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LEVEL 1 INSPECTION & TESTING WALLARA WATERS ESTATE – STAGE 14 WALLAN, VICTORIA

Prepared for Bitu-Mill Pty Ltd

Report Reference: GS4939/1 AA

Date: 24 October 2019

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PROJECT DETAILS

Project Reference	GS4939/1	Rev	AA
Project Title	Wallara Waters Estate - Stage 14		
Project Location	Wallan	State	VIC
Date	24 October 2019		

CLIENT DETAILS

Prepared For (Client)	Bitu-Mill Pty Ltd
Client Address	133 Metrolink Circuit, Campbellfield, VIC 3061

DISTRIBUTION

Original Held By	Ground Science Pty Ltd
One (1) Electronic Copy	Bitu-Mill Pty Ltd

This document presents the results of the Level 1 Inspection and Testing performed by Ground Science for the aforementioned project, as the nominated project Geotechnical Inspection & Testing Authority (GITA). This report is detailed for the sole use of the intended recipient(s). Should you have any questions related to this report please do not hesitate to contact the undersigned.

AUTHOR:

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Engineering Geologist

REVIEWED:

Gee Singh
Senior Geotechnical Engineer

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APPENDICES

1. INTRODUCTION

This report presents the results of inspection activities, compaction control and laboratory testing services performed by Ground Science Pty Ltd (Ground Science) on fill constructed within Stage 14 of the Wallara Waters Estate, located in Wallan, Victoria (the site). Authorisation to proceed was provided by Bitu-Mill Pty Ltd (the Client).

Level 1 Inspection & Testing, as defined in AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments' provides for full time inspection of the construction of controlled fill and compaction testing in accordance with AS1289 'Methods of Testing Soils for Engineering Purposes' and AS1726 (2017) 'Geotechnical Site Investigations'. Ground Science performed the role of the project Geotechnical Inspection & Testing Authority (GITA) with all Level 1 Inspection and Testing services described in this report undertaken by an experienced GITA site representative.

2. SCOPE OF WORK

2.1 AREAS OF WORK

Ground Science provided Level 1 Inspection and Testing of the controlled fill placed within the proposed allotments of the Wallara Waters Estate Stage 14. The areas requiring Level 1 Inspection and Testing are shown on site plans Figure 1 to Figure 3 in Appendix A of this report, which are based on drawings prepared by Reeds Consulting Pty (Drawing No. 14R18, Version C, Ref 20569E/14, dated 10/12/18)

Level 1 Inspection and Testing commenced on the 23rd May 2019 and was completed on the 5th September 2019. The works included 40 full days of filling operations that were observed on a fulltime basis by Ground Science technician.

2.2 PLACEMENT METHODOLOGY

The placement of controlled fill on the above-mentioned areas was carried out in general accordance with AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments' and clause 12 of the notes presented in Drawing no. 14R1, reference 20569E/14, Version F, Sheet 1. The following placement methodology was adopted on site which was based on both guidelines for the construction of controlled fill:

- Prior to filling, the area shall be stripped of topsoil, subsoil, soft material and vegetation to a firm base approved by the superintendent;
- Suitable fill material shall be placed in composite compacted layers not exceeding 300mm in thickness;
- The fill shall be compacted to a Dry Density Ratio of at least 95% Standard within residential allotments (AS 1289: 5.1.1, 5.4.1 or 5.7.1);
- A moisture variation of ± 3% of the soils optimum moisture content (OMC) was adopted during the fill process to assist with the compaction of fill materials. This was used as a guide for compaction purposes only without the presence of a specification for moisture;
- The fill material shall not contain greater than 20% by volume of particles coarser than 37.5mm and no particle over 2/3 layer thickness in any dimension;
- The frequency of field density testing shall be in accordance with the guidelines in AS3798 2007 for large scale developments (Type 1), which nominates a frequency of not less than:
    - 1 test per layer or 200mm per 2500m^2;
    - 1 test per 500m^3 distributed reasonably evenly throughout the full depth and area; or
    - 3 tests per site visit; whichever requires the most tests.

3. INSPECTION AND TESTING

3.1 SUBGRADE PREPARATION

Site stripping was conducted in the presence of a Ground Science GITA representative. It is understood that site stripping was performed with the use of a dozer and excavator. The stripping generally involved the removal of all surface vegetation and topsoil, typically requiring approximately 50mm to 400mm of stripping until a suitable subgrade was achieved.

The above stripped subgrade was visually inspected and assessed using tactile methods described in AS1726 (2017). The subgrade soils were observed to comprise of silty clay (CI-CH), medium to high plasticity, brown and damp to wet in moisture condition. The exposed subgrade was inspected for surface deflection and/or soft spots with the use of a fully loaded water truck, tipper truck or dump truck. All tested subgrade passed and was considered suitable for subsequent fill placement.

3.2 CONSTRUCTION MATERIALS

Fill for the project is understood to have been sourced from onsite excavations. The fill materials were observed to comprise of silty clay and gravelly clay of medium plasticity to high plasticity, brown/black/yellow and generally close to the optimum moisture content (OMC) of the soil.

The fill material used in this project was nominated by the on-site contractor. Ground Science performed an assessment of the fill source to identify the following material characteristics:

- Material suitability as an engineering property;
- Cohesiveness;
- Free from building debris and vegetative matter;
- Oversize rock particles.

Visual assessments on the above-mentioned properties were conducted on-site and the fill material used was considered suitable for use as engineered fill. It should be noted that no chemical analysis was conducted on the fill material.

3.3 FILL CONSTRUCTION

The contractor had the following plant available on site during the earthworks phase:

- Water Cart;
- Compactor;
- Excavator;
- Dump Truck;
- Dozer;
- Grader;
- Tipper Truck;
- Padfoot Roller.

During fill placement, the weather conditions were generally cool with temperature conditions ranging from 5 to 20 degrees Celsius with heavy rainfall occurred on 18th June 2019. The exposed subgrade was visually inspected afterwards and was noted to be suitable for further fill placement.

The filling process was generally consistent throughout the project and involved the approved fill sources stockpiled by tipper trucks, dump trucks and excavators adjacent to the fill placement zones. Onsite dozer and compactor were used to spread the material across the site. A compactor and padfoot roller compacted the materials into layers measuring approximately 300mm (each layer was compacted by applying a minimum of 4 passes). No oversize particles (greater than 2/3 layer thickness) were observed and moisture conditioning of the fill soils was performed with an onsite water cart to achieve a moisture condition close to the soils optimum moisture content (OMC).

The depth of filling within the site ranged from 2 to 6 layers of 300mm thick composite controlled fill layers placed and compacted to achieve the required finished surface levels. Throughout the filling process and/or at the completion of the day's production, compaction testing was performed to assess the achieved density ratio of each layer.

Figures 1 to 3 provides a guide to the areas of fill placement and the location of density tests performed. Any fill placed as part of drainage, sewer works or similar also does not form part of this Level 1 report.

3.4 RESULTS OF COMPACTION CONTROL TESTING

Level 1 Inspection and Testing was undertaken by experienced technicians from Ground Science who attended the site for the duration of the construction phase and nominated the location of the in-situ density tests. Testing comprised a total of 125 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289.5.8.1) together with 125 "Rapid HILF" Compaction tests (AS1289.5.7.1). The tests were conducted to assess the level of compaction and moisture ratio achieved for fill construction.

A summary of the field density tests performed for the project is presented in Appendix B of this report. Field density and compaction control testing report sheets are presented in Appendix C of this report. It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed.

All tests were noted to meet the required density ratio of 95% Standard within residential allotments, with the exception of test numbers #45 and #57. These areas were reworked and retested as test numbers #52 and #67 respectively. Both retests achieved a compliant density ratio.

The moisture condition of the compacted fill material was noted to be generally within the recommended moisture variation of ± 3% of OMC. All laboratory testing was undertaken in our NATA accredited Thomastown laboratory.

3.5 FINAL SURFACE LEVELS

Observations were made by a Ground Science staff member that filling had been completed up to the nominated finished levels as per confirmation provided from the contractor's site foreman. The observed final levels are the constructed finished surface levels of the controlled fill. It should be noted that the overall fill depths are estimated using onsite visual methods and may not be a true representation of fill depths given that conditions on site may change over time. True fill depths should be obtained from the contractor's survey data.

4. COMPLIANCE

Ground Science staff have undertaken Level 1 Inspection and Testing services of the construction of the controlled fill in the areas designated on Figures 1 to 3. Ground Science field staff have also observed that the prepared subgrade provided an adequate base for the subsequent placement of controlled fill.

Based on observations made by Ground Science staff and the results of density tests, we consider that the controlled fill placed has been constructed in accordance with the general construction notes, AS3798 (2007) and AS2870 (2011).

It should be noted that the final fill layers may be subjected to adverse weather conditions resulting in either surface softening or drying and cracking over time; regardless of the compactive efforts and moisture conditioning applied

during the works. The integrity of the top 200mm to 300mm of the fill will deteriorate with time and should be taken into account by the foundation engineer prior to the construction of a dwelling. The levels nominated in this report are a guide to amounts of fill placed and do not necessarily reflect an accurate survey of the fill levels.

Level 1 Inspection & Testing requires full time inspection and testing of the fill placement undertaken on a site. Ground Science (project GITA), are notified daily (or at the completion of each day's work) by the project foreman where subsequent days of fill placement under Level 1 is to occur. On projects that rely upon the importation of a fill source, there can be delays in the receipt of sufficient materials to warrant fill placement works which may result in periods of time where a GITA representative is not required on site. It is the contractor's responsibility to notify the GITA when works proceed and their attendance on site is required again. A GITA relies upon the integrity of the contractor to advise when site attendance is required and makes all reasonable visual attempts to assess if the works are the same as the previous days attendance.

