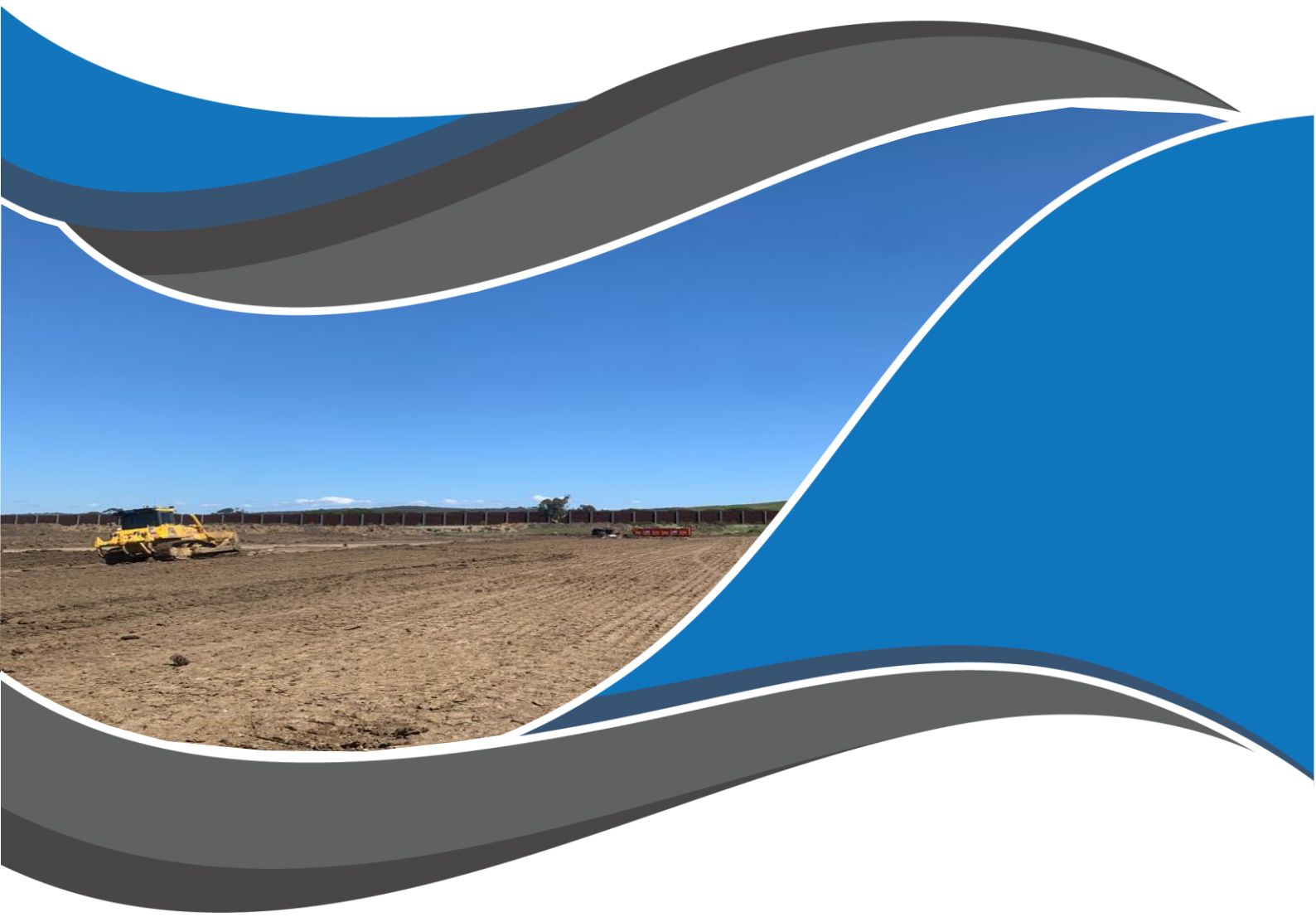
Wallara Waters Estate, Wallan - Stage 15

Level 1 Inspection & Testing Report

Reference: 1120 0284-1



Prepared for:

Bitu-Mill

March 2022

A&Y ASSOCIATES

GEOTECHNICAL ENGINEERING CONSULTANTS

Document Control Record

Prepared by:
A&Y Associates Pty Ltd
ABN 92 614 244 665
5/16 Network Drive
Truganina, VIC 3029
T: (03) 8754 8325
E: info@ayassociates.com.au
W: www.ayassociates.com.au

Document control

Report title		Level 1 Inspection & Testing			
Project reference number		1120 0284-1			
Client		Bitu-Mill			
Contact name		Tristan Walton			
Contact number		0408 776 514			
Contact e-mail		tristan.walton@bild.group			
Revision	**Date**	**Descriptions/Status**	**Author**	**Reviewer**	**Approver**
0	**9/03/2022**	**Final**	**B Mu**	**A Tan**	**A Tan**

Approver

Alvin Tan
(BE Civil and Infrastructure), MIEAust
Senior Geotechnical Engineer
E: alvin@ayassociates.com.au | M: 0449 288 338

ENGINEERS
AUSTRALIA
Professional Engineer
MEMBER

Disclaimer

The findings and conclusions contained in this report are made based on site conditions that existed at the time this work was conducted. The conclusions present in this report are relevant to the conditions of the site and the state of legislation currently enacted as at the date of this report.

Findings and conclusions are made assuming that the soil, groundwater, geological and chemical conditions detailed within this report are accurate and remain applicable to the site at the time of writing. No other warranties are made or intended.

A&Y Associates (A&Y) Pty Ltd has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality.

A&Y does not make any representation or warranty that the conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the conclusions contained in this report.

This report has been prepared exclusively for use by our client. This report cannot be reproduced without the written authorisation of A&Y and then can only be reproduced in its entirety.

Applicability

This report has been prepared for the benefit for 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 if it is altered in any way, or not reproduced in full.

Contents

1 Introduction

This report presents the results of the Level 1 Inspection and Testing for the construction of the fill platforms located in Wallara Waters Estate, Wallan - Stage 15.

2 Project Summary

It is understood that Bitu-Mill required the fill platforms within Wallara Waters Estate, Wallan - Stage 15 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 13 working days from the **7th October 2021 to 30th November 2021**.

This report is applicable for fill placed by Bitu-Mill for the following lots located in Wallara Waters Estate, Wallan - Stage 15, as shown in Appendix A – Site Plan.

- Lot 1501 to 1514
- Lot 1516 to 1549

3 Project Specifications

No specification on the compaction and moisture requirement has been provided for the construction works in Wallara Waters Estate, Wallan - Stage 15. However, based on drawing (ref: 20569/15E-Ver C prepared by Reeds Consulting PTY LTD) all filling on lots and within road reserves greater than 200mm is to be undertaken under level 1 supervision in accordance with AS3798. The supervision and inspections were performed based on AS3798. A short summary of the requirements outline in AS3798 is provided below:

- 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 was undertaken over five (5) working days from 7th October 2021 to 30th November 2021 as mentioned in report *1120 0284-1 (SSI1)*.

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 fill thickness placed is approximately 200-600mm. The fill layers or thickness nominated in this report are provided as a guide on the amounts of fill placed and do not necessarily reflect an accurate survey of the fill levels.

6 Fill Material

The fill material used for the platform consisted of site derived material. The material was predominantly comprised of Silty Clay with some gravels.

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).

Tests were performed using a 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 tests per day's production based on the minimum requirements of AS 3798-2007 and taken from each layer of fill placed.

A total of 39 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 39 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 Finished Surface Levels

It should be noted that even though the final fill layer meets the specification requirements, over time, the material may be subject to adverse weather conditions resulting in either surface softening or drying and cracking. The top 150mm – 200mm of the fill will deteriorate with time and should be considered by the foundation engineer.

9 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.

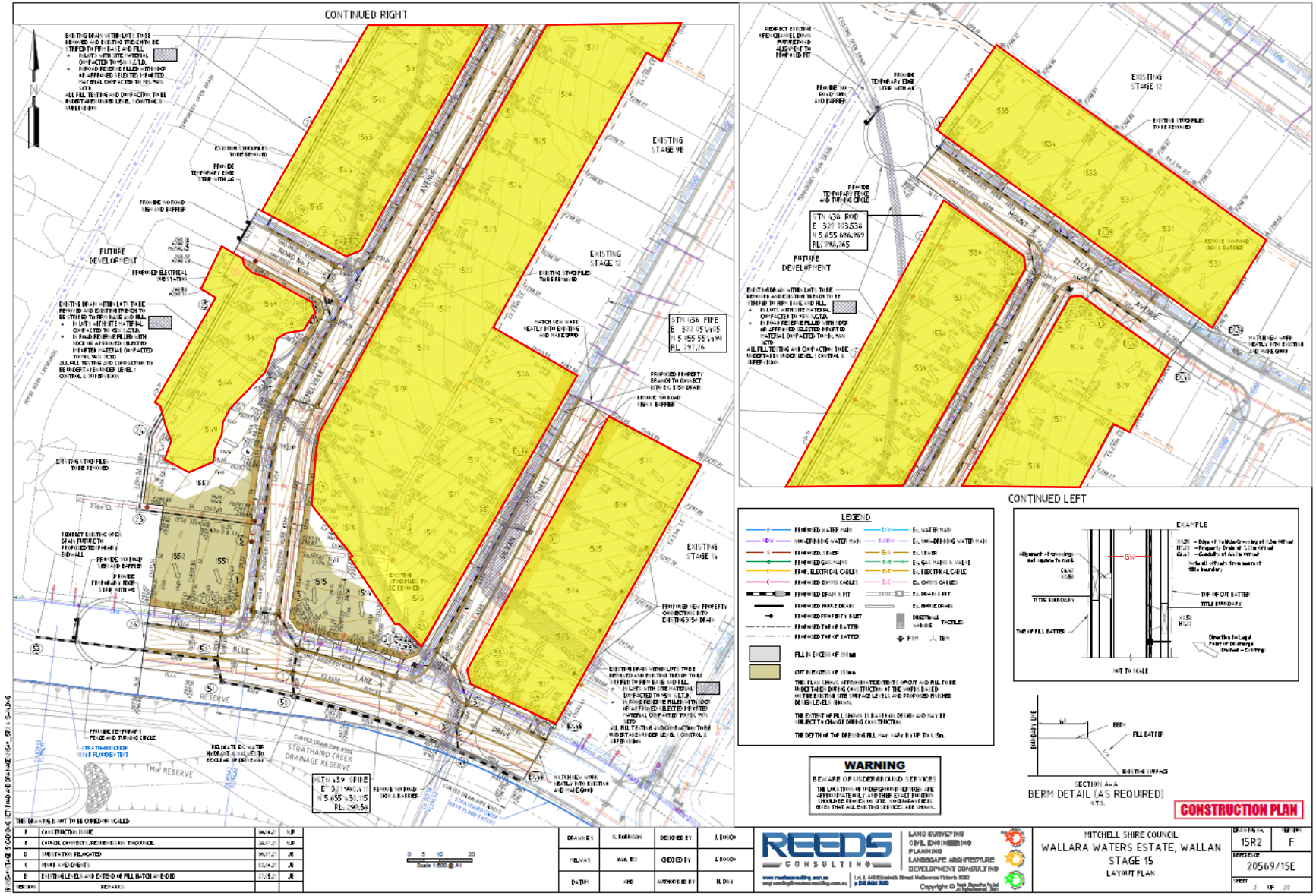
- Any trenches excavated and backfilled on site for the installation of underground services such as sewers, electrical conduits, water mains etc.
- Footpaths in front of the lots that may be excavated and filled after the Level 1 supervision conducted by A&Y Associates.
- Uncontrolled fill and topsoil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

