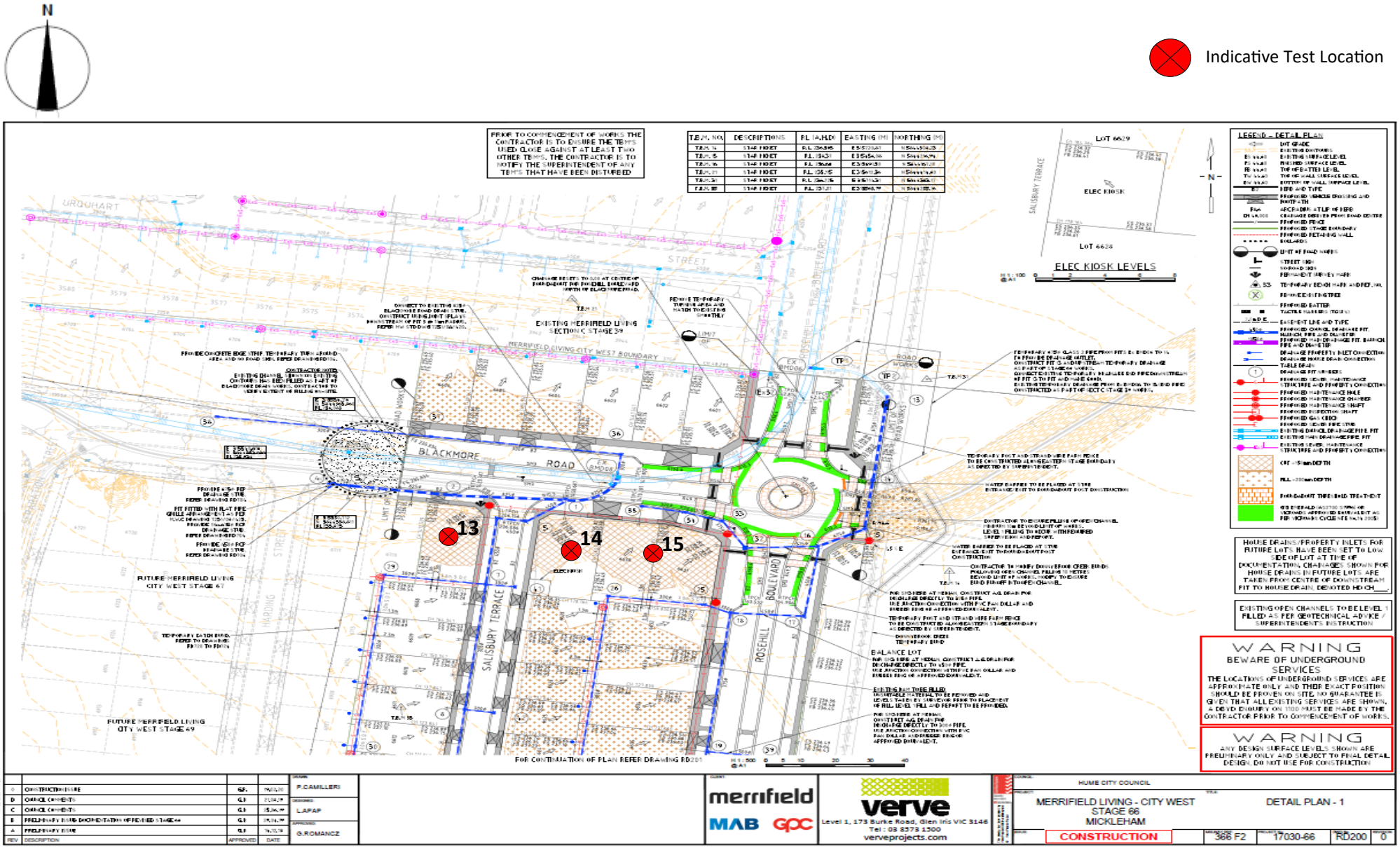
Approved Signatory:

David Burns

Date: 21/07/2020



PROJECT: Merrifield Estate—Stage 66	**CLIENT:** BMD Urban	**DATE:** 7/07/2020
LOCATION: Mickleham	**PROJECT NO:** 1120 0180–1 (SI04)	**SITE PLAN SKETCH—NOT TO SCALE**

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Field Density Test Results
AS1289.5.7.1

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Client:	BMD Urban			**Job No:**	BMD1200	
Project:	Merrifield Estate - Stage 66			**Report:**	5	
Location:	Mickleham					