5. UNDERSTANDING LEVEL 1 INSPECTION & TESTING

The purpose of performing Level 1 Inspection and Testing is to ensure compliance of the fill with the specification. The engagement of a Geotechnical Inspection Testing Authority (GITA) allows the contractor to perform their role in the construction of the filling operation while the GITA monitors the quality control process of the fill placement. The visual observations of thorough processes and work practices by the contractor allows the GITA to approve the subsequent placement of fill without having to wait for the completion of testing and the extended time it takes to get a test result back. The GITA will however, carry out random spot checks of the filling operations throughout the day's production as confirmation that the placement procedures and the fill moisture content is appropriate. At the end of a day's production the GITA will sign off the completed works as satisfactory. Any failed tests will result in that particular area of operation requiring rectification in the following mornings activities. This may be as simple as extra rolling with compaction plant if moisture conditioning is suitable. Sometimes these areas may be retested if the GITA feels it is necessary.

While the code AS3798 2007 is a guideline on the minimum requirements of filling on commercial and residential developments, some projects require a more detailed project specification to deal with site specific issues. While moisture conditioning of fill sources aids in the ease with which compaction is achieved, it is not necessarily a physical characteristic that determines if the placed fill is acceptable. In some situations, the moisture requirement is an extremely important function of the final constructed product. In these situations, a specific project specification should apply to the project as detailed by the designing geotechnical engineer. These are typical of clay liners for wet lands, dams, landfill liners and caps and an array of other engineering situations. Creating a consolidated platform of which is similar to equivalent surrounding natural conditions is the primary aim of level one processes, preventing the occurrence of differential ground movements to footing structures.

For & on behalf of
Ground Science Pty Ltd

AUTHOR:

Aivan Floresca
Engineering Geologist

REVIEWED:

Gee Singh
Senior Geotechnical Engineer

6. LIMITATIONS

This type of investigation (as per our commission) is not designed or capable of locating all soil conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall soil conditions. However, it should be noted that actual conditions in some parts of the Site might differ from those found. If further sampling reveals soil conditions significantly different from those shown in our findings, Ground Science must be consulted. Maintenance and upkeep of finished fill placement must be regularly monitored as exposure to extended weather periods/other elements may cause surface drying which may lead to cracking. Conversely, excessive exposure to moisture may cause heaving/softening in the soils.

It is recognised that the passage of time affects the information and assessment provided in this document. Ground Science's assessment is based on information that existed at the time of the preparation of this document. It is understood that the services provided allowed Ground Science to form no more than an opinion of the actual site conditions observed during sampling and observations of the site visit and cannot be used to assess the effects of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

The scope and the period of Ground Science services are described in the proposal and are subject to restrictions and limitations. Ground Science did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Science in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Science for incomplete or inaccurate data supplied by others.

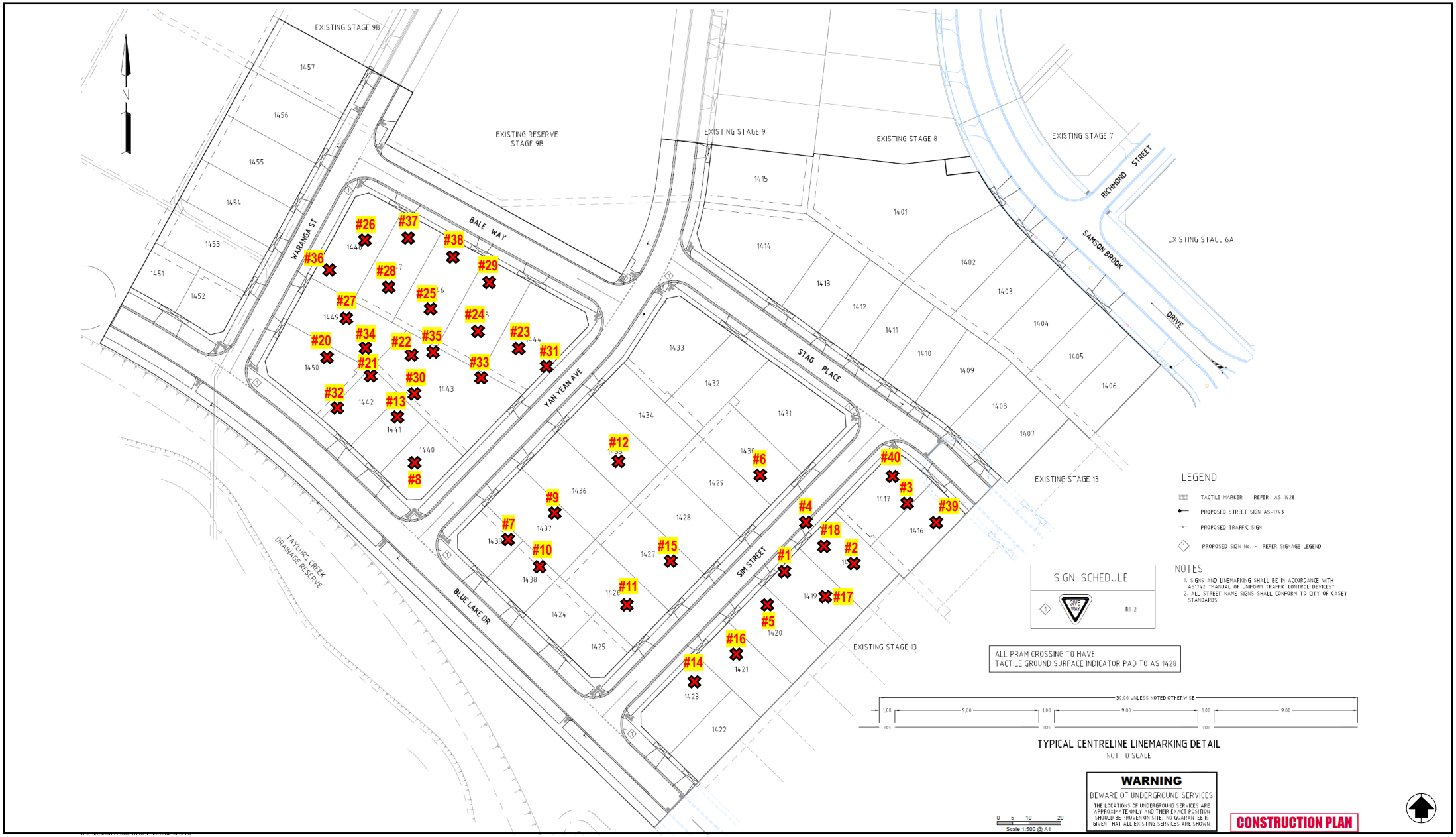
Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

7. REFERENCES

- AS3798 (2007) Guidelines on Earthworks for Residential and Commercial Developments.
- AS2870 (2011) Residential Slabs and Footings.
- AS1289 Methods of Testing Soils for Engineering Purposes.
- AS1726 (1993): Geotechnical Site Investigations.
- Drawing No. 14R18, Reference 20569E/14, Version C, Sheet 18 provided by Reed Consulting Pty Ltd

APPENDIX A

Figures 1 to 3: Site Plan and Test Locations



Rev		Drawn	Date	Checked	Scale
0	Figure 1: Density Test #1 - #40	AF	09/10/19	ES	NTS