10 Conclusion

On the completion of the earthworks and after analysing the materials used, it has been concluded that the filling procedure conducted by Bitu-Mill 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.

Appendix A - Site Plan

Area Inspected and Tested



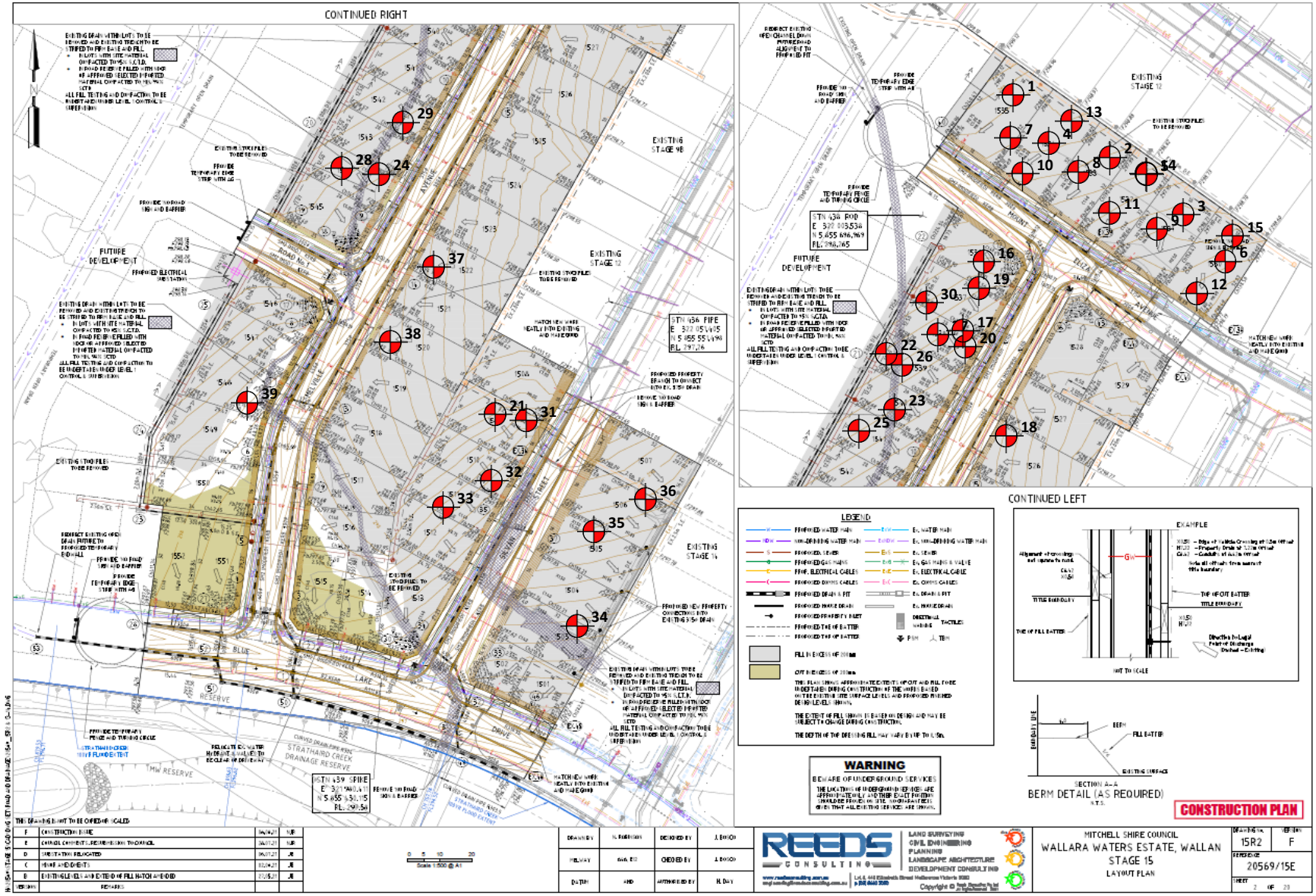
PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
LOCATION: Wallan	**PROJECT No:** 1120 0284-1

SITE PLAN SKETCH—NOT TO SCALE

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Appendix B – Test Locations

Indicative Test Location



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
LOCATION: Wallan	**PROJECT No:** 1120 0284-1

SITE PLAN SKETCH—NOT TO SCALE

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Appendix C – Test Results Summary

Project No	1120 0284-1				Client	Bitu-mill				
Project Name	Wallara Waters Estate, Stage 15 (Level 1)				Specification			Density Ratio ≥ 95% of Peak Wet Density		
Location	Wallen									
Test No	Retest of Test	Date	Location	Layer	Oversize	Density Ratio	Moisture Ratio	Moisture Variation	Pass / Fail	Retest
#	#		Lot #	#	%	%	%	%		Pass / Fail
1	-	7/10/2021	-	1	0.0	96.5	98.5	-0.5	Pass	-
2	-	7/10/2021	-	1	0.0	96.5	99.0	0.0	Pass	-
3	-	7/10/2021	-	1	0.0	100.5	100.5	0.0	Pass	-
4	-	8/10/2021	-	1	12.3	99.5	100.0	0.0	Pass	-
5	-	8/10/2021	-	1	0.0	97.5	99.5	0.0	Pass	-
6	-	8/10/2021	-	1	0.0	96.5	101.5	0.0	Pass	-
7	-	9/10/2021	-	2	0.0	97.5	102.5	0.5	Pass	-
8	-	9/10/2021	-	2	0.0	97.5	99.5	0.0	Pass	-
9	-	9/10/2021	-	2	0.0	96.5	99.0	0.0	Pass	-
10	-	11/10/2021	-	3	0.0	98.5	99.5	-0.5	Pass	-
11	-	11/10/2021	-	3	0.0	98.5	100.5	0.0	Pass	-
12	-	11/10/2021	-	3	10.5	99.0	102.0	0.5	Pass	-
13	-	12/10/2021	-	FSL	6.3	95.0	98.0	-0.5	Pass	-
14	-	12/10/2021	-	FSL	6.9	95.0	98.5	-0.5	Pass	-
15	-	12/10/2021	-	FSL	7.5	95.0	97.5	-0.5	Pass	-
16	-	13/10/2021	-	1	6.0	96.0	88.0	-2.5	Pass	-
17	-	13/10/2021	-	1	6.5	97.0	89.5	-3.0	Pass	-
18	-	13/10/2021	-	1	6.3	98.5	87.5	-3.0	Pass	-
19	-	18/10/2021	-	2	5.1	96.5	90.5	-2.5	Pass	-
20	-	18/10/2021	-	2	6.5	97.0	87.5	-3.0	Pass	-
21	-	18/10/2021	-	1	6.3	98.5	86.0	-3.0	Pass	-
22	-	20/10/2021	-	1	5.9	95.5	88.0	-3.0	Pass	-
23	-	20/10/2021	-	1	5.0	97.0	89.5	-3.0	Pass	-
24	-	20/10/2021	-	1	4.5	98.5	89.5	-3.0	Pass	-

25	-	21/10/2021	-	2	5.6	96.0	99.0	0.0	Pass	-
26	-	21/10/2021	-	3	6.4	97.5	88.5	-3.0	Pass	-
27	-	21/10/2021	-	3	6.7	97.5	91.0	-3.0	Pass	-
28	-	22/10/2021	-	FSL	5.1	97.0	88.5	-3.0	Pass	-
29	-	22/10/2021	-	FSL	6.2	95.5	99.0	-0.5	Pass	-
30	-	22/10/2021	-	FSL	6.5	95.0	89.5	-3.0	Pass	-
31	-	25/10/2021	-	FSL	6.5	96.0	88.0	-3.0	Pass	-
32	-	25/10/2021	-	FSL	6.8	97.0	87.5	-2.5	Pass	-
33	-	25/10/2021	-	FSL	6.4	98.5	87.0	-3.0	Pass	-
34	-	26/10/2021	-	FSL	5.3	96.5	90.0	-3.0	Pass	-
35	-	26/10/2021	-	FSL	5.7	97.5	89.0	-3.0	Pass	-
36	-	26/10/2021	-	FSL	5.5	97.0	89.0	-3.0	Pass	-
37	-	30/11/2021	-	FSL	6.5	98.0	98.5	-0.5	Pass	-
38	-	30/11/2021	-	FSL	5.0	96.5	96.0	-1.0	Pass	-
39	-	30/11/2021	-	FSL	6.0	95.0	98.0	-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)

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Appendix D – NATA Test Results

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	Bitu-Mill				**Job No:**	BTU1888
Project:	Wallara Waters Estate, Wallan - Stage 15 (Level 1)				**Report:**	1
Location:	Wallan					