Sample No		16	17	18			
Date Tested		5/08/2020	5/08/2020	5/08/2020			
Time Tested		AM	AM	AM			
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	1.967	1.952	2.003			
Field Moisture Content	%	20.3	19.7	23.3			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	18.0	12.2	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	1.95	1.98	1.98			
Optimum Moisture Content	%	21	20.5	24			
Moisture Ratio	%	96.5	96	97			
Moisture Variation from OMC	%	-0.5 Drier	-0.5 Drier	-0.5 Drier			
Density Ratio	%	100.0	98.5	101.5			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	1120 0180-1 (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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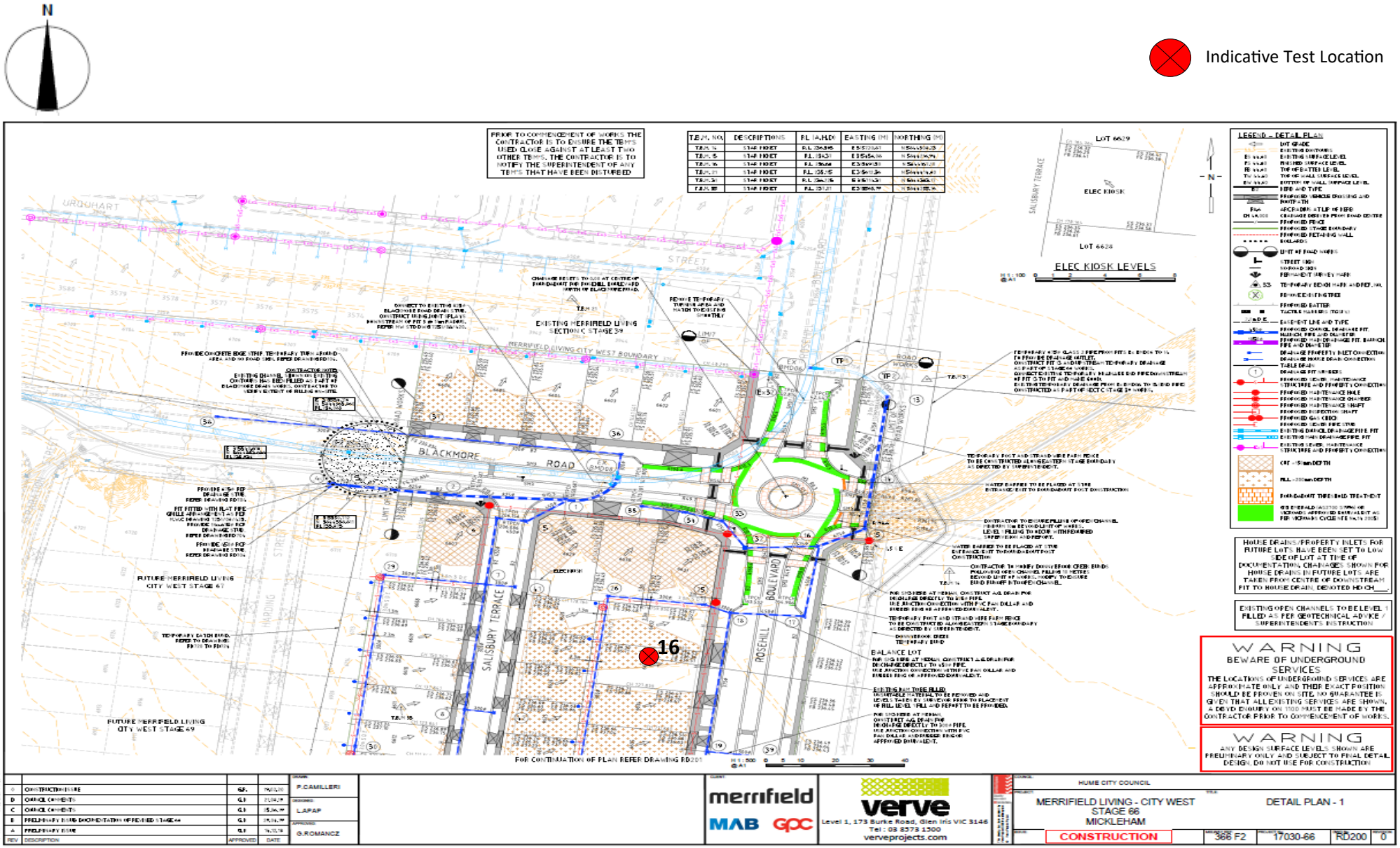
Approved Signatory:

David Burns

Date: 10/08/2020



PROJECT: Merrifield Estate—Stage 66	**CLIENT:** BMD Urban
DATE: 5/08/2020	
LOCATION: Mickleham	**PROJECT NO:** 1120 0180–1 (SI05)
SITE PLAN SKETCH—NOT TO SCALE	

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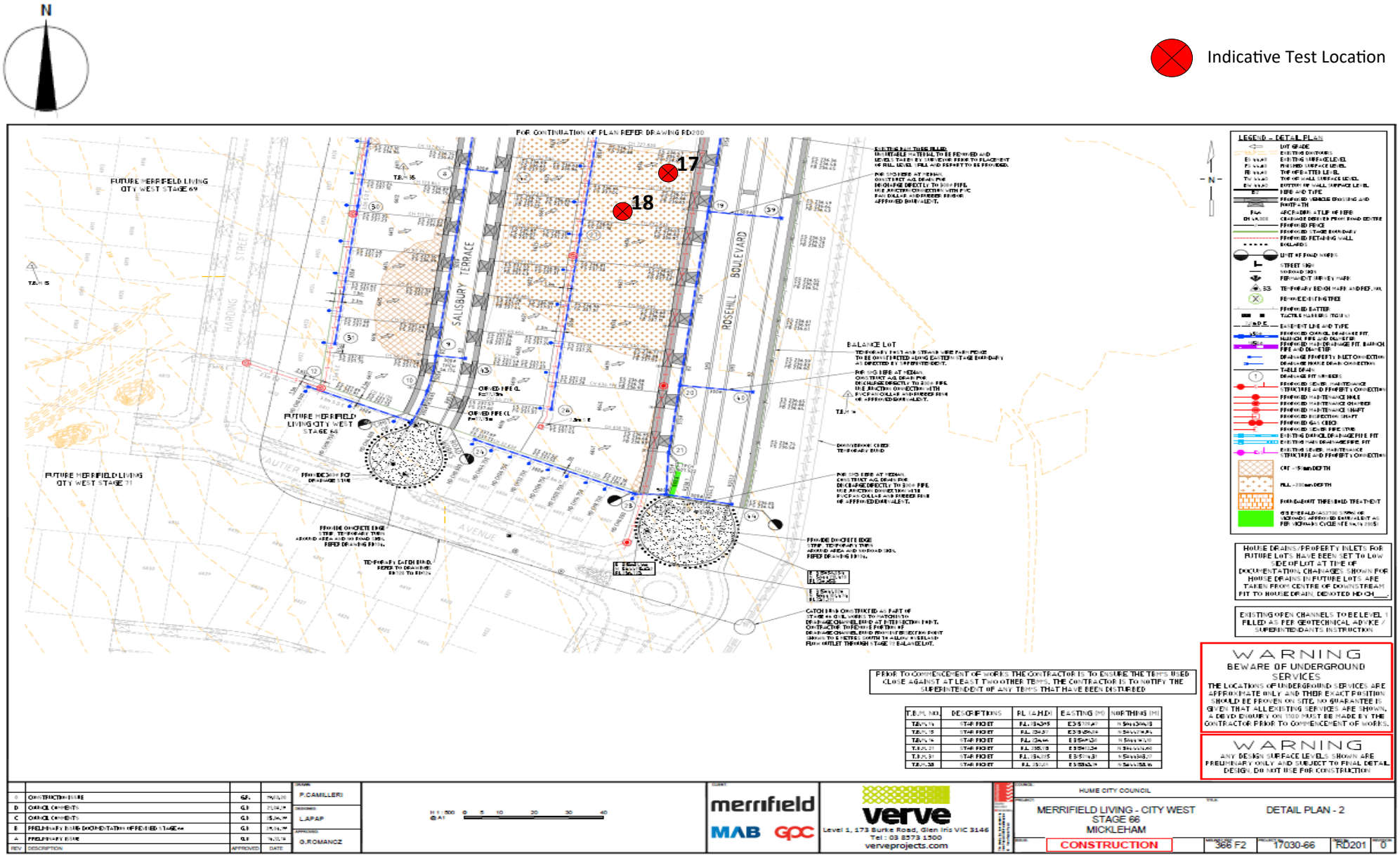

PROJECT: **Merrifield Estate—Stage 66**	**CLIENT:** **BMD Urban**	**DATE:** **5/08/2020**
LOCATION: **Mickleham**	**PROJECT NO:** **1120 0180–1 (SI05)**	**SITE PLAN SKETCH—NOT TO SCALE**

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