Legend

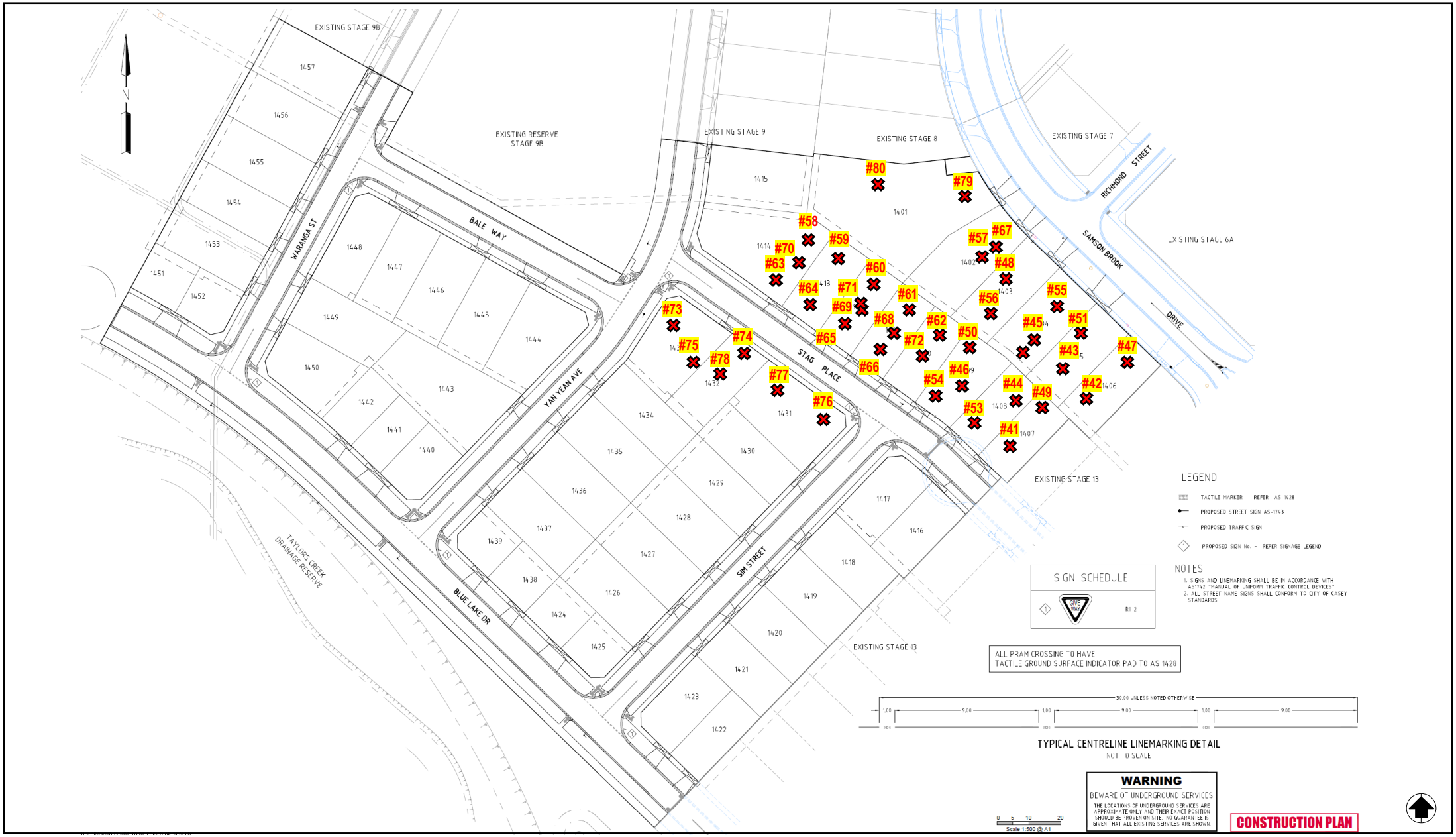
✖ Density Test Location

WALLARA WATERS STAGE14, WALLAN

Prepared For: Bitu-Mill Pty Ltd

Job No: GS4939/1 AA

GroundScience



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Legend

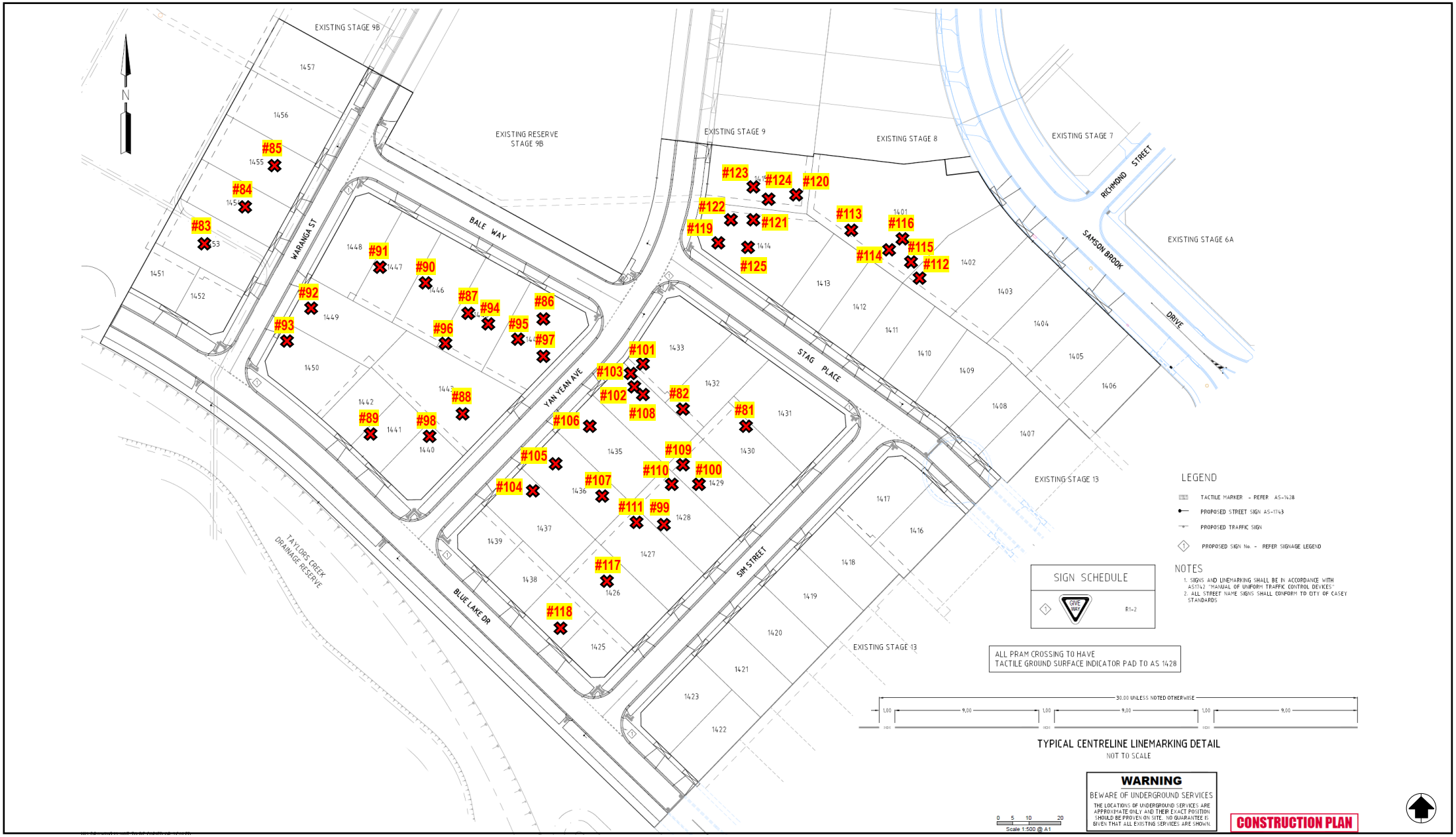
✖ Density Test Location

WALLARA WATERS STAGE14, WALLAN

Prepared For: Bitu-Mill Pty Ltd

Job No: GS4939/1 AA

GroundScience



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Legend

✖ Density Test Location

WALLARA WATERS STAGE14, WALLAN

Prepared For: Bitu-Mill Pty Ltd

Job No: GS4939/1 AA

GroundScience

APPENDIX B

Field Density Test Summary

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**BITU-MILL (CAMPBELLFIELD)**	**Job No:**	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	**Tech:**	**PRD**
Location:	**WALLAN**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
23/05/2019	1	North cnr of Lot 1419 / 2m South East, 5m South West	1	101.0	86.0	-2.5	P	
23/05/2019	2	North cnr of Lot 1418 / 15m South East, 7m South West	1	100.0	98.0	-0.5	P	
23/05/2019	3	North cnr of Lot 1417 / 13m South East, 10m South West	1	101.0	104.0	1.0	P	
24/05/2019	4	North cnr of Lot 1430 / 42m South East, 10m South West	1	103.5	88.0	-2.5	P	
24/05/2019	5	North cnr of Lot 1420, 7m South East, 5m South West	1	97.0	100.0	0.0	P	
24/05/2019	6	North cnr of Lot 1430 / 24m South East, 8m South West	1	100.0	111.0	2.5	P	
6/06/2019	7	North cnr of Lot 1439 / 12m South East, 3m South West	1	103.5	103.0	0.5	P	
6/06/2019	8	North cnr of Lot 1440 / 6m South East, 11m South West	1	98.5	103.0	0.5	P	
6/06/2019	9	North cnr of Lot 1437 / 17m South East, 3m South West	2	102.5	111.0	2.5	P	
7/06/2019	10	North cnr of Lot 1438 / 10m South East, 3m South West	2	99.0	110.0	2.0	P	
7/06/2019	11	North cnr of Lot 1426 / 25m South East, 6m South West	2	100.5	112.0	2.5	P	
7/06/2019	12	North cnr of Lot 1435 / 20m South East, 10m South West	2	98.0	103.0	0.5	P	
7/06/2019	13	North cnr of Lot 1441 / 7m South East, 4m South West	2	97.0	103.0	0.5	P	
8/06/2019	14	North cnr of Lot 1423 / 5m South East, 7m South West	1	100.5	94.0	-1.0	P	
8/06/2019	15	North cnr of Lot 1427 / 20m South East, 5m South West	1	96.5	90.0	-1.5	P	
8/06/2019	16	North cnr of Lot 1421 / 10m South East, 7m South West	2	100.0	95.0	-1.0	P	
8/06/2019	17	North cnr of Lot 1419 / 17m South East, 5m South West	2	98.5	94.0	-1.0	P	
11/06/2019	18	North cnr of Lot 1418 / 6m South East, 12m South West	3	101.5	88.0	-2.0	P	
11/06/2019	19	North cnr of Lot 1422 / 4m South East, 4m South West	3	102.5	117.0	3.5	P	
15/06/2019	20	North cnr of Lot 1450 / 19m South East, 4m South West	1	100.0	111.0	2.0	P	
15/06/2019	21	North cnr of Lot 1442 / 4m South East, 3m South West	1	102.0	103.0	0.5	P	
15/06/2019	22	North cnr of Lot 1443 / 8m South East, 2m South West	1	101.5	113.0	2.5	P	
15/06/2019	23	North cnr of Lot 1444 / 6m South East, 21m South West	1	100.0	116.0	3.0	P	
15/06/2019	24	North cnr of Lot 1445 / 7m South East, 22m South West	1	102.0	118.0	4.5	P	
15/06/2019	25	North cnr of Lot 1446 / 9m South East, 21m South West	1	98.5	113.0	2.5	P	
17/06/2019	26	North cnr of Lot 1448 / 10m South East, 13m South West	1	102.5	102.0	0.5	P	
17/06/2019	27	North cnr of Lot 1449 / 15m South East, 6m South West	1	102.0	98.0	-0.5	P	
17/06/2019	28	North cnr of Lot 1447 / 7m South East, 22m South West	1	98.5	106.0	1.0	P	
17/06/2019	29	North cnr of Lot 1445 / 5m South East, 7m South West	1	104.0	95.0	-1.0	P	
19/06/2019	30	North cnr of Lot 1443 / 15m South East, 10m South West	2	103.5	103.0	0.5	P	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**BITU-MILL (CAMPBELLFIELD)**	**Job No:**	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	**Tech:**	**PRD**
Location:	**WALLAN**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
19/06/2019	31	North cnr of Lot 1444 / 15m South East, 22m South West	2	101.5	108.0	1.5	P	
19/06/2019	32	North cnr of Lot 1442 / 2m South East, 12m South West	3	104.0	100.0	0.0	P	
19/06/2019	33	North cnr of Lot 1443 / 28m South East, 5m North East	3	101.5	107.0	1.5	P	
19/06/2019	34	North cnr of Lot 1449 / 22m South East, 10m South West	2	102.5	98.0	-0.5	P	
19/06/2019	35	North cnr of Lot 1443 / 12m South East, 0m South West	2	103.0	100.0	0.0	P	
20/06/2019	36	North cnr of Lot 1448 / 6m South East, 28m South West	2	102.0	102.0	0.5	P	
20/06/2019	37	North cnr of Lot 1447 / 6m South East, 7m South West	2	102.0	100.0	0.0	P	
20/06/2019	38	North cnr of Lot 1446 / 8m South East, 6m South West	2	104.5	107.0	1.5	P	
21/06/2019	39	North cnr of Lot 1416 / 7m South East, 6m South West	3	100.0	100.0	0.0	P	
21/06/2019	40	North cnr of Lot 1417 / 7m South East, 6m South West	2	102.0	103.0	0.5	P	
21/06/2019	41	North cnr of Lot 1407 / 5m South East, 9m South West	1	98.0	103.0	0.5	P	
22/06/2019	42	North cnr of Lot 1406 / 3m South East, 23m South West	1	103.0	105.0	1.0	P	
22/06/2019	43	North cnr of Lot 1405 / 7m South East, 23m South West	2	97.5	103.0	0.5	P	
22/06/2019	44	North cnr of Lot 1408 / 9m South East, 10m South West	3	96.5	112.0	2.5	P	
24/06/2019	45	North cnr of Lot 1404 / 11m South East, 21m South West	1	94.0	100.0	0.0	F	
24/06/2019	46	North cnr of Lot 1409 / 11m South East, 14m South West	2	98.5	115.0	2.5	P	
24/06/2019	47	North cnr of Lot 1406 / 5m South East, 8m South West	3	101.0	89.0	-2.5	P	
25/06/2019	48	North cnr of Lot 1403 / 5m South East, 13m South West	3	102.5	98.0	-0.5	P	
25/06/2019	49	North cnr of Lot 1407 / 5m South East, 7m South West	4	99.5	107.0	2.0	P	
25/06/2019	50	North cnr of Lot 1409 / 5m South East, 6m South West	4	104.5	102.0	0.5	P	
25/06/2019	51	North cnr of Lot 1405 / 6m South East, 11m South West	4	106.0	102.0	0.5	P	
25/06/2019	52	Retest of #45	1	107.5	102.0	0.5	P	
25/06/2019	53	North cnr of Lot 1408 / 3m South East, 20m South West	5	98.5	108.0	2.0	P	
26/06/2019	54	North cnr of Lot 1409 / 5m South East, 22m South West	5	99.0	102.0	0.5	P	
27/06/2019	55	North cnr of Lot 1404 / 8m South East, 10m South West	5	98.0	112.0	2.5	P	
27/06/2019	56	North cnr of Lot 1403 / 6m South East, 23m South West	4	99.0	111.0	2.5	P	
27/06/2019	57	North cnr of Lot 1402 / 4m South East, 15m South West	2	93.0	124.0	4.5	F	
4/07/2019	58	North cnr of Lot 1414 / 5m South East, 6m South West	1	95.5	134.0	7.0	P	
4/07/2019	59	North cnr of Lot 1413 / 5m South East, 5m South West	1	102.5	112.0	3.0	P	