Sample No		1	2	3			
Date Tested		7/10/2021	7/10/2021	7/10/2021			
Time Tested		PM	PM	PM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 1	Layer 1	Layer 1			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.94	1.90	1.97			
Field Moisture Content	%	16.7	16.8	17.6			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.01	1.97	1.96			
Optimum Moisture Content	%	17	17	17.5			
Moisture Ratio	%	98.5	99	100.5			
Moisture Variation from OMC	%	-0.5 Drier	0.0 OMC	0.0 OMC			
Density Ratio	%	96.5	96.5	100.5			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

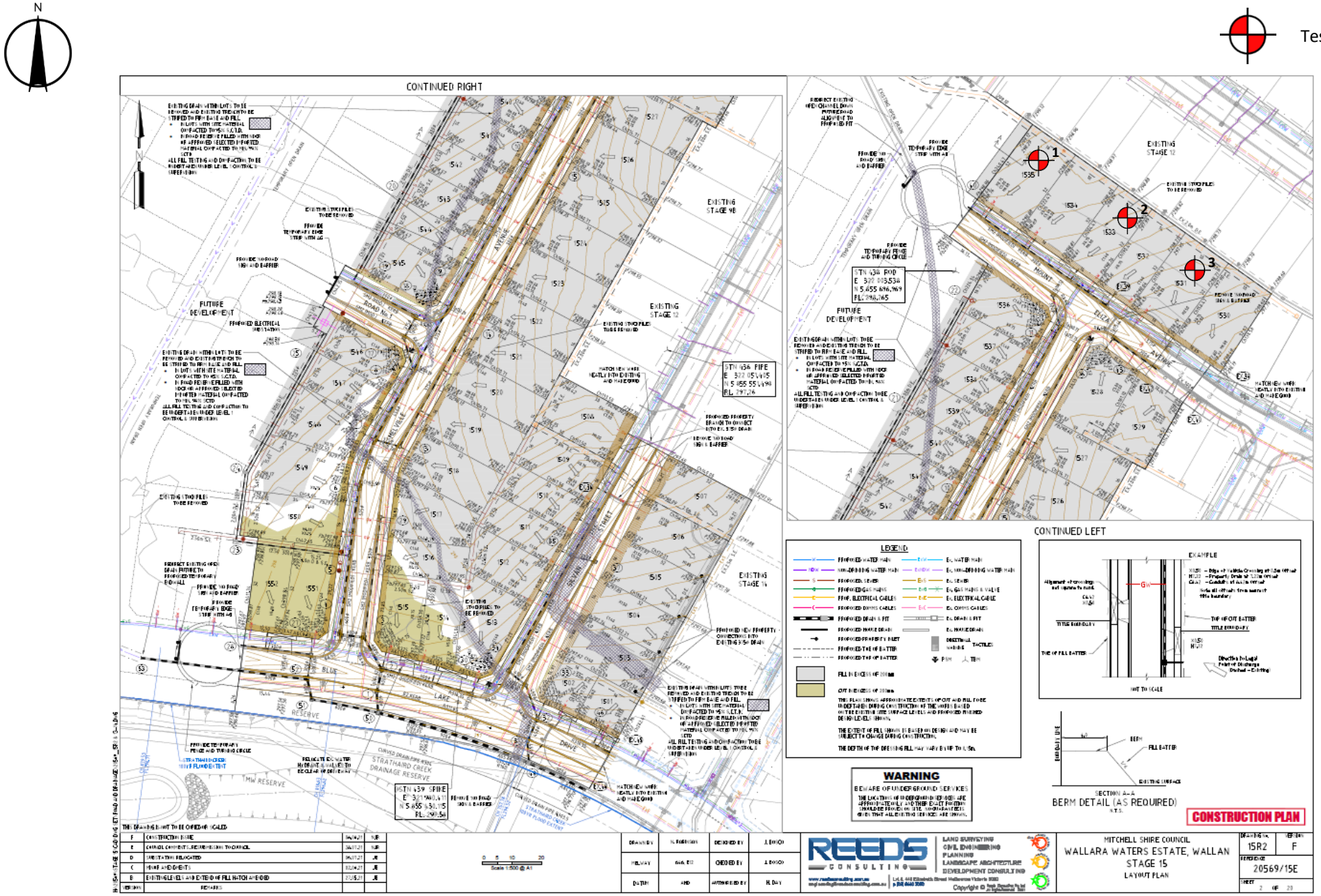
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 12/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI01)

DATE: 07/10/2021

SITE PLAN SKETCH—NOT TO SCALE

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 2

Location: Wallan

Sample No		4	5	6			
Date Tested		8/10/2021	8/10/2021	8/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 1	Layer 1	Layer 1			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	2.01	1.95	1.91			
Field Moisture Content	%	19.5	22.9	23.8			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	12.3	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	1.98	2.00	1.97			
Optimum Moisture Content	%	19.5	23	23.5			
Moisture Ratio	%	100	99.5	101.5			
Moisture Variation from OMC	%	0.0 OMC	0.0 OMC	0.0 OMC			
Density Ratio	%	99.5	97.5	96.5			

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

Notes: Ref : 1120 0284-1 (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)

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

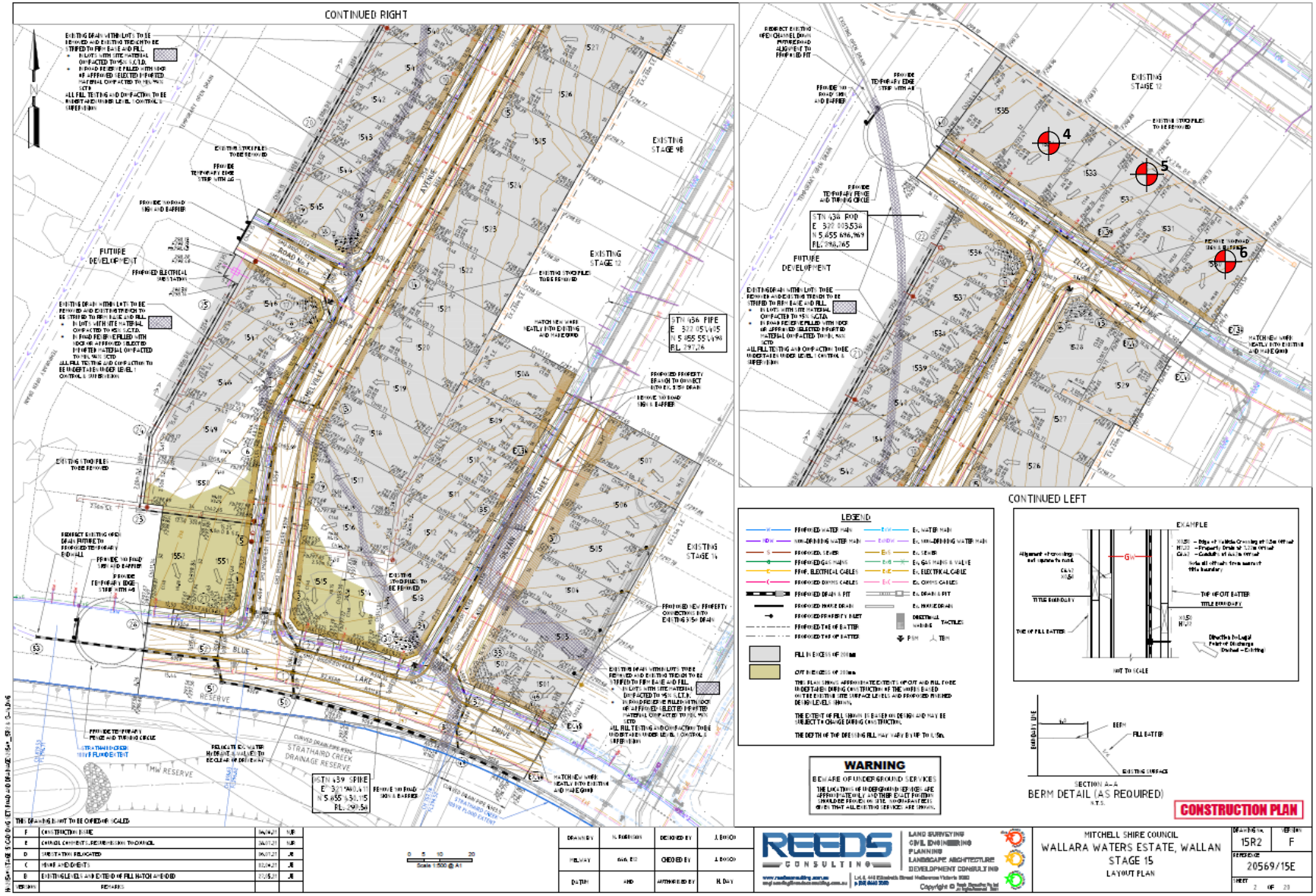
The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 12/10/2021

N

Test Location



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI02)

DATE: 08/10/2021

SITE PLAN SKETCH—NOT TO SCALE

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 3

Location: Wallan

Sample No		7	8	9			
Date Tested		9/10/2021	9/10/2021	9/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 2	Layer 2	Layer 2			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.89	1.90	1.90			
Field Moisture Content	%	23.1	20.9	23.7			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	0.0	0.0	0.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	1.94	1.95	1.98			
Optimum Moisture Content	%	22.5	21	24			
Moisture Ratio	%	102.5	99.5	99			
Moisture Variation from OMC	%	0.5 Wetter	0.0 OMC	0.0 OMC			
Density Ratio	%	97.5	97.5	96.5			

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

Notes: Ref : 1120 0284-1 (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)