4/07/2019	60	North cnr of Lot 1412 / 6m South East, 7m South West	1	102.5	100.0	0.0	P	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**BITU-MILL (CAMPBELLFIELD)**	**Job No:**	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	**Tech:**	**PRD**
Location:	**WALLAN**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
4/07/2019	61	North cnr of Lot 1411 / 5m South East, 7m South West	2	102.0	109.0	2.0	P	
4/07/2019	62	North cnr of Lot 1410 / 4m South East, 5m South West	2	101.0	102.0	0.5	P	
4/07/2019	63	North cnr of Lot 1414 / 5m South East, 21m South West	1	98.5	112.0	2.5	P	
4/07/2019	64	North cnr of Lot 1413 / 4m South East, 20m South West	1	97.5	125.0	5.5	P	
4/07/2019	65	North cnr of Lot 1412 / 5m South East, 22m South West	1	101.5	109.0	2.5	P	
4/07/2019	66	North cnr of Lot 1411 / 3m South East, 20m South West	2	105.0	100.0	0.0	P	
4/07/2019	67	Retest of #57	2	100.5	109.0	2.5	P	
4/07/2019	68	North cnr of Lot 1411 / 15m South East, 7m South West	3	102.0	102.0	0.5	P	
4/07/2019	69	North cnr of Lot 1413 / 15m South East, 8m South West	2	103.0	100.0	0.0	P	
8/07/2019	70	North cnr of Lot 1414 / 8m South East, 15m South West	3	98.5	103.0	0.5	P	
8/07/2019	71	North cnr of Lot 1410 / 8m South East, 16m South West	4	99.0	103.0	0.5	P	
8/07/2019	72	North cnr of Lot 1410 / 8m South East, 17m South West	5	103.5	102.0	0.5	P	
8/07/2019	73	North cnr of Lot 1433 / 7m South East, 6m South West	1	101.0	103.0	0.5	P	
8/07/2019	74	North cnr of Lot 1432 / 8m South East, 5m South West	2	99.0	105.0	1.0	P	
8/07/2019	75	North cnr of Lot 1433 / 14m South East, 12m South West	2	101.5	100.0	0.0	P	
9/07/2019	76	North cnr of Lot 1431 / 26m South East, 5m South West	2	100.0	98.0	-0.5	P	
9/07/2019	77	North cnr of Lot 1431 / 10m South East, 5m South West	3	99.0	103.0	0.5	P	
9/07/2019	78	North cnr of Lot 1432 / 5m South East, 12m South West	3	99.5	100.0	0.0	P	
9/07/2019	79	North cnr of Lot 1401 / 14m South East, 7m South West	3	102.0	102.0	0.5	P	
10/07/2019	80	North cnr of Lot 1401 / 6m South East, 29m South West	4	99.5	100.0	0.0	P	
10/07/2019	81	North cnr of Lot 1430 / 7m South East, 3m South West	3	100.5	98.0	-0.5	P	
10/07/2019	82	North cnr of Lot 1432 / 7m South East, 28m South West	4	101.5	103.0	0.5	P	
19/07/2019	83	North cnr of Lot 1453 / 12m South East, 7m South West	1	95.5	119.0	3.5	P	
19/07/2019	84	North cnr of Lot 1454 / 21m South East, 5m South West	2	100.0	105.0	1.0	P	
19/07/2019	85	North cnr of Lot 1455 / 22m South East, 8m South West	2	97.5	110.0	2.0	P	
22/07/2019	86	North cnr of Lot 1444 / 8m South East, 9m South West	2	101.0	106.0	1.5	P	
22/07/2019	87	North cnr of Lot 1445 / 3m South East, 16m South West	2	96.0	105.0	1.0	P	
23/07/2019	88	North cnr of Lot 1443 / 30m South East, 4m South West	3	105.0	100.0	0.0	P	
23/07/2019	89	North cnr of Lot 1441 / 3m South East, 14m South West	3	102.5	102.0	0.5	P	
25/07/2019	90	North cnr of Lot 1450 / 7m South East, 6m South West	3	102.5	100.0	0.0	P	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**BITU-MILL (CAMPBELLFIELD)**	**Job No:**	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	**Tech:**	**PRD**
Location:	**WALLAN**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
25/07/2019	91	North cnr of Lot 1449 / 8m South East, 6m South West	3	98.5	115.0	3.0	P	
25/07/2019	92	North cnr of Lot 1447 / 3m South East, 18m South West	3	101.5	117.0	3.5	P	
25/07/2019	93	North cnr of Lot 1446 / 4m South East, 16m South West	3	100.0	108.0	1.5	P	
26/07/2019	94	North cnr of Lot 1445 / 11m South East, 17m South West	3	102.0	100.0	0.0	P	
26/07/2019	95	North cnr of Lot 1444 / 5m South East, 16m South West	3	101.5	100.0	0.0	P	
26/07/2019	96	North cnr of Lot 1445 / 3m South East, 27m South West	4	100.0	107.0	1.5	P	
26/07/2019	97	North cnr of Lot 1444 / 12m South East, 16m South West	4	100.5	107.0	1.5	P	
30/07/2019	98	North cnr of Lot 1440 / 4m South East, 3m South West	4	102.0	98.0	-0.5	P	
30/07/2019	99	North cnr of Lot 1428 / 12m South East, 12m South West	3	102.5	103.0	0.5	P	
30/07/2019	100	North cnr of Lot 1429 / 12m South East, 11m South West	3	101.0	100.0	0.0	P	
30/07/2019	101	North cnr of Lot 1433 / 9m South East, 35m South West	2	103.5	108.0	2.5	P	
30/07/2019	102	North cnr of Lot 1434 / 12m South East, 2m South West	1	105.0	102.0	0.5	P	
31/07/2019	103	North cnr of Lot 1434 / 6m South East, 2m South West	3	103.0	102.0	0.5	P	
31/07/2019	104	North cnr of Lot 1435 / 10m South East, 7m South West	3	102.0	112.0	3.0	P	
31/07/2019	105	North cnr of Lot 1436 / 10m South East, 6m South West	3	102.5	108.0	2.0	P	
31/07/2019	106	North cnr of Lot 1437 / 9m South East, 2m South West	3	104.5	111.0	2.5	P	
1/08/2019	107	North cnr of Lot 1436 / 22m South East, 5m South West	4	103.5	108.0	2.0	P	
1/08/2019	108	North cnr of Lot 1434 / 8m South East, 5m South West	5	104.0	105.0	1.0	P	
1/08/2019	109	North cnr of Lot 1429 / 7m South East, 10m South West	4	109.0	91.0	-2.5	P	
2/08/2019	110	North cnr of Lot 1428 / 9m South East, 3m South West	4	100.5	114.0	3.0	P	
2/08/2019	111	North cnr of Lot 1427 / 8m South East, 2m South West	4	100.5	107.0	1.5	P	
2/08/2019	112	North cnr of Lot 1402 / 3m South East, 31m South West	3	102.0	115.0	3.5	P	
2/08/2019	113	North cnr of Lot 1401 / 18m South East, 35m South West	2	102.0	108.0	2.0	P	
5/08/2019	114	North cnr of Lot 1401 / 23m South East, 27m South West	4	100.5	107.0	1.5	P	
5/08/2019	115	North cnr of Lot 1401 / 29m South East, 20m South West	5	98.0	108.0	1.5	P	
6/08/2019	116	North cnr of Lot 1401 / 13m South East, 43m South West	6	103.5	109.0	2.0	P	
6/08/2019	117	North cnr of Lot 1426 / 12m South East, 7m South West	3	101.0	104.0	1.0	P	
6/08/2019	118	North cnr of Lot 1424 / 12m South East, 10m South West	3	98.5	118.0	4.0	P	
7/08/2019	119	North cnr of Lot 1415 / 35m South, 11m East	1	102.5	112.0	2.5	P	
7/08/2019	120	North cnr of Lot 1415 / 13m South, 26m East	1	101.5	104.0	1.0	P	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**BITU-MILL (CAMPBELLFIELD)**	**Job No:**	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	**Tech:**	**PRD**
Location:	**WALLAN**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
7/08/2019	121	North cnr of Lot 1415 / 23m South, 17m East	2	102.0	102.0	0.5	P	
28/08/2019	122	North cnr of Lot 1415 / 22m South, 8m East	3	101.0	105.0	1.0	P	
28/08/2019	123	North cnr of Lot 1415 / 12m South, 15m East	3	99.5	102.0	0.5	P	
5/09/2019	124	North cnr of Lot 1415 / 15m South, 20m East	4	101.5	100.0	0.0	P	
5/09/2019	125	North cnr of Lot 1415 / 27m South, 11m East	4	102.0	107.0	1.5	P	

APPENDIX C

Field Density Test Report Sheets

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AA**
Location:	**WALLAN**	Test date:	**23-May-19**

Test Number		1	2	3			
Test location taken from		Lot 1419	Lot 1418	Lot 1417			
North corner of each lot		2m S.E 5m S.W	15m S.E 7m S.W	13m S.E 10m S.W			
Layer Number		1	1	1			
Time of tests		15:10:00	15:15:00	15:25:00			
Depth of Layer	mm	300	275	300			
Depth of Test	mm	275	250	275			
Field Wet Density	t/m³	1.97	2.00	1.92			
Field Dry Density	t/m³	1.69	1.64	1.53			
Field Moisture Content	%	15.5	21.5	26.0			
Oversize Material	Wet %	7	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.95	2.00	1.90			
Optimum Moisture Content	%	18.0	22.0	25.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**86**	**98**	**104**			
Moisture Variation	%	**-2.5**	**-0.5**	**1.0**			
Moisture Variation		**DRY**	**DRY**	**WET**			
Density Ratio	%	**101.0**	**100.0**	**101.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, yellow and black

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National Standards

Chris Senserrick
Approved Signatory
Date 27-May-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AB**
Location:	**WALLAN**	Test date:	**24-May-19**

Test Number		4	5	6		
Test location taken from		Lot 1430	Lot 1420	Lot 1430		
North corner of each lot		42m S.E 10m S.W	7m S.E 5m S.W	24m S.E 8m S.W		
Layer Number		1	1	1		
Time of tests		13:10:00	13:20:00	13:30:00		
Depth of Layer	mm	300	300	300		
Depth of Test	mm	275	275	275		
Field Wet Density	t/m³	2.07	1.90	1.98		
Field Dry Density	t/m³	1.76	1.50	1.58		
Field Moisture Content	%	17.5	26.5	25.0		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.99	1.96	1.98		
Optimum Moisture Content	%	20.0	26.5	22.5		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**88**	**100**	**111**		
Moisture Variation	%	**-2.5**	**0.0**	**2.5**		
Moisture Variation		**DRY**	**-**	**WET**		
Density Ratio	%	**103.5**	**97.0**	**100.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Test #4: sandy CLAY, medium plasticity, brown

Tests #5 & 6: silty CLAY, medium to high plasticity, black and yellow

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
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Tim Senserrick
Approved Signatory
Date 28-May-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AC**
Location:	**WALLAN**	Test date:	**6-Jun-19**

Test Number		7	8	9			
Test location taken from		Lot 1439	Lot 1440	Lot 1437			
North corner of each lot		12m S.E 3m S.W	6m S.E 11m S.W	17m S.E 3m S.W			
Layer Number		1	1	2			
Time of tests		11:00:00	11:10:00	15:15:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.13	1.93	2.01			
Field Dry Density	t/m³	1.81	1.58	1.60			
Field Moisture Content	%	17.5	22.5	25.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	2.06	1.96	1.95			
Optimum Moisture Content	%	17.0	22.0	23.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**103**	**103**	**111**			
Moisture Variation	%	**0.5**	**0.5**	**2.5**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**103.5**	**98.5**	**102.5**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, yellow and black

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 11-Jun-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AD**
Location:	**WALLAN**	Test date:	**7-Jun-19**

Test Number		10	11	12	13		
Test location taken from		Lot 1438	Lot 1426	Lot 1435	Lot 1441		
North corner of each lot		10m S.E	25m S.E	20m S.E	7m S.E		
		3m S.W	6m S.W	10m S.W	4m S.W		
Layer Number		2	2	2	2		
Time of tests		13:10:00	13:20:00	13:30:00	13:40:00		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	1.99	1.98	1.93	1.91		
Field Dry Density	t/m³	1.63	1.61	1.58	1.56		
Field Moisture Content	%	22.0	23.0	22.5	22.5		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.01	1.97	1.97	1.97		
Optimum Moisture Content	%	20.0	20.5	22.0	22.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**110**	**112**	**103**	**103**		
Moisture Variation	%	**2.0**	**2.5**	**0.5**	**0.5**		
Moisture Variation		**WET**	**WET**	**WET**	**WET**		
Density Ratio	%	**99.0**	**100.5**	**98.0**	**97.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 12-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AE**
Location:	**WALLAN**	Test date:	**8-Jun-19**

Test Number		14	15	16	17		
Test location taken from		Lot 1423	Lot 1427	Lot 1421	Lot 1419		
North corner of each lot		5m S.E 7m S.W	20m S.E 5m S.W	10m S.E 7m S.W	17m S.E 5m S.W		
Layer Number		1	1	2	2		
Time of tests		9:10:00	9:20:00	12:10:00	12:20:00		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	2.15	2.05	1.96	1.95		
Field Dry Density	t/m³	1.88	1.82	1.67	1.71		
Field Moisture Content	%	14.5	13.0	17.5	14.5		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.14	2.13	1.97	1.98		
Optimum Moisture Content	%	15.5	14.5	18.5	15.5		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**94**	**90**	**95**	**94**		
Moisture Variation	%	**-1.0**	**-1.5**	**-1.0**	**-1.0**		
Moisture Variation		**DRY**	**DRY**	**DRY**	**DRY**		
Density Ratio	%	**100.5**	**96.5**	**100.0**	**98.5**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Tests #14 - 15: silty gravelly CLAY, medium to high plasticity, brown

Tests #16 - 17: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 13-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AF**
Location:	**WALLAN**	Test date:	**11-Jun-19**

Test Number		18	19				
Test location taken from		Lot 1418	Lot 1422				
North corner of each lot		6m S.E	4m S.E				
		12m S.W	4m S.W				
Layer Number		3	3				
Time of tests		13:10:00	13:20:00				
Depth of Layer	mm	300	300				
Depth of Test	mm	275	275				
Field Wet Density	t/m³	1.95	2.01				
Field Dry Density	t/m³	1.71	1.61				
Field Moisture Content	%	14.0	25.0				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	1.93	1.96				
Optimum Moisture Content	%	16.0	21.5				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**88**	**117**				
Moisture Variation	%	**-2.0**	**3.5**				
Moisture Variation		**DRY**	**WET**				
Density Ratio	%	**101.5**	**102.5**				

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown and black

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
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Tim Senserrick
Approved Signatory
Date 13-Jun-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AG**
Location:	**WALLAN**	Test date:	**15-Jun-19**

Test Number		20	21	22	23	24	25
Test location taken from		Lot 1450	Lot 1442	Lot 1443	Lot 1444	Lot 1445	Lot 1446
North corner of each lot		19m S.E 4m S.W	4m S.E 3m S.W	8m S.E 2m S.W	6m S.E 21m S.W	7m S.E 22m S.W	9m S.E 21m S.W
Layer Number		1	1	1	1	1	1
Time of tests		10:00:00	10:05:00	10:15:00	10:20:00	12:30:00	12:40:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	2.03	2.04	2.08	2.05	2.00	2.01
Field Dry Density	t/m³	1.67	1.68	1.71	1.67	1.54	1.65
Field Moisture Content	%	21.5	21.5	21.5	22.5	30.0	22.0
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	2.03	2.00	2.05	2.05	1.96	2.03
Optimum Moisture Content	%	19.5	21.0	19.0	19.5	25.5	19.5
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**111**	**103**	**113**	**116**	**118**	**113**
Moisture Variation	%	**2.0**	**0.5**	**2.5**	**3.0**	**4.5**	**2.5**
Moisture Variation		**WET**	**WET**	**WET**	**WET**	**WET**	**WET**
Density Ratio	%	**100.0**	**102.0**	**101.5**	**100.0**	**102.0**	**98.5**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
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Chris Senserrick
Approved Signatory
Date 18-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AH**
Location:	**WALLAN**	Test date:	**17-Jun-19**

Test Number		26	27	28	29		
Test location taken from		Lot 1448	Lot 1449	Lot 1447	Lot 1445		
North Corner of each Lot		10m S.E	15m S.E	7m S.E	5m S.E		
Offset (m)		13m S.W	6m S.W	22m S.W	7m S.W		
Layer Number		1	1	1	1		
Time of tests		1.50pm	2.10pm	2.15pm	2.25pm		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	1.98	2.03	2.00	2.02		
Field Dry Density	t/m³	1.58	1.71	1.67	1.68		
Field Moisture Content	%	25.0	19.0	20.0	20.0		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.93	1.99	2.03	1.94		
Optimum Moisture Content	%	24.5	19.5	19.0	21.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**102**	**98**	**106**	**95**		
Moisture Variation	%	**0.5**	**-0.5**	**1.0**	**-1.0**		
Moisture Variation		**WET**	**DRY**	**WET**	**DRY**		
Density Ratio	%	**102.5**	**102.0**	**98.5**	**104.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Silty CLAY, medium to high plasticity, brown / black.