NATA
WORLD RECOGNISED ACCREDITATION

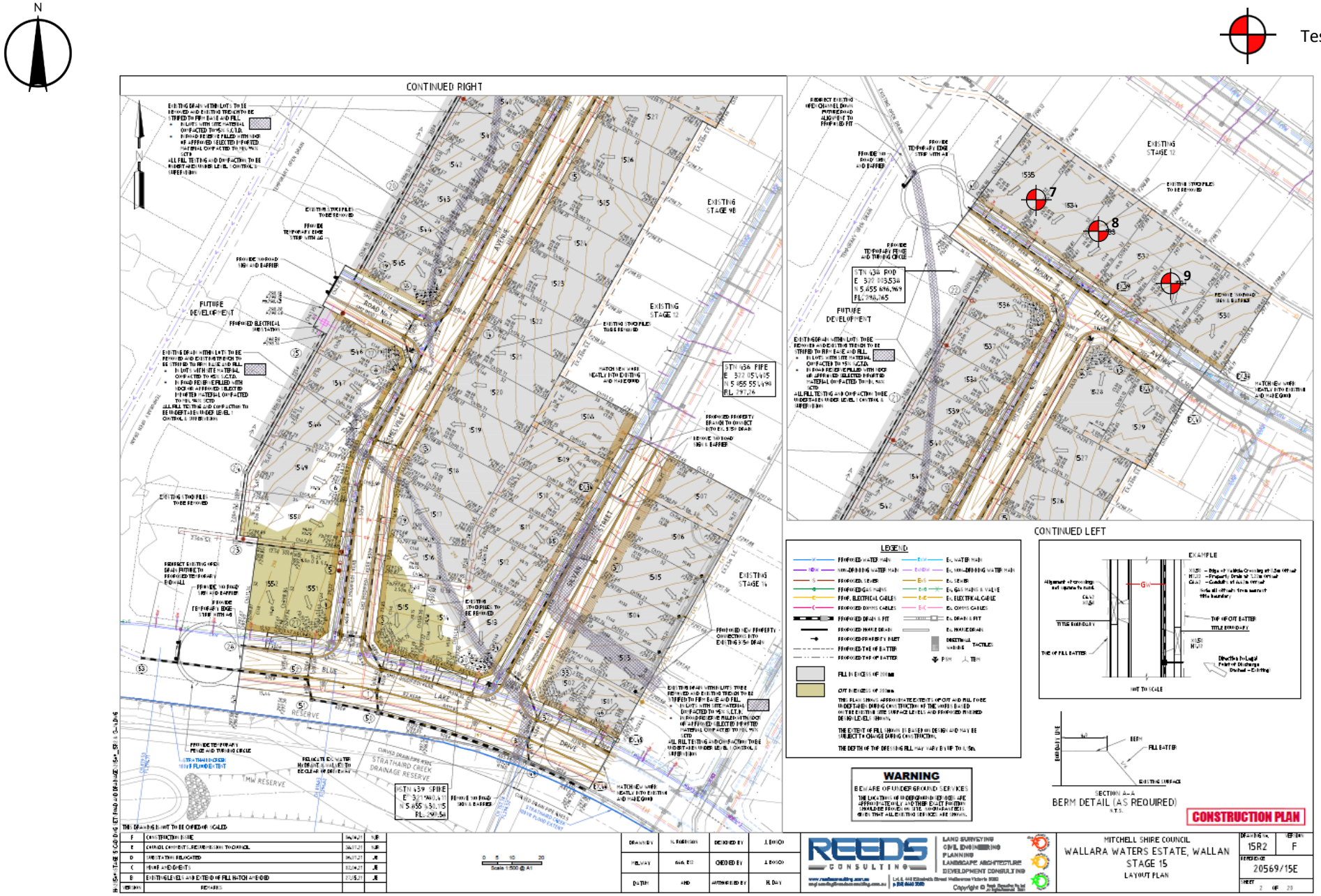
NATA Accredited Laboratory No. 20172

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

Approved Signatory: David Burns

Date: 12/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 09/10/2021
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI03)	**SITE PLAN SKETCH—NOT TO SCALE**

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 4

Location: Wallan

Sample No		10	11	12			
Date Tested		11/10/2021	11/10/2021	11/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 3	Layer 3	Layer 3			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.98	1.99	2.01			
Field Moisture Content	%	20.8	18.1	23.4			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	0.0	0.0	10.5			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.01	2.02	2.00			
Optimum Moisture Content	%	21	18	23			
Moisture Ratio	%	99.5	100.5	102			
Moisture Variation from OMC	%	-0.5 Drier	0.0 OMC	0.5 Wetter			
Density Ratio	%	98.5	98.5	99.0			

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

Notes: Ref : 1120 0284-1 (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)

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

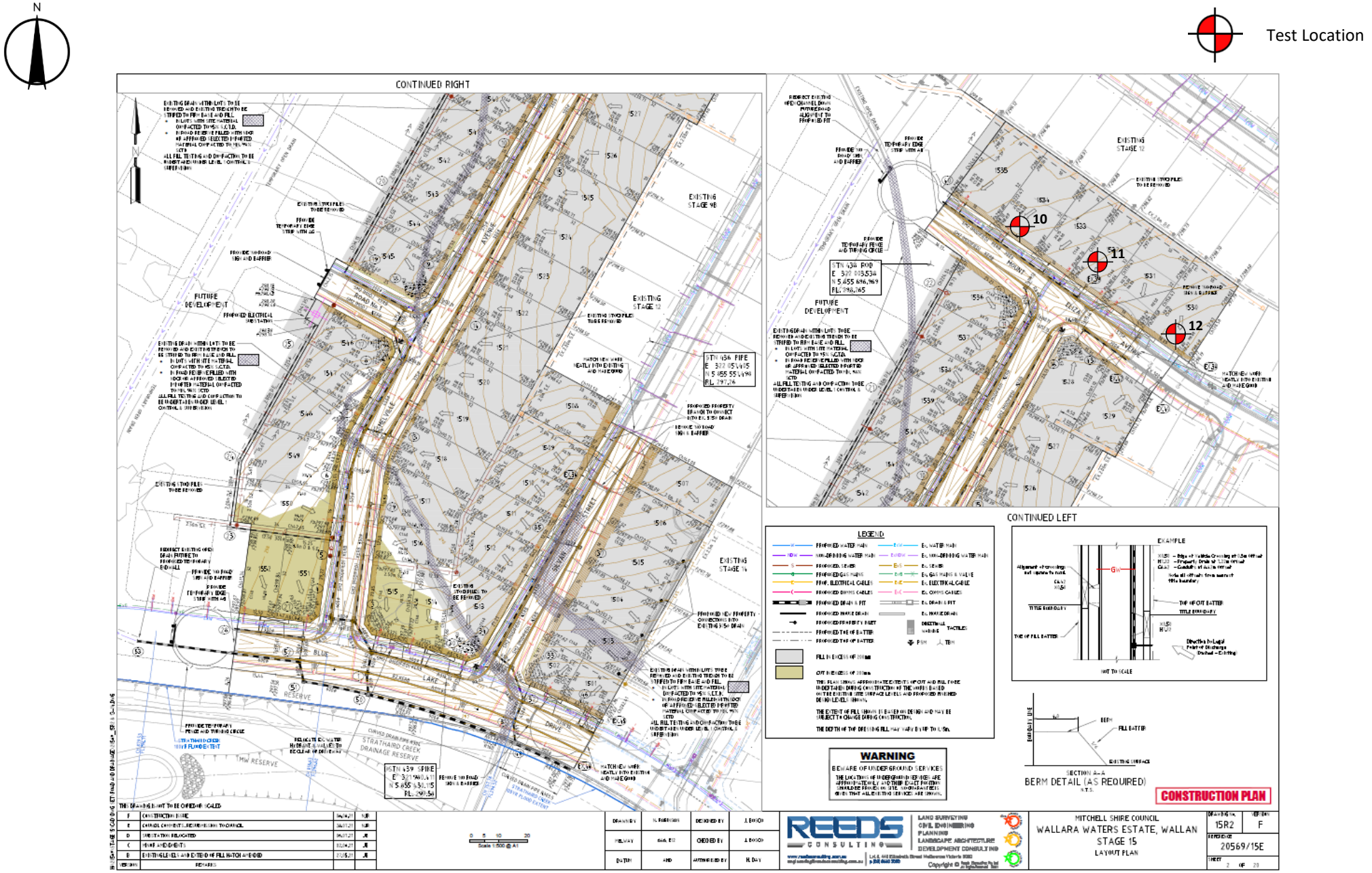
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 12/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
DATE: 11/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI04)
SITE PLAN SKETCH—NOT TO SCALE	

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:		Bitu-Mill			**Job No:**	BTU1888	
Project:		Wallara Waters Estate, Wallan - Stage 15 (Level 1)			**Report:**	5	
Location:		Wallan					
Sample No		13	14	15			
Date Tested		12/10/2021	12/10/2021	12/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		FSL	FSL	FSL			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.98	1.96	1.99			
Field Moisture Content	%	24.5	24.1	25.8			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	6.3	6.9	7.5			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.06	2.05	2.08			
Optimum Moisture Content	%	25	24.5	26.5			
Moisture Ratio	%	98	98.5	97.5			
Moisture Variation from OMC	%	-0.5 Drier	-0.5 Drier	-0.5 Drier			
Density Ratio	%	95.0	95.0	95.0			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (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)