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National Standards

Chris Senserrick
Approved Signatory
Date 19-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AI**
Location:	**WALLAN**	Test date:	**19-Jun-19**

Test Number		30	31	32	33	34	35
Test location taken from		Lot 1443	Lot 1444	Lot 1442	Lot 1443	Lot 1449	Lot 1443
North corner of each Lot		15m S.E 10m S.W	15m S.E 22m S.W	2m S.E 12m S.W	28m S.E 5m N.E	22m S.E 10m S.W	12m S.E 0m S.W
Layer Number		2	2	3	3	2	2
Time of tests		10:05:00	10:10:00	13:05:00	13:10:00	13:20:00	13:25:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	2.05	2.05	2.04	1.91	1.99	2.00
Field Dry Density	t/m³	1.68	1.70	1.67	1.56	1.63	1.62
Field Moisture Content	%	22.0	21.0	22.5	23.0	21.5	23.5
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	1.98	2.02	1.97	1.89	1.94	1.95
Optimum Moisture Content	%	21.5	19.5	22.5	21.5	22.0	23.5
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**103**	**108**	**100**	**107**	**98**	**100**
Moisture Variation	%	**0.5**	**1.5**	**0.0**	**1.5**	**-0.5**	**0.0**
Moisture Variation		**WET**	**WET**	**-**	**WET**	**DRY**	**-**
Density Ratio	%	**103.5**	**101.5**	**104.0**	**101.5**	**102.5**	**103.0**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown / black

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
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Tim Senserrick
Approved Signatory
Date 21-Jun-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AJ**
Location:	**WALLAN**	Test date:	**20-Jun-19**

Test Number		36	37	38			
Test location taken from		Lot 1448	Lot 1447	Lot 1446			
North corner of each Lot		6m S.E	6m S.E	8m S.E			
		28m S.W	7m S.W	6m S.W			
Layer Number		2	2	2			
Time of tests		13:10:00	13:20:00	13:30:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	1.97	2.00	2.02			
Field Dry Density	t/m³	1.57	1.61	1.61			
Field Moisture Content	%	26.0	24.0	25.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.93	1.96	1.94			
Optimum Moisture Content	%	25.5	24.0	24.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**102**	**100**	**107**			
Moisture Variation	%	**0.5**	**0.0**	**1.5**			
Moisture Variation		**WET**	**-**	**WET**			
Density Ratio	%	**102.0**	**102.0**	**104.5**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 24-Jun-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AK**
Location:	**WALLAN**	Test date:	**21-Jun-19**

Test Number		39	40	41			
Test location taken from		Lot 1416	Lot 1417	Lot 1407			
North corner of each lot		7m S.E 6m S.W	7m S.E 6m S.W	5m S.E 9m S.W			
Layer Number		3	2	1			
Time of tests		9:00:00	9:10:00	13:10:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	1.99	2.04	2.02			
Field Dry Density	t/m³	1.69	1.70	1.72			
Field Moisture Content	%	17.5	19.5	17.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.99	1.99	2.06			
Optimum Moisture Content	%	17.5	19.0	17.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**100**	**103**	**103**			
Moisture Variation	%	**0.0**	**0.5**	**0.5**			
Moisture Variation		**-**	**WET**	**WET**			
Density Ratio	%	**100.0**	**102.0**	**98.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 25-Jun-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AL**
Location:	**WALLAN**	Test date:	**22-Jun-19**

Test Number		42	43	44			
Test location taken from		Lot 1406	Lot 1405	Lot 1408			
North corner of each lot		3m S.E	7m S.E	9m S.E			
		23m S.W	23m S.W	10m S.W			
Layer Number		1	2	3			
Time of tests		9:00:00	12:00:00	12:10:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.02	2.00	1.99			
Field Dry Density	t/m³	1.64	1.68	1.60			
Field Moisture Content	%	23.5	19.0	24.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.96	2.06	2.07			
Optimum Moisture Content	%	22.5	18.5	22.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**105**	**103**	**112**			
Moisture Variation	%	**1.0**	**0.5**	**2.5**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**103.0**	**97.5**	**96.5**			

Specification Requirements 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description silty CLAY, medium to high plasticity, light brown

Test Methods AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 25-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AM**
Location:	**WALLAN**	Test date:	**24-Jun-19**

Test Number		45	46	47			
Test location taken from		Lot 1404	Lot 1409	Lot 1406			
North corne of each Lot		11m S.E	11m S.E	5m S.E			
		21m S.W	14m S.W	8m S.W			
Layer Number		1	2	3			
Time of tests		9:00:00	13:20:00	14:00:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.03	2.01	1.99			
Field Dry Density	t/m³	1.78	1.68	1.72			
Field Moisture Content	%	14.0	20.0	16.0			
Oversize Material	Wet %	4	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	2.16	2.04	1.97			
Optimum Moisture Content	%	14.0	17.5	18.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	**%**	**100**	**115**	**89**			
Moisture Variation	%	**0.0**	**2.5**	**-2.0**			
Moisture Variation		**-**	**WET**	**DRY**			
Density Ratio	%	**94.0**	**98.5**	**101.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 26-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AN**
Location:	**WALLAN**	Test date:	**25-Jun-19**

Test Number		48	49	50	51	52	53
Test location taken from		Lot 1403	Lot 1407	Lot 1409	Lot 1405	Retest of #45	Lot 1408
North corner of each lot		5m S.E 13m S.W	5m S.E 7m S.W	5m S.E 6m S.W	6m S.E 11m S.W		3m S.E 20m S.W
Layer Number		3	4	4	4	1	5
Time of tests		8:45:00	8:55:00	9:00:00	9:10:00	13:00:00	15:00:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	1.94	1.89	1.99	2.00	2.04	1.92
Field Dry Density	t/m³	1.56	1.44	1.61	1.58	1.63	1.52
Field Moisture Content	%	24.5	31.5	23.5	26.5	25.0	26.5
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	1.90	1.90	1.91	1.89	1.89	1.95
Optimum Moisture Content	%	25.0	29.5	23.0	26.0	24.5	24.5
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**98**	**107**	**102**	**102**	**102**	**108**
Moisture Variation	%	**-0.5**	**2.0**	**0.5**	**0.5**	**0.5**	**2.0**
Moisture Variation		**DRY**	**WET**	**WET**	**WET**	**WET**	**0.0**
Density Ratio	%	**102.5**	**99.5**	**104.5**	**106.0**	**107.5**	**98.5**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Tests #48 & 50 to 52: silty CLAY, medium to high plasticity, black and yellow

Tests #49 and 53: silty CLAY, high plasticity, black and yellow

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
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Tim Senserrick
Approved Signatory
Date 28-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AO**
Location:	**WALLAN**	Test date:	**26-Jun-19**

Test Number		54					
Test location taken from		Lot 1409					
North corner of each lot		5m S.E					
		22m S.W					
Layer Number		5					
Time of tests		15:10:00					
Depth of Layer	mm	300					
Depth of Test	mm	275					
Field Wet Density	t/m³	1.92					
Field Dry Density	t/m³	1.52					
Field Moisture Content	%	26.5					
Oversize Material	Wet %	0					
Sieve Size	mm	19.0					
Peak Converted Wet Density	t/m³	1.93					
Optimum Moisture Content	%	26.0					
Compactive Effort Used	std / mod	STD					
Moisture Ratio	%	**102**					
Moisture Variation	%	**0.5**					
Moisture Variation		**WET**					
Density Ratio	%	**99.0**					

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, high plasticity, black and yellow

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 28-Jun-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AP**
Location:	**WALLAN**	Test date:	**27-Jun-19**

Test Number		55	56	57			
Test location taken from		Lot 1404	Lot 1403	Lot 1402			
North corner of each lot		8m S.E	6m S.E	4m S.E			
		10m S.W	23m S.W	15m S.W			
Layer Number		5	4	2			
Time of tests		15:00:00	15:10:00	15:20:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.00	1.91	1.86			
Field Dry Density	t/m³	1.63	1.51	1.51			
Field Moisture Content	%	23.0	26.5	23.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	2.04	1.93	2.00			
Optimum Moisture Content	%	20.5	24.0	19.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**112**	**111**	**124**			
Moisture Variation	%	**2.5**	**2.5**	**4.5**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**98.0**	**99.0**	**93.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Test #55: silty CLAY, medium to high plasticity, light brown

Tests #56 - 57: silty CLAY, medium to high plasticity, yellow / black

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 01-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AQ**
Location:	**WALLAN**	Test date:	**4-Jul-19**

Test Number		58	59	60	61	62	63
Test location taken from		Lot 1414	Lot 1413	Lot 1412	Lot 1411	Lot 1410	Lot 1414
North corner of each Lot		5m S.E 6m S.W	5m S.E 5m S.W	6m S.E 7m S.W	5m S.E 7m S.W	4m S.E 5m S.W	5m S.E 21m S.W
Layer Number		1	1	1	2	2	1
Time of tests		9:00:00	9:10:00	9:20:00	9:30:00	9:45:00	12:10:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	1.92	1.96	1.98	1.99	1.96	1.96
Field Dry Density	t/m³	1.51	1.53	1.59	1.57	1.57	1.59
Field Moisture Content	%	27.5	28.0	24.5	26.0	25.0	23.5
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	2.01	1.91	1.93	1.94	1.94	1.99
Optimum Moisture Content	%	20.5	25.0	24.5	24.0	24.5	21.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**134**	**112**	**100**	**109**	**102**	**112**
Moisture Variation	%	**7.0**	**3.0**	**0.0**	**2.0**	**0.5**	**2.5**
Moisture Variation		**WET**	**WET**	**-**	**WET**	**WET**	**WET**
Density Ratio	%	**95.5**	**102.5**	**102.5**	**102.0**	**101.0**	**98.5**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown and black, yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Approved Signatory
Date 08-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AR**
Location:	**WALLAN**	Test date:	**4-Jul-19**

Test Number		64	65	66	67	68	69
Test location taken from		Lot 1413	Lot 1412	Lot 1411	Lot 1402	Lot 1411	Lot 1413
North corner of each Lot		4m S.E 20m S.W	5m S.E 22m S.W	3m S.E 20m S.W	9m S.E 18m S.W	15m S.E 7m S.W	15m S.E 8m S.W
Layer Number		1	1	2	2	3	2
Time of tests		12:20:00	12:30:00	12:45:00	13:00:00	15:50:00	16:00:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	1.93	1.92	2.01	1.91	1.94	1.95
Field Dry Density	t/m³	1.51	1.47	1.62	1.47	1.55	1.56
Field Moisture Content	%	27.5	30.5	24.0	30.0	25.5	25.0
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	1.98	1.89	1.91	1.91	1.91	1.89
Optimum Moisture Content	%	22.0	28.0	24.0	27.5	25.0	25.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**125**	**109**	**100**	**109**	**102**	**100**
Moisture Variation	%	**5.5**	**2.5**	**0.0**	**2.5**	**0.5**	**0.0**
Moisture Variation		**WET**	**WET**	**-**	**WET**	**WET**	**-**
Density Ratio	%	**97.5**	**101.5**	**105.0**	**100.5**	**102.0**	**103.0**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown and black, yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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Tim Senserrick
Approved Signatory
Date 08-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AS**
Location:	**WALLAN**	Test date:	**8-Jul-19**

Test Number		70	71	72	73	74	75
Test location taken from		Lot 1414	Lot 1412	Lot 1410	Lot 1433	Lot 1432	Lot 1433
North corner of each Lot		8m S.E 15m S.W	7m S.E 16m S.W	8m S.E 17m S.W	7m S.E 6m S.W	8m S.E 5m S.W	14m S.E 12m S.W
Layer Number		3	4	5	1	2	2
Time of tests		10:10:00	10:20:00	10:30:00	15:02:00	15:35:00	15:45:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	2.06	1.99	2.01	2.08	2.04	2.04
Field Dry Density	t/m³	1.75	1.62	1.61	1.73	1.69	1.69
Field Moisture Content	%	18.0	22.5	25.0	20.0	20.5	21.0
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	19.0
Peak Converted Wet Density	t/m³	2.09	2.01	1.94	2.05	2.05	2.01
Optimum Moisture Content	%	17.5	22.0	24.5	19.5	19.5	21.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**103**	**103**	**102**	**103**	**105**	**100**
Moisture Variation	%	**0.5**	**0.5**	**0.5**	**0.5**	**1.0**	**0.0**
Moisture Variation		**WET**	**WET**	**WET**	**WET**	**WET**	
Density Ratio	%	**98.5**	**99.0**	**103.5**	**101.0**	**99.0**	**101.5**

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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NATA Accredited Laboratory No. 15055
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Tim Senserrick
Approved Signatory
Date 10-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AT**
Location:	**WALLAN**	Test date:	**9-Jul-19**

Test Number		76	77	78	79		
Test location taken from		Lot 1431	Lot 1431	Lot 1432	Lot 1401		
North corner of each Lot		26m S.E 5m S.W	10m S.E 5m S.W	5m S.E 12m S.W	14m S.E 7m S.W		
Layer Number		2	3	3	3		
Time of tests		9:00:00	12:00:00	12:10:00	14:00:00		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	1.99	1.99	1.99	2.02		
Field Dry Density	t/m³	1.68	1.66	1.67	1.63		
Field Moisture Content	%	19.0	20.0	19.0	24.0		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.99	2.02	2.00	1.98		
Optimum Moisture Content	%	19.5	19.5	19.0	23.5		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**98**	**103**	**100**	**102**		
Moisture Variation	%	**-0.5**	**0.5**	**0.0**	**0.5**		
Moisture Variation		**DRY**	**WET**	**-**	**WET**		
Density Ratio	%	**100.0**	**99.0**	**99.5**	**102.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 11-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AU**
Location:	**WALLAN**	Test date:	**10-Jul-19**

Test Number		80	81	82		
Test location taken from		Lot 1401	Lot 1430	Lot 1432		
North corner of each lot		6m S.E 29m S.W	7m S.E 3m S.W	7m S.E 28m S.W		
Layer Number		4	3	4		
Time of tests		10:00:00	15:00:00	15:15:00		
Depth of Layer	mm	300	300	300		
Depth of Test	mm	275	275	275		
Field Wet Density	t/m³	2.03	2.03	2.06		
Field Dry Density	t/m³	1.71	1.69	1.72		
Field Moisture Content	%	18.5	20.0	20.0		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.04	2.02	2.03		
Optimum Moisture Content	%	18.5	20.5	19.5		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**100**	**98**	**103**		
Moisture Variation	%	**0.0**	**-0.5**	**0.5**		
Moisture Variation		**-**	**DRY**	**WET**		
Density Ratio	%	**99.5**	**100.5**	**101.5**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 12-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AV**
Location:	**WALLAN**	Test date:	**19-Jul-19**

Test Number		83	84	85			
Test location taken from		Lot 1453	Lot 1454	Lot 1455			
North corner of each Lot		12m S.E	21m S.E	22m S.E			
		7m S.W	5m S.W	8m S.W			
Layer Number		1	2	2			
Time of tests		15:45:00	15:55:00	16:05:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	1.97	2.07	2.02			
Field Dry Density	t/m³	1.62	1.69	1.66			
Field Moisture Content	%	22.0	22.0	22.0			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	2.07	2.07	2.08			
Optimum Moisture Content	%	18.5	21.0	20.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**119**	**105**	**110**			
Moisture Variation	%	**3.5**	**1.0**	**2.0**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**95.5**	**100.0**	**97.5**			

Specification Requirements	95% Standard compaction
Notes:	Moisture Variation: (-) indicates dry; (+) indicates wet
Material description	silty CLAY, medium to high plasticity, light brown
Test Methods	AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 23-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AW**
Location:	**WALLAN**	Test date:	**22-Jul-19**

Test Number		86	87				
Test location taken from		Lot 1444	Lot 1445				
North corner of each Lot		8m S.E	3m S.E				
		9m S.W	16m S.W				
Layer Number		2	2				
Time of tests		14:00:00	14:10:00				
Depth of Layer	mm	300	300				
Depth of Test	mm	275	275				
Field Wet Density	t/m³	1.99	1.98				
Field Dry Density	t/m³	1.58	1.61				
Field Moisture Content	%	26.0	22.5				
Oversize Material	Wet %	1	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	1.97	2.05				
Optimum Moisture Content	%	24.5	21.5				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**106**	**105**				
Moisture Variation	%	**1.5**	**1.0**				
Moisture Variation			**WET**				
Density Ratio	%	**101.0**	**96.0**				

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 24-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AX**
Location:	**WALLAN**	Test date:	**23-Jul-19**

Test Number		88	89				
Test location taken from		Lot 1443	Lot 1441				
North corner of each lot		30m S.E	3m S.E				
		4m S.W	14m S.W				
Layer Number		3	3				
Time of tests		15:10:00	15:25:00				
Depth of Layer	mm	250	250				
Depth of Test	mm	225	225				
Field Wet Density	t/m³	2.08	2.01				
Field Dry Density	t/m³	1.70	1.60				
Field Moisture Content	%	22.0	25.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	1.98	1.96				
Optimum Moisture Content	%	22.0	25.0				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**100**	**102**				
Moisture Variation	%	**0.0**	**0.5**				
Moisture Variation		**-**	**WET**				
Density Ratio	%	**105.0**	**102.5**				

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 25-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AY**
Location:	**WALLAN**	Test date:	**25-Jul-19**

Test Number		90	91	92	93		
Test location taken from		Lot 1450	Lot 1449	Lot 1447	Lot 1446		
North corner of each Lot		7m S.E 6m S.W	8m S.E 6m S.W	3m S.E 18m S.W	4m S.E 16m S.W		
Layer Number		3	3	3	3		
Time of tests		13:30:00	13:40:00	13:55:00	14:10:00		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	2.07	2.02	2.08	2.06		
Field Dry Density	t/m³	1.69	1.63	1.68	1.68		
Field Moisture Content	%	22.0	24.0	24.0	21.5		
Oversize Material	Wet %	0	0	0	3		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.02	2.05	2.05	2.06		
Optimum Moisture Content	%	22.0	21.0	20.5	20.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**100**	**115**	**117**	**108**		
Moisture Variation	%	**0.0**	**3.0**	**3.5**	**1.5**		
Moisture Variation		**-**	**WET**	**WET**	**WET**		
Density Ratio	%	**102.5**	**98.5**	**101.5**	**100.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 29-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**AZ**
Location:	**WALLAN**	Test date:	**26-Jul-19**

Test Number		94	95	96	97		
Test location taken from		Lot 1445	Lot 1444	Lot 1445	Lot 1444		
North corner of Lot		11m S.E	5m S.E	3m S.E	12m S.E		
		17m S.W	16m S.W	27m S.W	16m S.W		
Layer Number		3	3	4	4		
Time of tests		10:10:00	10:15:00	14:15:00	14:30:00		
Depth of Layer	mm	300	300	300	300		
Depth of Test	mm	275	275	275	275		
Field Wet Density	t/m³	2.06	2.09	2.04	2.05		
Field Dry Density	t/m³	1.70	1.71	1.65	1.66		
Field Moisture Content	%	21.0	21.5	23.0	23.5		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.02	2.05	2.04	2.04		
Optimum Moisture Content	%	21.0	21.5	21.5	22.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**100**	**100**	**107**	**107**		
Moisture Variation	%	**0.0**	**0.0**	**1.5**	**1.5**		
Moisture Variation		**-**	**-**	**WET**	**WET**		
Density Ratio	%	**102.0**	**101.5**	**100.0**	**100.5**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 30-Jul-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BA**
Location:	**WALLAN**	Test date:	**30-Jul-19**