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

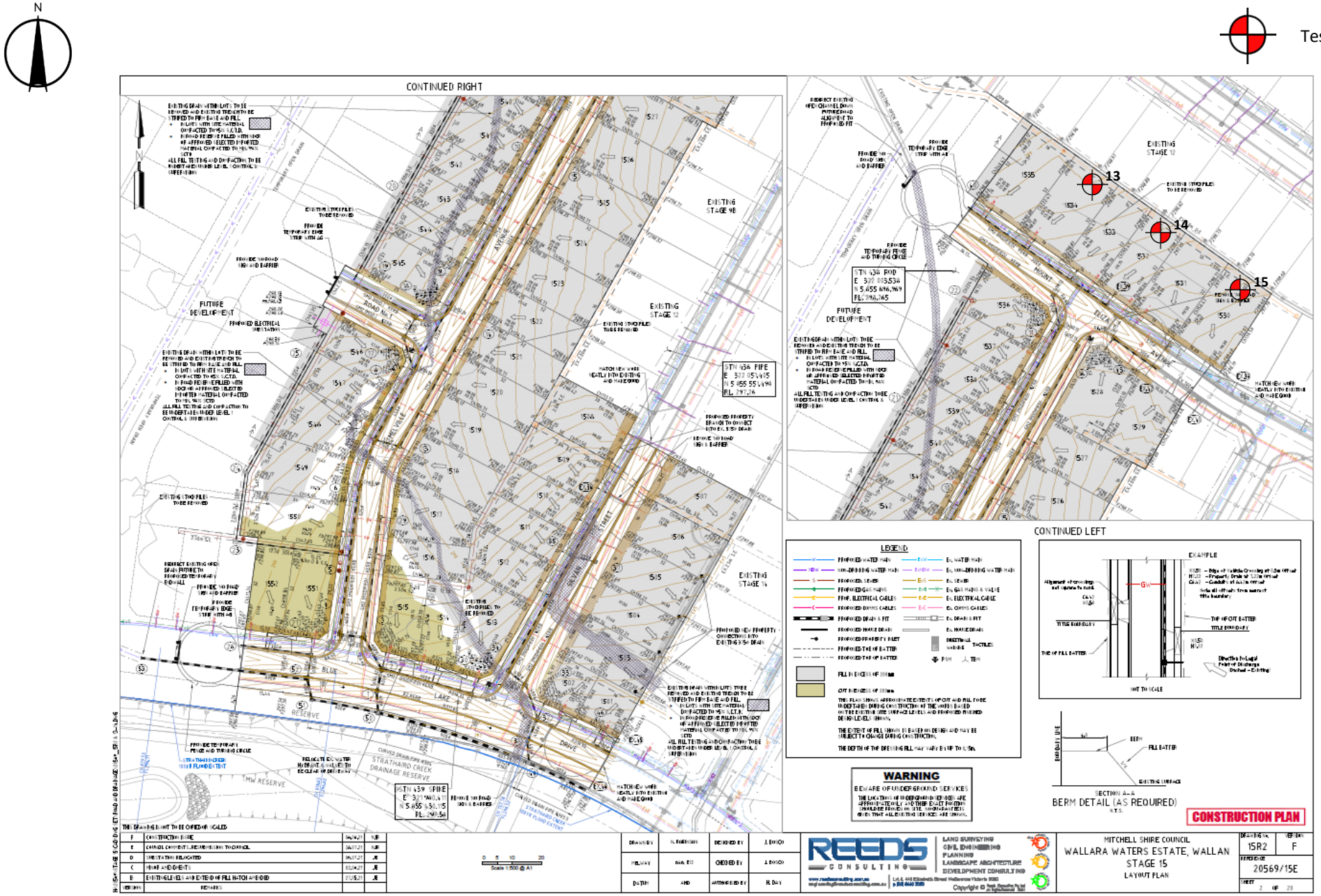
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 13/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 12/10/2021
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI05)	**SITE PLAN SKETCH—NOT TO SCALE**

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 6

Location: Wallan

Sample No		16	17	18			
Date Tested		13/10/2021	13/10/2021	13/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		1	1	2			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	2.00	1.99	2.00			
Field Moisture Content	%	20.7	25.9	21.0			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	6.0	6.5	6.3			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.08	2.04	2.01			
Optimum Moisture Content	%	23.5	29	24			
Moisture Ratio	%	88	89.5	87.5			
Moisture Variation from OMC	%	-2.5 Drier	-3.0 Drier	-3.0 Drier			
Density Ratio	%	96.0	97.0	98.5			

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

Notes: Ref : 1120 0284-1 (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)

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

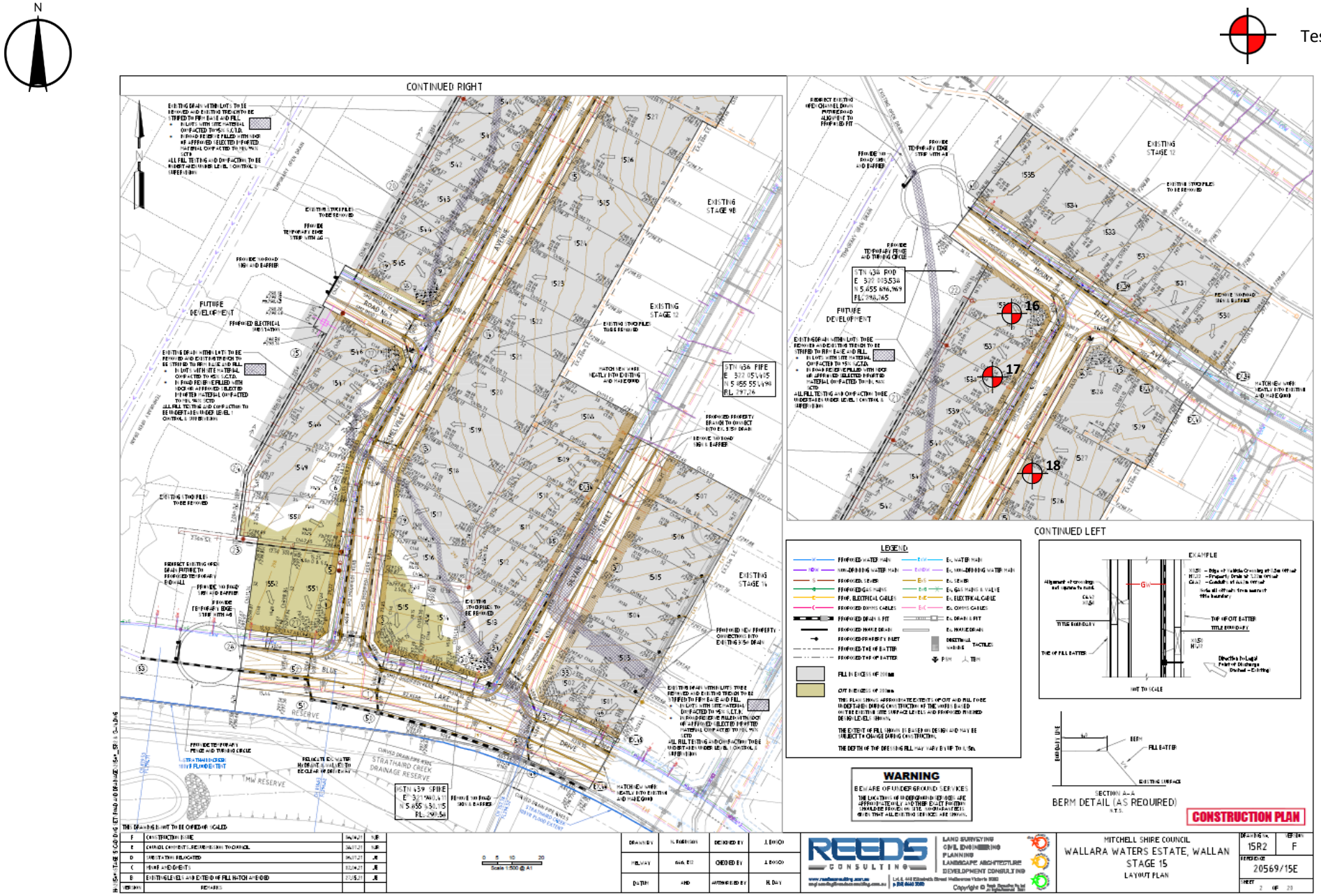
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 14/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 13/10/2021
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI06)	**SITE PLAN SKETCH—NOT TO SCALE**

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	Bitu-Mill	**Job No:**	BTU1888
Project:	Wallara Waters Estate, Wallan - Stage 15 (Level 1)	**Report:**	7
Location:	Wallan		

Sample No		19	20	21			
Date Tested		18/10/2021	18/10/2021	18/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 2	Layer 2	Layer 1			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.96	2.00	1.96			
Field Moisture Content	%	25.3	22.3	19.3			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	5.1	6.5	6.3			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.02	2.05	1.98			
Optimum Moisture Content	%	28	25.5	22.5			
Moisture Ratio	%	90.5	87.5	86			
Moisture Variation from OMC	%	-2.5 Drier	-3.0 Drier	-3.0 Drier			
Density Ratio	%	96.5	97.0	98.5			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (SI07)		
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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

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

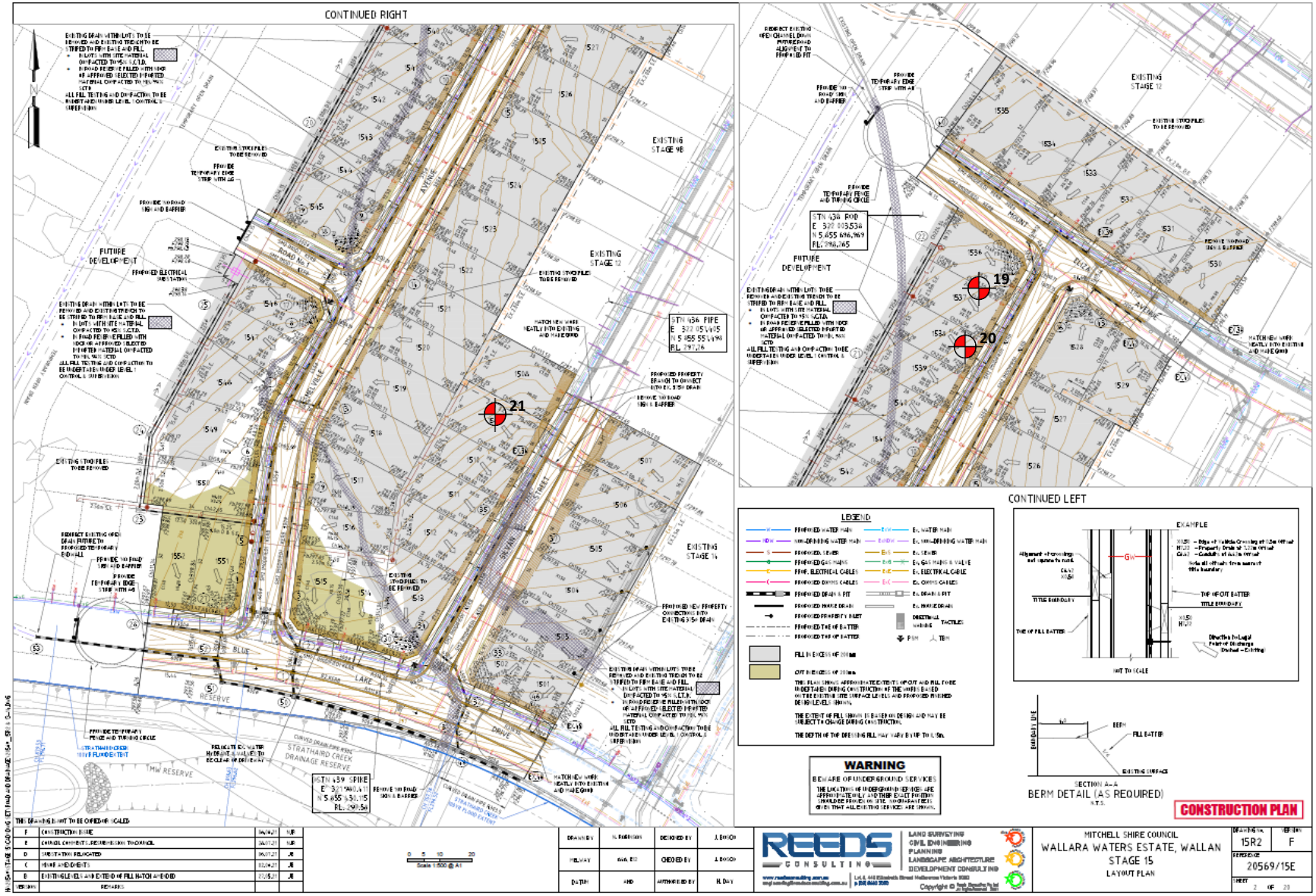
Approved Signatory:

David Burns

Date: 20/10/2021

N

Test Location



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
DATE: 18/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI07)
SITE PLAN SKETCH—NOT TO SCALE	

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 8

Location: Wallan

Sample No		22	23	24			
Date Tested		20/10/2021	20/10/2021	20/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 1	Layer 1	Layer 1			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.94	1.95	1.88			
Field Moisture Content	%	24.3	25.5	27.8			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	5.9	5.0	4.5			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.01	2.00	1.89			
Optimum Moisture Content	%	27.5	28.5	31			
Moisture Ratio	%	88	89.5	89.5			
Moisture Variation from OMC	%	-3.0 Drier	-3.0 Drier	-3.0 Drier			
Density Ratio	%	95.5	97.0	98.5			

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

Notes: Ref : 1120 0284-1 (SI08)

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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

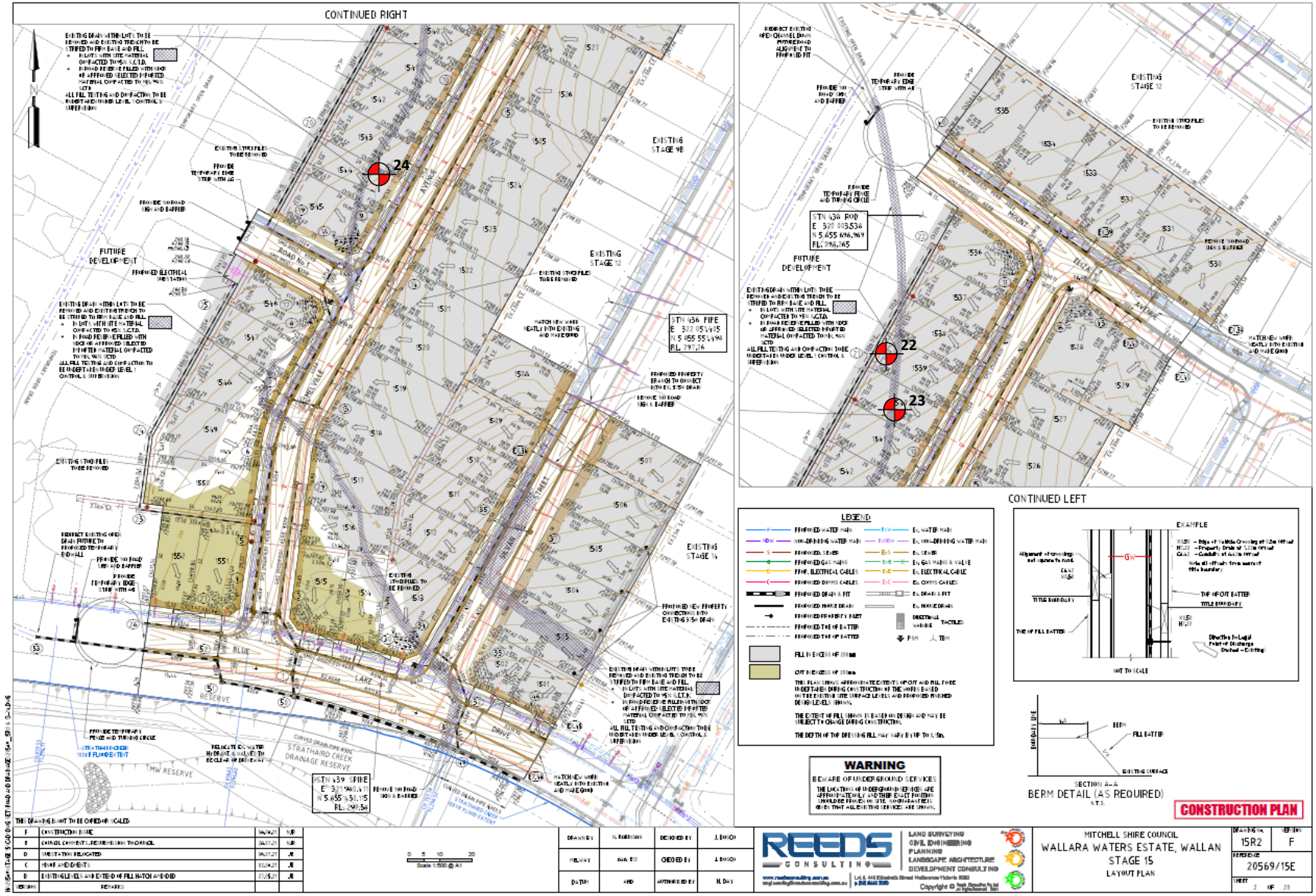
The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 21/10/2021

N

Test Location



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
DATE: 20/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI08)
SITE PLAN SKETCH—NOT TO SCALE	

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 9

Location: Wallan

Sample No		25	26	27			
Date Tested		21/10/2021	21/10/2021	21/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		Layer 2	Layer 3	Layer 3			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.97	1.99	1.94			
Field Moisture Content	%	26.2	23.0	29.1			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	5.6	6.4	6.7			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.04	2.02	1.97			
Optimum Moisture Content	%	26.5	26	32			
Moisture Ratio	%	99	88.5	91			
Moisture Variation from OMC	%	0.0 OMC	-3.0 Drier	-3.0 Drier			
Density Ratio	%	96.0	97.5	97.5			

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

Notes: Ref : 1120 0284-1 (SI09)

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
WORLD RECOGNISED ACCREDITATION

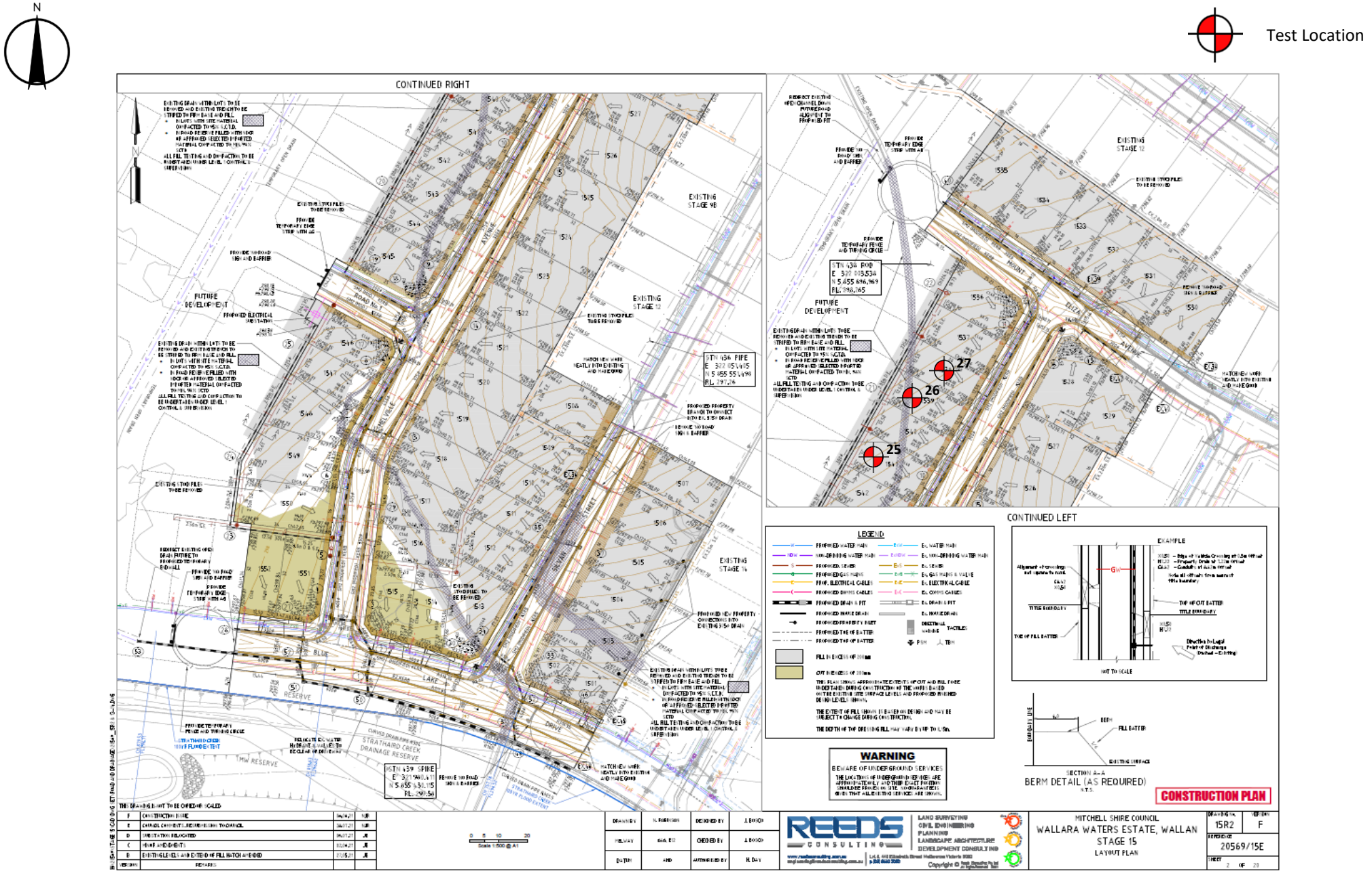
NATA Accredited Laboratory No. 20172

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

Approved Signatory: David Burns

Date: 22/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 21/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI09)	**SITE PLAN SKETCH—NOT TO SCALE**	A&Y ASSOCIATES GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	Bitu-Mill				**Job No:**	BTU1888
Project:	Wallara Waters Estate, Wallan - Stage 15 (Level 1)				**Report:**	10
Location:	Wallan					