Test Number		98	99	100	101	102	
Test location taken from		Lot 1440	Lot 1428	Lot 1429	Lot 1433	Lot 1434	
North corber of each Lot		4m S.E 3m S.W	12m S.E 12m S.W	12m S.E 11m S.W	9m S.E 35m S.W	12m S.E 2m S.W	
Layer Number		4	3	3	2	1	
Time of tests		14:10:00	15:05:00	16:15:00	15:45:00	15:55:00	
Depth of Layer	mm	300	300	300	300	300	
Depth of Test	mm	275	275	275	275	275	
Field Wet Density	t/m³	2.07	2.05	2.07	1.97	2.02	
Field Dry Density	t/m³	1.73	1.68	1.69	1.48	1.63	
Field Moisture Content	%	20.0	22.0	22.5	33.0	24.0	
Oversize Material	Wet %	0	0	0	0	0	
Sieve Size	mm	19.0	19.0	19.0	19.0	19.0	
Peak Converted Wet Density	t/m³	2.03	2.00	2.05	1.91	1.92	
Optimum Moisture Content	%	20.5	21.5	22.5	30.5	23.5	
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	
Moisture Ratio	%	**98**	**103**	**100**	**108**	**102**	
Moisture Variation	%	**-0.5**	**0.5**	**0.0**	**2.5**	**0.5**	
Moisture Variation		**DRY**	**WET**	**-**	**WET**	**WET**	
Density Ratio	%	**102.0**	**102.5**	**101.0**	**103.5**	**105.0**	

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 01-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BB**
Location:	**WALLAN**	Test date:	**31-Jul-19**

Test Number		103	104	105	106		
Test location taken from		Lot 1434	Lot 1435	Lot 1436	Lot 1437		
North corner of each Lot		6m S.E 2m S.W	10m S.E 7m S.W	10m S.E 6m S.W	9m S.E 2m S.W		
Layer Number		3	3	3	3		
Time of tests		15:00:00	15:10:00	15:20:00	15:30:00		
Depth of Layer	mm	300	300	275	275		
Depth of Test	mm	275	275	250	275		
Field Wet Density	t/m³	2.02	2.01	2.00	2.02		
Field Dry Density	t/m³	1.63	1.58	1.55	1.59		
Field Moisture Content	%	23.5	27.5	29.0	26.5		
Oversize Material	Wet %	3	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.96	1.97	1.94	1.93		
Optimum Moisture Content	%	23.0	24.5	27.0	24.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**102**	**112**	**108**	**111**		
Moisture Variation	%	**0.5**	**3.0**	**2.0**	**2.5**		
Moisture Variation		**WET**	**WET**	**WET**	**WET**		
Density Ratio	%	**103.0**	**102.0**	**102.5**	**104.5**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown and yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 02-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BC**
Location:	**WALLAN**	Test date:	**1-Aug-19**

Test Number		107	108	109			
Test location taken from		Lot 1436	Lot 1434	Lot 1429			
North corner of each Lot		22m S.E 5m S.W	8m S.E 5m S.W	7m S.E 10m S.W			
Layer Number		4	5	4			
Time of tests		13:10:00	13:25:00	13:35:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.00	2.04	2.08			
Field Dry Density	t/m³	1.56	1.65	1.68			
Field Moisture Content	%	28.5	23.5	24.0			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.94	1.96	1.90			
Optimum Moisture Content	%	26.5	22.5	26.5			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**108**	**105**	**91**			
Moisture Variation	%	**2.0**	**1.0**	**-2.5**			
Moisture Variation		**WET**	**WET**	**DRY**			
Density Ratio	%	**103.5**	**104.0**	**109.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown / yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National Standards

Chris Senserrick
Approved Signatory
Date 05-Aug-19

Field Density Test Results

A C N 105 704 078

13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BD**
Location:	**WALLAN**	Test date:	**2-Aug-19**

Test Number		110	111	112	113		
Test location taken from		Lot 1428	Lot 1427	Lot 1402	Lot 1401		
North corner of each Lot		9m S.E	8m S.E	3m S.E	18m S.E		
		3m S.W	2m S.W	31m S.W	35m S.W		
Layer Number		4	4	3	2		
Time of tests		13:00:00	13:10:00	16:00:00	16:05:00		
Depth of Layer	mm	250	250	300	300		
Depth of Test	mm	225	225	275	275		
Field Wet Density	t/m³	1.99	2.01	2.02	2.01		
Field Dry Density	t/m³	1.59	1.63	1.58	1.58		
Field Moisture Content	%	25.0	23.5	27.5	27.5		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.98	2.00	1.98	1.97		
Optimum Moisture Content	%	22.0	22.0	24.0	25.5		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**114**	**107**	**115**	**108**		
Moisture Variation	%	**3.0**	**1.5**	**3.5**	**2.0**		
Moisture Variation		**WET**	**WET**	**WET**	**WET**		
Density Ratio	%	**100.5**	**100.5**	**102.0**	**102.0**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown / yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 06-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BE**
Location:	**WALLAN**	Test date:	**5-Aug-19**

Test Number		114	115				
Test location taken from		Lot 1401	Lot 1401				
North corner of each Lot		23m S.E	29m S.E				
		27m S.W	20m S.W				
Layer Number		4	5				
Time of tests		9:20:00	11:40:00				
Depth of Layer	mm	300	300				
Depth of Test	mm	275	275				
Field Wet Density	t/m³	2.05	2.02				
Field Dry Density	t/m³	1.66	1.66				
Field Moisture Content	%	23.0	21.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	2.04	2.06				
Optimum Moisture Content	%	21.5	20.0				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**107**	**108**				
Moisture Variation	%	**1.5**	**1.5**				
Moisture Variation		**WET**	**WET**				
Density Ratio	%	**100.5**	**98.0**				

Specification Requirements 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description silty CLAY, medium to high plasticity, brown / yellow mottled

Test Methods AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 07-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BF**
Location:	**WALLAN**	Test date:	**6-Aug-19**

Test Number		116	117	118		
Test location taken from		Lot 1401	Lot 1426	Lot 1424		
North corner of each Lot		13m S.E 43m S.W	12m S.E 7m S.W	12m S.E 10m S.W		
Layer Number		6	3	3		
Time of tests		13:00:00	13:10:00	13:25:00		
Depth of Layer	mm	300	200	200		
Depth of Test	mm	275	175	175		
Field Wet Density	t/m³	2.09	2.00	1.97		
Field Dry Density	t/m³	1.68	1.60	1.56		
Field Moisture Content	%	24.0	25.0	26.5		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.02	1.98	2.01		
Optimum Moisture Content	%	22.0	24.0	22.5		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**109**	**104**	**118**		
Moisture Variation	%	**2.0**	**1.0**	**4.0**		
Moisture Variation		**WET**	**WET**	**WET**		
Density Ratio	%	**103.5**	**101.0**	**98.5**		

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Tests #116 & 117: silty CLAY, medium to high plasticity, light brown

Test #118: silty CLAY, medium to high plasticity, brown / yellow mottled

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Tim Senserrick
Approved Signatory
Date 08-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BG**
Location:	**WALLAN**	Test date:	**7-Aug-19**

Test Number		119	120	121			
Test location taken from		Lot 1415	Lot 1415	Lot 1415			
North west corner of each Lot		35m South 11m East	13m South 26m East	23m South 17m East			
Layer Number		1	1	2			
Time of tests		15:20:00	15:35:00	15:45:00			
Depth of Layer	mm	300	300	300			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.05	2.03	2.01			
Field Dry Density	t/m³	1.64	1.62	1.61			
Field Moisture Content	%	23.5	25.5	25.0			
Oversize Material	Wet %	6	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	1.99	2.00	1.97			
Optimum Moisture Content	%	21.0	24.5	24.5			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**112**	**104**	**102**			
Moisture Variation	%	**2.5**	**1.0**	**0.5**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**102.5**	**101.5**	**102.0**			

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, light brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 09-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BH**
Location:	**WALLAN**	Test date:	**28-Aug-19**

Test Number		122	123				
Test location taken from		Lot 1415	Lot 1415				
North Corner of each Lot		22m South	12m South				
Offset (m)		8m East	15m East				
Layer Number		3	3				
Time of tests		14:00:00	14:15:00				
Depth of Layer	mm	300	300				
Depth of Test	mm	275	275				
Field Wet Density	t/m³	2.10	2.01				
Field Dry Density	t/m³	1.73	1.63				
Field Moisture Content	%	21.5	23.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	2.08	2.03				
Optimum Moisture Content	%	20.5	23.0				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**105**	**102**				
Moisture Variation	%	**1.0**	**0.5**				
Moisture Variation		**WET**	**WET**				
Density Ratio	%	**101.0**	**99.5**				

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: Silty CLAY, medium to high plasticity, brown.

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 30-Aug-19

Field Density Test Results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **Email** reception@groundscience.com.au

Client:	**BITU-MILL (CAMPBELLFIELD)**	Job No:	**GS4939/1**
Project:	**WALLARA WATERS - STAGE 14 (LEVEL 1)**	Report No.	**BI**
Location:	**WALLAN**	Test date:	**5-Sep-19**

Test Number		124	125				
Test location taken from North corner of each Lot		Lot 1415 15m South 20m East	Lot 1415 27m South 11m East				
Layer Number		4	4				
Time of tests		14:30:00	14:40:00				
Depth of Layer	mm	300	300				
Depth of Test	mm	275	275				
Field Wet Density	t/m³	2.04	2.07				
Field Dry Density	t/m³	1.66	1.68				
Field Moisture Content	%	22.5	23.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	2.01	2.03				
Optimum Moisture Content	%	22.5	22.0				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**100**	**107**				
Moisture Variation	%	**0.0**	**1.5**				
Moisture Variation		**-**	**WET**				
Density Ratio	%	**101.5**	**102.0**				

Specification Requirements: 95% Standard compaction

Notes: Moisture Variation: (-) indicates dry; (+) indicates wet

Material description: silty CLAY, medium to high plasticity, brown

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Chris Senserrick
Approved Signatory
Date 09-Sep-19