Sample No		28	29	30			
Date Tested		22/10/2021	22/10/2021	22/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		FSL	FSL	FSL			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.99	1.98	1.91			
Field Moisture Content	%	24.3	26.7	27.8			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	5.1	6.2	6.5			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.05	2.05	1.99			
Optimum Moisture Content	%	27.5	27	31			
Moisture Ratio	%	88.5	99	89.5			
Moisture Variation from OMC	%	-3.0 Drier	-0.5 Drier	-3.0 Drier			
Density Ratio	%	97.0	95.5	95.0			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (SI10)		
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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

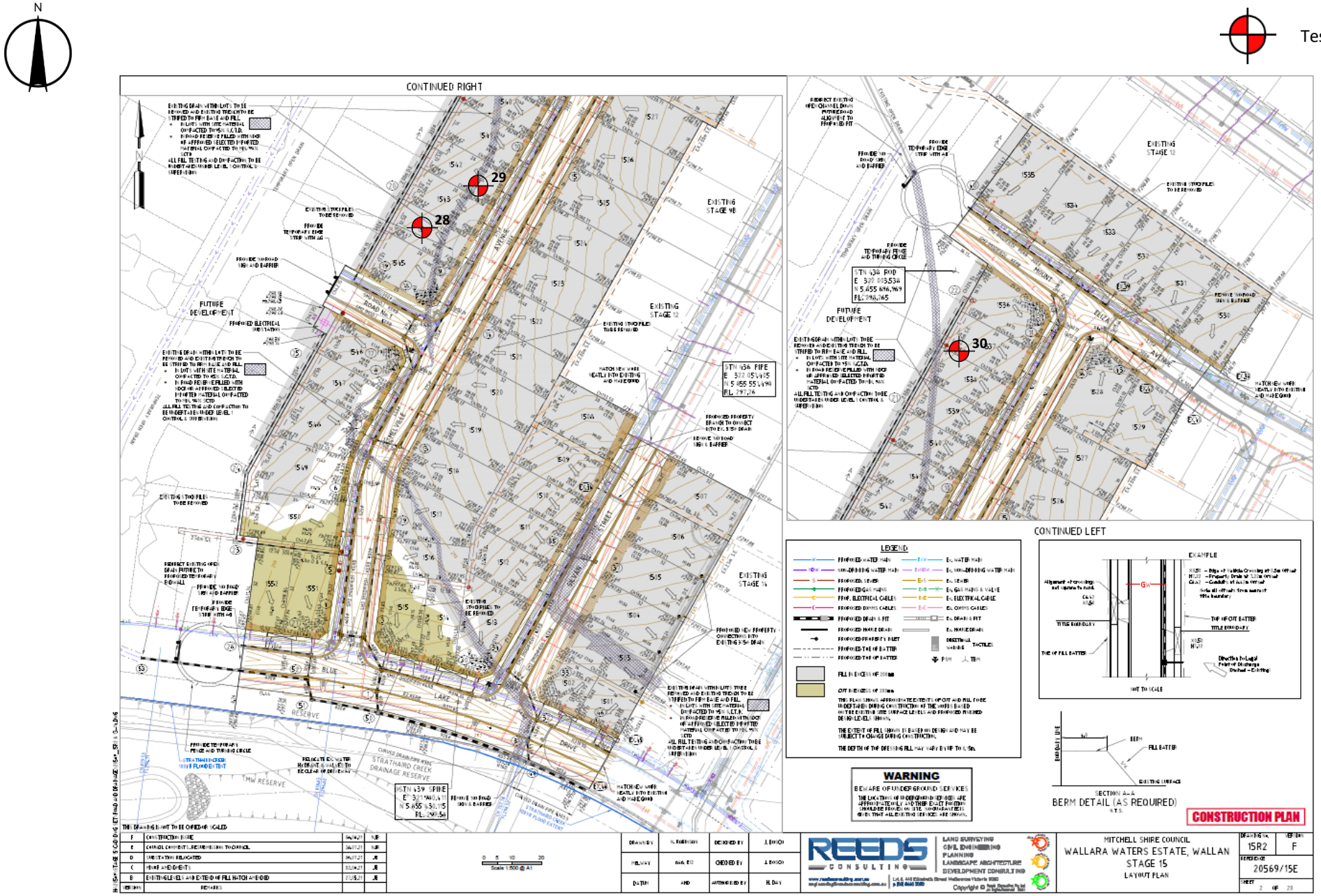
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 25/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
DATE: 22/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI10)
SITE PLAN SKETCH—NOT TO SCALE	

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	Bitu-Mill				**Job No:**	BTU1888
Project:	Wallara Waters Estate, Wallan - Stage 15 (Level 1)				**Report:**	11
Location:	Wallan					

Sample No		31	32	33			
Date Tested		25/10/2021	25/10/2021	25/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		FSL	FSL	FSL			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	2.06	2.08	2.03			
Field Moisture Content	%	22.1	21.1	20.9			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	6.5	6.8	6.4			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.14	2.12	2.05			
Optimum Moisture Content	%	25	24	24			
Moisture Ratio	%	88	87.5	87			
Moisture Variation from OMC	%	-3.0 Drier	-2.5 Drier	-3.0 Drier			
Density Ratio	%	96.0	97.0	98.5			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (SI11)		
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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

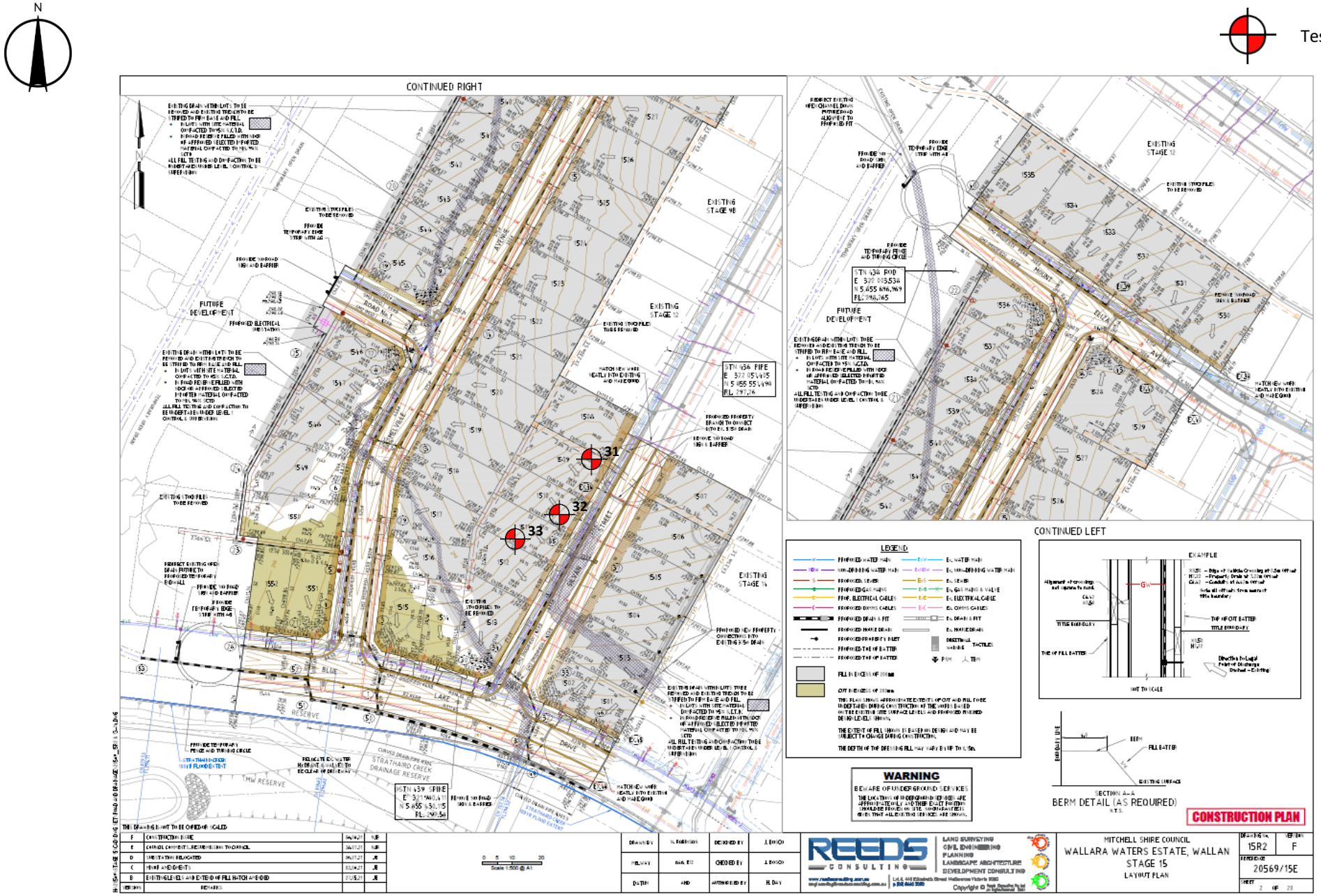
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 26/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill
DATE: 25/10/2021	
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI11)
SITE PLAN SKETCH—NOT TO SCALE	

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	Bitu-Mill				**Job No:**	BTU1888
Project:	Wallara Waters Estate, Wallan - Stage 15 (Level 1)				**Report:**	12
Location:	Wallan					

Sample No		34	35	36			
Date Tested		26/10/2021	26/10/2021	26/10/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		FSL	FSL	FSL			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	1.99	1.99	1.99			
Field Moisture Content	%	26.1	25.4	23.6			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	5.3	5.7	5.5			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.04	2.03	2.03			
Optimum Moisture Content	%	29	28.5	26.5			
Moisture Ratio	%	90	89	89			
Moisture Variation from OMC	%	-3.0 Drier	-3.0 Drier	-3.0 Drier			
Density Ratio	%	96.5	97.5	97.0			

Specification:	95% STD	**Test Selection:**	N/A
Notes:	Ref : 1120 0284-1 (SI12)		
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
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

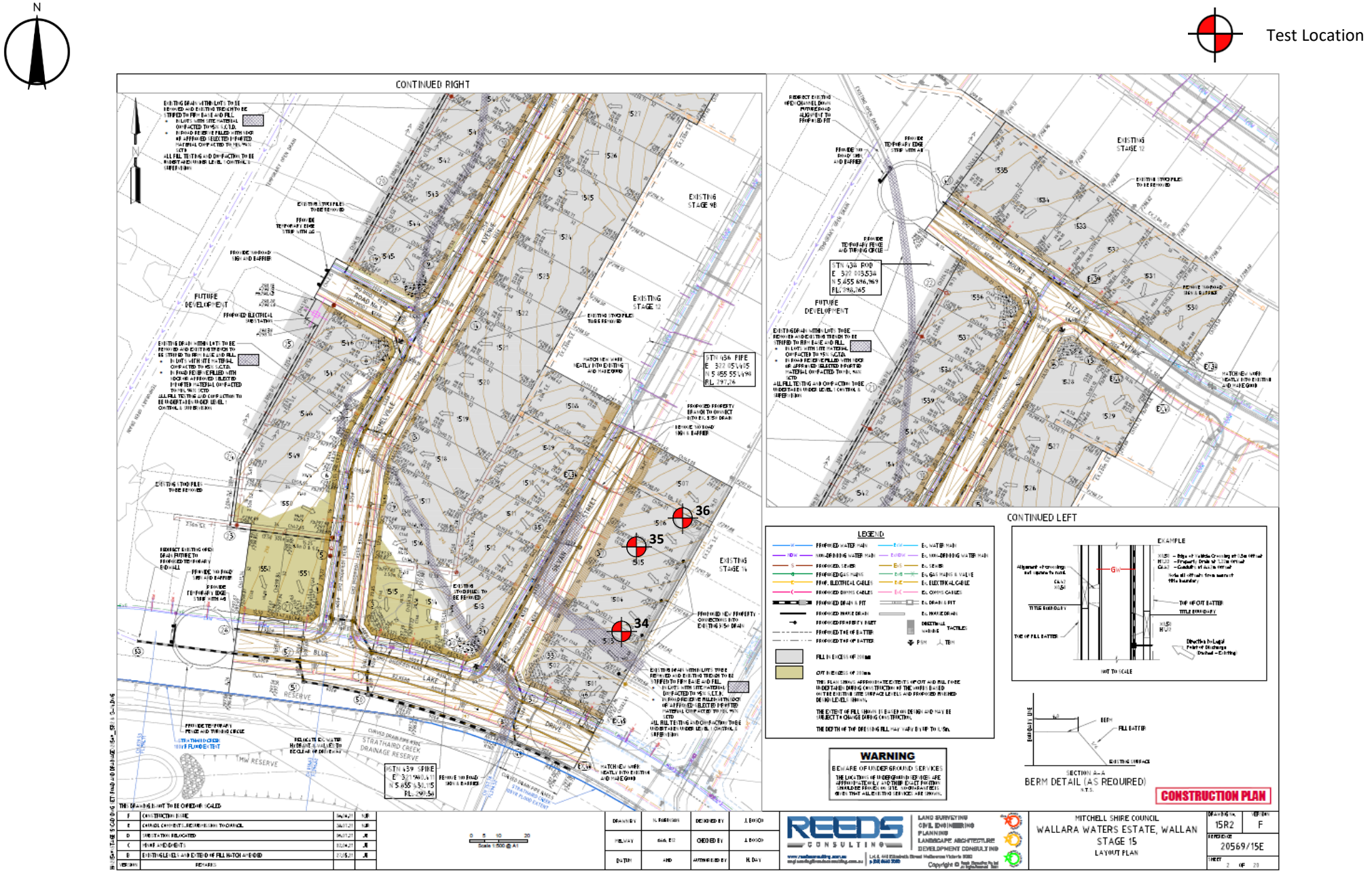
Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 27/10/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 26/10/2021
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI12)	**SITE PLAN SKETCH—NOT TO SCALE**

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Field Density Test Results
AS1289.5.7.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client: Bitu-Mill **Job No:** BTU1888

Project: Wallara Waters Estate, Wallan - Stage 15 (Level 1) **Report:** 13

Location: Wallan

Sample No		37	38	39			
Date Tested		30/11/2021	30/11/2021	30/11/2021			
Time Tested		AM	AM	AM			
Test Location		Refer to Plan	Refer to Plan	Refer to Plan			
Level/Layer		FSL	FSL	FSL			
Layer Thickness	mm	200	200	200			
Test Depth	mm	175	175	175			
Field Wet Density	t/m^3	2.02	1.93	2.02			
Field Moisture Content	%	26.6	24.5	23.5			
Material:		Site Derived Clay Fill	Site Derived Clay Fill	Site Derived Clay Fill			
Oversize Material	WET, %	6.5	5.0	6.0			
Sieve Size	mm	19	19	19			
Peak Converted Wet Density	t/m^3	2.05	1.99	2.11			
Optimum Moisture Content	%	27	25.5	24			
Moisture Ratio	%	98.5	96	98			
Moisture Variation from OMC	%	-0.5 Drier	-1.0 Drier	-0.5 Drier			
Density Ratio	%	98.0	96.5	95.0			

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

Notes: Ref : 1120 0284-1 (SI13)

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
WORLD RECOGNISED ACCREDITATION

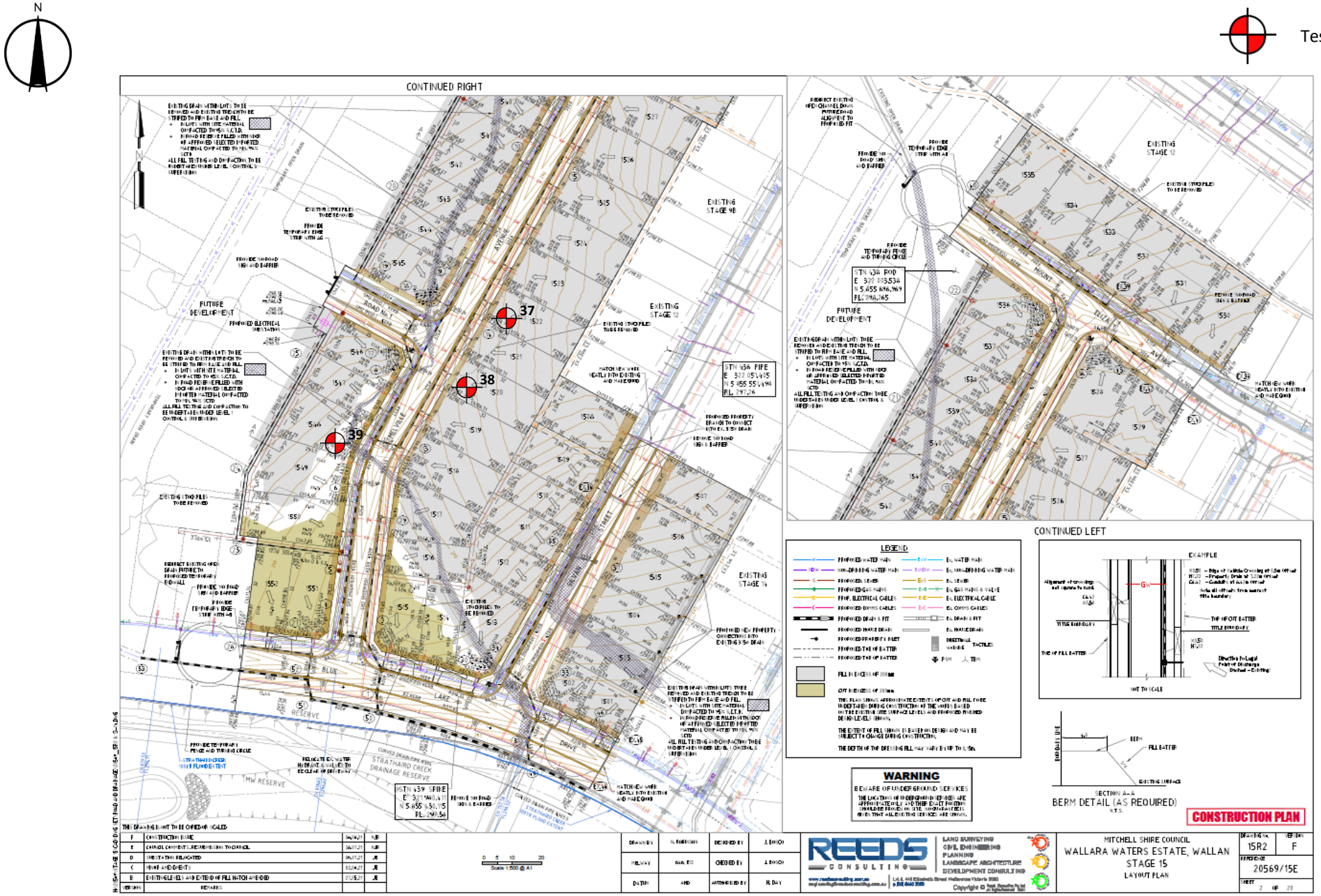
NATA Accredited Laboratory No. 20172

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

Approved Signatory: David Burns

Date: 02/12/2021



PROJECT: Wallara Waters Estate – Stage 15 (Level 1)	**CLIENT:** Bitu-Mill	**DATE:** 30/11/2021
LOCATION: Wallan	**PROJECT No:** 1120 0284-1 (SI13)	**SITE PLAN SKETCH—NOT TO SCALE**

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS