ABN 31 105 704 078
13 Brock Street, Thomastown
Victoria 3074
(P) +61 3 9464 4617
(F) +61 3 9464 4618

LEVEL 1 INSPECTION & TESTING ACACIA STAGE 3B & STAGE 4 BOTANIC RIDGE, VICTORIA

Prepared for PEET Botanic Village c/- GPR Consulting

Report Reference: GS4050.1 AB

Date: 16 May 2017

ABN 31 105 704 078

13 Brock Street, Thomastown

Victoria 3074

(P) +61 3 9464 4617

(F) +61 3 9464 4618

PROJECT DETAILS

Project Reference	GS4050.1	Rev	AB
Project Title	Acacia Estate, Stage 3B & Stage 4		
Project Location	Botanic Ridge	State	VIC
Date	16 May 2017		

CLIENT DETAILS

Prepared For (Client)	PEET Botanic Village
Project Facilitator	GPR Consulting

DISTRIBUTION

Original Held By	Ground Science Pty Ltd
One (1) Electronic Copy	GPR Consulting
One (1) Electronic Copy	PEET Botanic Village

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

AUTHOR:

Daniel Schorer
Geotechnical Engineer

REVIEWED:

Gee Singh
Senior Geotechnical Engineer

Table of Contents

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 Stage 3B and Stage 4 of the Acacia Estate, located in Botanic Ridge, Victoria (herein referred to as the 'site'). Ground Science was engaged to provide Level 1 Inspection and Testing services for this component of the project. Authorisation to proceed was provided by GPR Consulting on behalf of PEET Botanic Village (the 'Client').

Level 1 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". The Level 1 Inspection and Testing was undertaken by experienced geotechnicians from Ground Science.

2. SCOPE OF WORK

2.1 AREAS OF WORK

Ground Science provided Level 1 Inspection and Testing for the controlled fill placed as part of the construction of the residential estate. The areas on which controlled fill was placed is shown on site plan Figure 1 & 2 (presented in Appendix A), which is based on drawings prepared by GPR Consulting (ref: 0055-03B-R02 Rev 2 15/08/16 and ref: 0055-04-R03 Rev 2 15/08/2016). It is understood that the controlled fill was placed and compacted to approximately 100mm below the required finished level, to allow for up to 100mm of topsoil placement.

This report details the Level 1 earthworks process performed on site which commenced on 5th October 2015 and was completed on 9th May 2017 which included 13 full days of filling operations, which were observed on a fulltime basis by Ground Science technicians.

2.2 PLACEMENT SPECIFICATION

The placement of controlled fill on the above-mentioned areas was carried out in accordance with AS3798 (2007) "Guidelines on Earthworks for Commercial and Residential Developments". A Technical specification for the controlled fill placement was not provided. The following is a recommended specification based on the requirements of AS3798 (2007) Level 1 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 loose horizontal layers not exceeding 250mm in thickness;
- The fill shall be compacted to a Dry Density Ratio of at least 95% Standard (AS 1289: 5.1.1, 5.4.1 or 5.7.1) as per the project specification requirements;
- The fill is to be moisture conditioned to a moisture ratio of 85% – 115% of standard compaction (AS 1289 5.1.1, 5.4.1, or 5.7.1);
- The fill material shall not contain greater than 20% by volume, of particles coarser than 37.5mm and no particle over 200mm 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.

It should be noted that an existing decommissioned well located within allotment Lot 318 required backfilling using

suitable fill material. As per email correspondence between GPR Consulting and Ground Science (dated 23rd September 2016), it was advised that the decommissioned well, measuring approximately 2.5m x 3.0m (area) and 6.0m (depth) was to be backfilled using the following procedures:

- Ensure that the base of the well was cleaned of any loose material, soft, saturated soils including soil fall in or localised collapsible material;
- Backfill the well using stabilised sand to a depth of -2.0m below the surrounding surface level;
- Perform backfill from -2.0m to the surface to Level 1 procedures, using the same methods as described in the Placement Specification of this report.

3. INSPECTION AND TESTING

3.1 SUBGRADE PREPARATION

Site stripping was conducted with the use of excavators, graders and scrapers. Observations of the stripped base indicated all surface soils and vegetation/topsoil was removed resulting in stripping of between 100mm and 700mm across the allotments. The exposed subgrade was generally observed to be natural soils, including clays and silty clays.

It is understood that a well was located on Lot 318 which was measured to be approximately 6m deep. As per discussions between Ground Science and GPR Consulting (via email dated 23rd September 2017), the following instructions were provided for the well backfill, to be undertaken by the project contractor:

- The well should be covered to stop any rainfall from entering the excavated well zone;
- Ensure that the base of the well is clear of loose debris, water and caved-in material prior to filling;
- Commence backfill using stabilised sand to a depth of -2m (i.e. 2m below the finished surface level);
- The top 2.0m must be backfilled to Level 1 standards in accordance with AS3798 (2007) "Guidelines on Earthworks for Commercial and Residential Developments" as per other areas of the site using suitable fill material used on other areas;
- Suitably batter the excavations within the top 2.0m, to allow access for a padfoot roller and correct keying of the existing subgrade and well backfill material.

The moisture at subgrade level was assessed to range from dry to moist throughout the project. At the commencement of each fill placement area, the subgrade was test rolled. Where deflections and/or soft spots were not observed, these areas were deemed suitable for subsequent fill placement.

The prepared subgrade on Lots 432, 433 and 434 (standing surface water) were found to be generally poor and deflecting requiring de-watering and additional stripping (in the order of 150mm to 300mm) prior to the placement of fill.

3.2 CONSTRUCTION MATERIALS

Fill for the project is understood to have been sourced from onsite stockpiles generated from road boxing and sewer excavation works. Fill materials were hauled by dump trucks to the site and stockpiled adjacent to the fill area. The material was visually assessed to consist of clay/silty clay/gravelly clay which was observed to be generally grey/brown/orange. 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 acceptable for use on this project. It should be noted that no chemical analysis was conducted on the fill material. The maximum oversize particles within the fill matrix were observed to range up to 200mm. Where encountered, these were removed from the fill prior to placement. The fill source was assessed to be generally slightly dry to moist of optimum moisture content and was deemed suitable for use provided the fill was moisture conditioned before and during placement.

3.3 FILL CONSTRUCTION

The contractor had the following plant available on site during the construction period for use in the fill placement;

- Scraper;
- 815 Compactor;
- Padfoot Roller;
- Excavator;
- Grader;
- Dump Trucks.

During fill placement, the weather conditions were generally cool and sunny with typical temperature conditions during the works ranging from 15 to 25 degrees Celsius.

The filling process was generally consistent throughout the project. The fill material was hauled to the nominated placement areas by dump trucks and stockpiled. The 815 Compactor and dozer were used to spread the fill into thin loose layers over the nominated placement areas. Compaction was provided using the 815 Compactor and padfoot roller applying a minimum of 6 to 8 passes per layer. The thin layers were compacted to form one composite layer, measuring approximately 250mm to 300mm in depth. Generally, between 1 and 2 layers of fill were placed and compacted to achieve the required finished level. Lots 317 to 320 required up to 4 layers of fill to achieve the nominated finished levels.

Ground Science were not notified of the well backfill process performed on Lot 318. As a result, limited validation testing was undertaken on 13th April 2017. At the time of the validation testing, the well backfill and filling process (in the top 2m) adopted by the contractors was not known and as such these works cannot be verified as suitable. Ground Science undertook validation testing on 13th April 2017 which involved the performance of 3 field density tests at 3 locations within Lot 318. The field density tests were performed at levels of -0.6m, -0.8m and -1.0m below the existing finished surface level. The results are identified as test numbers #47 to #49.

Ground Science were also not present during filling works performed within lots 305 – 306, 336, 409 – 411, 416 – 425 and 439 – 440. It is understood that generally 1 to 2 layers were placed and compacted however these works cannot be verified as suitable. Ground Science performed validation testing within each of these lots on 21st April 2017. The results are identified as test numbers #50 to #68. Where validation tests failed, the areas were stripped of fill, re-placed and compacted with compliant test results achieved.

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. Figure 1 and 2 provides a guide to the fill placement and is limited to the areas described in this report. It should be noted that a further topsoil layer of approximately 100mm is expected to complete the finished levels of the fill and does not form part of the controlled fill. This layer is placed to provide a growing medium for grass and gardens. 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 75 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 75 "Rapid HILF" Compaction tests (AS1289 5.7.1).

A summary of the field density tests performed for the project is presented in Appendix B. Field density and compaction control testing results are presented on the NATA endorsed Field Density Test Reports in Appendix C. It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed.

It is noted that all tests met the minimum density requirement of 95% standard compaction with the exception of tests #13, #14, #15, #33, #52, #53, #54, #60 and #65. The areas of these tests were reworked and retested with compliant test results achieved. The HILF rapid compaction testing was undertaken in our NATA accredited Thomastown laboratory. The moisture conditioning was generally found to be around the optimum moisture content with several results falling outside this requirement.

The validation tests performed for the well backfill area on Lot 318 indicated that all 3 tests met the minimum required density ratio of 95% and moisture conditioning of within 85% and 115% of the optimum moisture content. Validation tests performed within lots 305 – 306, 336, 409 – 411, 416 – 425, 439 – 440 indicated 5 of the 18 tests did not meet the required density ratio. The areas of these tests were stripped of any placed fill and reworked with compliant test results achieved.

3.5 FINAL SURFACE LEVELS

Observations were made by a Ground Science staff member that filling had been complete up to the nominated finished levels as per confirmation provided from the contractor's site foreman that controlled fill operations were complete. 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 tactile 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 Figure 1 and 2. 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 stated intent of the Specification and 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 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 days 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 contractors 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.

On this basis, the well backfill process undertaken on Lot 318 cannot be validated by Ground Science and cannot be confirmed to have occurred as per our initial site instructions (detailed in Section 3.1 of this report) and AS3798 (2007).

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 his 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.

AUTHOR:

Daniel Schorer
Geotechnical Engineer

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.

APPENDIX A

Figure 1: Site Figures

Acacia – Stage 3B & Stage 4, Botanic Bridge

SITE AND TEST LOCATION PLAN

FIGURE 1

JOB NO: GS4050/1
DATE: 16/05/2017
DRAWN: DS
CHECKED: GS

LEGEND

● Field Density Test location

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site.
No guarantee is given that all existing services are shown.
Locate all underground services before commencement of works.
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NOTE: FENCING
1. CONSTRUCT FENCE ALONG COMMON BOUNDARY OF LOTS 309 & 310 WITH A RESERVE AS PER CASEY STANDARD DRAWING S-706.
2. VEHICLE EXCLUSION MEASURES WHERE ROADS ABUT A RESERVE ARE TO FORM PART OF THE LANDSCAPE WORKS.

NOTE: OPEN DRAINS
EXISTING OPEN DRAIN THROUGH LOTS 329 TO 336 TO BE EXCAVATED TO A SOUND BASE AND FILLED AS SPECIFIED.

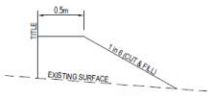
NOTE:
TREES SHOWN THUS TO BE REMOVED

TBM TABLE

No.	TYPE	EASTING	NORTHING	LEVEL
C21	STAR PICKET	349829.20	5776466.32	50.63
C42	STAR PICKET	350032.07	5776549.76	42.94
C43	STAR PICKET	349876.98	5776617.04	45.50
C55	RIVET IN KERB	350101.00	5776562.55	41.44

SERVICES OFFSET SCHEDULE

STREET NAME	ROAD RESERVE	BACK OF KERB	SEWER	GAS	NON DRINKING WATER	DRINKING WATER	COMMUNICATIONS	ELECTRICITY	LIGHT POLES
BOTTLETREE ROAD	18.00	5.20	1.00 S	2.25 S	2.70 S	3.20 S	1.85 N	2.60 N	4.40 N
DAISYBANK TERRACE	15.00	5.20 N / 2.20 S		2.25 N	2.70 N	3.20 N	0.50 S	1.00 S	1.40 S
NECTAR ROAD (LOT 316-329)	15.00	2.20 W / 5.20 E		2.25 E	2.70 E	3.20 E	0.50 W	1.00 W	1.40 W
NECTAR ROAD (LOT 308-304)	18.00	5.20	1.00 W	2.25 E	2.70 E	3.20 E	1.85 W	2.60 W	4.40 W
NECTAR ROAD (LOT 331)	18.00	5.20		2.25 W	2.70 W	3.20 W	1.85 E	2.60 E	4.40 E
STRINGYLEAF STREET	18.00	5.20		2.15 W	2.70 W	3.20 W	1.85 E	2.60 E	4.40 E



FOR CONTINUATION REFER TO 0055-03B-R03

Rev	Amendment	Des/Dft	App'd	Date
A	Initial Issue	GP/AW	MG	29/01/16
B	Title boundary changes	GP/AW	MG	23/02/16
C	Title and lot benching amendments	GP/AW	MG	30/03/16
D	Council amendments	GP/AW	MG	18/05/16
1	Approved for construction	GP/AW	MG	14/06/16
2	Road hump & driveway lot 303 relocated, lot 320 wall levels & drain 11-14 & 12-42 amended	GP	MG	15/08/16

Legend

Existing Drain	Drain & Property Inlet	Existing Surface Level at Title	136.12
Existing House Drain	House Drain	Finished Surface at Title	FS135.12
Existing Sewer	Sewer	Level at Top/Toe of Batter/Ridge	FT135.10
Existing Gas	Scala Drain	Centreline Chainage	CH60.37
Existing Electricity U/G	Gas & Water Conduits	Retaining Wall	
Existing Electricity O/H	Direction of Cut/ Fall	P/W / TBM	
Existing Communications	Direction of Overland Flow	Concrete Pavement Treatment	
Existing Drinking Water	Allotment to be Evenly Graded	Concrete Infill	
Existing Swale Drain	Vehicle Crossings	Structural Fill > 200mm	

Principal
acacia BOTANIC RIDGE
Peet Botanic Village Syndicate Ltd
Level 3, 492 St Kilda Road
Melbourne VIC 3004

GPR Consulting
GPR Consulting Pty Ltd
ABN 98 140 136 205
Suite 217, 202 Jells Road
Wheelers Hill Vic. 3150
Telephone (03) 8544 8400
© GPR Consulting Pty Ltd

Council: City of Casey
Project: Acacia, Botanic Ridge Stage 3B
Title: Layout Plan Sheet 1 of 2
Designed: G.Pratt | Authorised: M.Graham
Drafted: A.Wilkins | Date: January 2016
Scale @ A1: 1:500 (0 5 10 15 20 25)
Drawing No: 0055-03B-R02
Sheet: 02 of 25
Rev: 2

Ground Science

Acacia – Stage 3B & Stage 4, Botanic Bridge

SITE AND TEST LOCATION PLAN

FIGURE 2

JOB NO: GS4050/1
DATE: 16/05/2017
DRAWN: DS
CHECKED: GS

LEGEND

- Field Density Test location

Ground Science

APPENDIX B

Field Density Test Summary

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**GPR Consulting**	**Job No:**	**GS4050/1**
Project:	**Acacia - Stage 3B & Stage 4**	**Tech:**	**DVH/SL**
Location:	**Botanic Ridge**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
6/10/2016	1	20m North, 12m East from the South West Corner of lot 317	1	101.5	103.0	0.5	P	
6/10/2016	2	5m South, 5m West from the North East Corner of lot 318	2	95.5	102.0	115.0	P	
6/10/2016	3	5m South, 7m East from the North West corner of lot 320	3	101.5	115.0	3.0	P	
7/10/2016	4	5m South, 11m East from North West Corner of lot 320	F.S.L.	100.5	105.0	1.0	P	
7/10/2016	5	3m South, 9m East from North West Corner of lot 318	4	99.0	114.0	3.0	P	
7/10/2016	6	6m South, 11m East from North West Corner of lot 317	5	102.5	108.0	2.0	P	
10/10/2016	7	19m South, 5m East from North West Corner of Lot 324	1	99.0	100.0	0.0	P	
10/10/2016	8	20m South, 5m from North West Corner of Lot 322	1	101.0	95.0	-1.5	P	
10/10/2016	9	20m South, 7m East from North West Corner of Lot 321	1	101.5	120.0	-1.5	P	
10/10/2016	10	7m South, 5m East from North West Corner of Lot 325	2	102.0	116.0	3.0	P	
10/10/2016	11	6m South, 6m East from North West Corner of Lot 323	2	96.5	116.0	2.5	P	
10/10/2016	12	8m South, 5m East from North West Corner of Lot 321	2	101.0	106.0	1.0	P	
11/10/2016	13	13m North, 3m East from South West Corner of Lot 429	1	90.5	104.0	1.0	F	
11/10/2016	14	7m North, 5m East from South West Corner of Lot 430	1	90.5	103.0	0.5	F	
11/10/2016	15	3m North, 12m East from South West Corner of Lot 431	1	92.5	123.0	4.5	F	
13/10/2016	16	8m North, 12m East from South West Corner of Lot 429	1	101.5	106.0	1.0	P	Re-test of #13
13/10/2016	17	8m North, 10m East from South West Corner of Lot 430	1	102.5	100.0	0.0	P	Re-test of #14
13/10/2016	18	5m North, 8m East from South West Corner of Lot 431	1	98.0	126.0	4.5	P	Re-test of #15
13/10/2016	19	7m North, 5m East from South West Corner of Lot 427	1	100.5	119.0	4.0	P	
13/10/2016	20	8m North, 6m East from South West Corner of Lot 428	1	101.5	109.0	2.0	P	
13/10/2016	21	9m North, 15m East from South West Corner of Lot 429	2	98.0	105.0	1.0	P	
13/10/2016	22	8m North, 16m East from South West Corner of Lot 430	2	101.0	111.0	2.0	P	
13/10/2016	23	10m North, 18m East from South West Corner of Lot 431	2	100.0	102.0	0.5	P	
13/10/2016	24	12m North, 24m East from South West Corner of Lot 429	3	98.5	109.0	1.5	P	
13/10/2016	25	14m North, 24m East from South West Corner of Lot 430	3	99.0	100.0	0.0	P	
13/10/2016	26	4m North, 24m East from South West Corner of Lot 431	3	99.5	115.0	2.5	P	
14/10/2016	27	10m North, 6m East from South West Corner of Lot 427	2	98.5	108.0	1.5	P	
14/10/2016	28	8m North, 15m east from South West Corner of Lot 429	4	98.5	108.0	1.5	P	
14/10/2016	29	7m North, 16m East from South West Corner of Lot 431	4.0	101.0	100.0	0.0	P	
19/10/2016	30	12m North, 8m East from South West Corner of Lot 329	1.0	103.0	100.0	0.0	P	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**GPR Consulting**	**Job No:**	**GS4050/1**
Project:	**Acacia - Stage 3B & Stage 4**	**Tech:**	**DVH/SL**
Location:	**Botanic Ridge**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
19/10/2016	31	14m North, 7m East from South West Corner of Lot 328	1	98.0	103.0	0.5	P	
19/10/2016	32	8m North, 14m East from South West Corner of Lot 327	1	98.5	109.0	1.5	P	
20/10/2016	33	7m North, 7m East from South West Corner of Lot 326	2	94.0	162.0	6.5	F	
20/10/2016	34	8m North, 8m East from South West Corner of Lot 328	2	97.5	103.0	0.5	P	
20/10/2016	35	9m North, 8m East from South West Corner of Lot 330	2	104.5	102.0	0.5	P	
20/10/2016	36	7m North, 14m East from South West Corner of Lot 433	1	98.5	105.0	1.0	P	
21/10/2016	37	8m North, 7m East from South West Corner of Lot 326	2	97.5	138.0	4.5	P	Re-test of #33
25/10/2016	38	5m North, 5m East from South West Corner of Lot 335	1	96.5	119.0	3.5	P	
25/10/2016	39	6m North, 5m East from South West Corner of Lot 433	2	97.0	105.0	1.0	P	
26/10/2016	40	25m North, 4m East from South West Corner of Lot 301	1	105.5	83.0	-5.0	P	
26/10/2016	41	8m North, 8m East from South West Corner of Lot 433	3	103.5	94.0	-1.5	P	
26/10/2016	42	10m North, 7m East from South West Corner of Lot 434	1	98.5	108.0	1.5	P	
26/10/2016	43	20m North, 2m East from South West Corner of Lot 301	2	99.5	103.0	0.5	P	
26/10/2016	44	22m North, 12m East from South West Corner of Lot 303	1	98.5	98.0	-0.5	P	
17/03/2017	45	10m North, 10m West from South East Corner of Lot 318	F.S.L.	95.5	85.0	-2.0	P	
17/03/2017	46	6m North, 4m West from South East Corner of Lot 319	F.S.L.	98.0	86.0	-3.0	P	
13/04/2017	47	15m South, 2m West from North East Corner of Lot 318	-0.6	96.5	108.0	2.0	P	
13/04/2017	48	15m South, 2m West from North East Corner of Lot 318	-0.8	99.5	107.0	1.5	P	
13/04/2017	49	16m South, 2.5m West from North East Corner of Lot 318	-1.0	101.0	100.0	0.0	P	
21/04/2017	50	5m South 14m West from North East Corner of Lot 305	1	103.0	98.0	-0.5	P	
21/04/2017	51	7m South 16m West from North East Corner of Lot 306	1	102.5	92.0	-1.5	P	
21/04/2017	52	10m West from North East Corner of Lot 336	1	92.0	100.0	0.0	F	
21/04/2017	53	16m South 5m West from North East Corner of Lot 410	1	94.0	78.0	-2.5	F	
21/04/2017	54	16m South 5m West from North East Corner of Lot 411	1	93.5	82.0	-3.0	F	
21/04/2017	55	18m South 5m West from North East Corner of Lot 440	1	102.5	100.0	0.0	P	
21/04/2017	56	6m South 5m West from North East Corner of Lot 421	1	95.5	103.0	0.5	P	
21/04/2017	57	8m South 6m West from North East Corner of Lot 422	1	98.5	103.0	0.5	P	
21/04/2017	58	9m South 8m West from North East Corner of Lot 423	1	100.5	90.0	-2.5	P	
21/04/2017	59	19m South 5m West from North East Corner of Lot 439	1	99.0	104.0	1.0	P	
21/04/2017	60	6m South 6m West from North East Corner of Lot 426	1	93.5	90.0	-2.5	F	

LEVEL 1 - COMPACTION TEST SUMMARY

Client:	**GPR Consulting**	**Job No:**	**GS4050/1**
Project:	**Arcacia - Stage 3B & Stage 4**	**Tech:**	**DVH/SL**
Location:	**Botanic Ridge**		

Date	Test No.	Location	Layer No.	Density Ratio (%)	Moisture Ratio (%)	Moisture variation	(P) Pass (F) Fail	Comments
21/04/2017	61	North East Corner of Lot 416 / 18m South 13m West	FSL	103.0	86.0	-3.0	P	
21/04/2017	62	North East Corner of Lot 417 / 7m South 5m West	FSL	98.0	82.0	-2.5	P	
21/04/2017	63	North East Corner of Lot 418 / 6m South 2m West	FSL	97.0	87.0	-2.5	P	
21/04/2017	64	North East Corner of Lot 419 / 7m South 4m West	FSL	99.5	103.0	0.5	P	
21/04/2017	65	North East Corner of Lot 420 / 8m South 6m West	FSL	90.0	100.0	0.0	F	
21/04/2017	66	North East Corner of Lot 424 / 15m South 4m West	FSL	99.5	103.0	0.5	P	
21/04/2017	67	North East Corner of Lot 425 / 16m South 8m West	FSL	104.0	90.0	-2.0	P	
21/04/2017	68	North East Corner of Lot 409 / 6m South 4m West	FSL	96.5	72.0	-5.0	P	
9/05/2017	69	North East Corner of Lot 410 / 31m South 6m West	1	97.0	100.0	0.0	P	Re-test #53
9/05/2017	70	North East Corner of Lot 410 / 31m South 8m West	2	100.0	111.0	2.5	P	
9/05/2017	71	North East Corner of Lot 411 / 29m South 6m West	1	97.0	103.0	0.5	P	Re-test #54
9/05/2017	72	North East Corner of Lot 411 / 30m South 9m West	2	101.5	103.0	0.5	P	
9/05/2017	73	North East Corner of Lot 336 / 22m South 10m West	1	101.5	103.0	0.5	P	Re-test #52
9/05/2017	74	North East Corner of Lot 420 / 21m South 2m West	1	98.5	103.0	0.5	P	Re-test #65
9/05/2017	75	North East Corner of Lot 426 / 1m South 10m West	1	101.0	103.0	0.5	P	Re-test #60
	76							
	77							
	78							
	79							
	80							
	81							
	82							
	83							
	84							
	85							
	86							
	87							
	88							
	89							
	90							

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 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AA**
location :	**BOTANIC RIDGE**	test date:	**6-Oct-16**

Test Number		1	2	3			
Test location from							
North / West corner of Lot		10m	10m	9m			
Offset (m)		10m	7m	6m			
Lot Number		317	318	320			
Fill Height (mm)		300	600	900			
Layer Number		1	2	3			
Time of tests		-	-	-			
Depth of Test	mm	275	275	275			
Field Wet Density	t/m³	2.078	1.928	2.076			
*Field Moisture Content	%	21.0	25.0	23.0			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m³	2.047	2.020	2.041			
*Optimum Moisture Content	%	20.5	24.5	20.0			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**103**	**102**	**115**			
Moisture Variation	%	**0.5**	**0.5**	**3.0**			
Moisture Variation		**WET**	**WET**	**WET**			
Density Ratio	%	**101.5**	**95.5**	**101.5**			

Specification Requirements: 95% Standard compaction

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

Material description: CLAY, medium to high plasticity, yellow

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 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AB**
location :	**BOTANIC RIDGE**	test date:	**7-Oct-16**

Test Number		4	5	6		
Test location from North West Corner Offset (m)		5m South 11m East	3m South 9m East	6m South 11m East		
Lot Number		320	318	317		
Layer Number		F.S.L	4	5		
Time of tests		-	-	-		
Depth of Test	mm	275	275	275		
Field Wet Density	t/m³	2.010	2.008	2.023		
*Field Moisture Content	%	21.0	24.5	28.0		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.995	2.025	1.976		
*Optimum Moisture Content	%	20.0	21.5	26.0		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**105**	**114**	**108**		
Moisture Variation	%	**1.0**	**3.0**	**2.0**		
Moisture Variation		**WET**	**WET**	**WET**		
Density Ratio	%	**100.5**	**99.0**	**102.5**		

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AC**
location :	**BOTANIC RIDGE**	test date:	**10-Oct-16**

Test Number		7	8	9	10	11	12
Test location from North West Corner of Lots		19m South 5m East	20m South 5m East	20m South 7m East	7m South 5m East	6m South 6m East	8m South 5m East
Lot Number		324	322	321	325	323	321
Layer Number		1	1	1	2	2	2
Time of tests		-	-	-	-	-	-
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m³	1.902	1.890	2.088	2.091	2.013	2.073
*Field Moisture Content	%	27.5	28.0	18.5	22.5	18.0	19.0
Oversize Material	Wet %	0	0	0	0	0	0
Sieve Size	mm	19.0	19.0	19.0	0.0	0.0	0.0
Peak Converted Wet Density	t/m³	1.921	1.869	2.056	2.050	2.086	2.048
*Optimum Moisture Content	%	27.5	29.5	15.5	19.5	15.5	18.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**100**	**95**	**120**	**116**	**116**	**106**
Moisture Variation	%	**0.0**	**-1.5**	**3.0**	**3.0**	**2.5**	**1.0**
Moisture Variation		**-**	**DRY**	**WET**	**WET**	**WET**	**WET**
Density Ratio	%	**99.0**	**101.0**	**101.5**	**102.0**	**96.5**	**101.0**

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AD**
location :	**BOTANIC RIDGE**	test date:	**11-Oct-16**

Test Number		13	14	15		
Test location from		#429	#430	#431		
South West Corner of Lot No.		13m North	7m North	3m North		
Offset (m)		3m East	5m East	12m East		
Layer Number		1	1	1		
Time of tests		-	-	-		
Depth of Test	mm	200	200	200		
Field Wet Density	t/m³	1.809	1.775	1.934		
*Field Moisture Content	%	28.0	16.5	24.0		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	1.994	1.964	2.090		
*Optimum Moisture Content	%	27.0	16.0	19.5		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**104**	**103**	**123**		
Moisture Variation	%	**1.0**	**0.5**	**4.5**		
Moisture Variation		**WET**	**WET**	**WET**		
Density Ratio	%	**90.5**	**90.5**	**92.5**		

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AE**
location :	**BOTANIC RIDGE**	test date:	**13-Oct-16**

Test Number		16	17	18	19	20	
Test location from		#429	#430	#431	#427	#428	
South West Corner of Lot No.		8m North	8m North	5m North	7m North	8m North	
Offset (m)		12m East	10m East	8m East	5m East	6m East	
Layer Number		1	1	1	1	1	
Time of tests		-	-	-	-	-	
Depth of Test	mm	200	200	200	200	200	
Field Wet Density	t/m³	2.101	2.118	2.054	2.010	2.024	
*Field Moisture Content	%	19.5	17.5	22.0	25.5	24.5	
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	2.069	2.064	2.098	2.003	1.993	
*Optimum Moisture Content	%	18.5	17.5	17.5	21.5	22.5	
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	
Moisture Ratio	%	**106**	**100**	**126**	**119**	**109**	
Moisture Variation	%	**1.0**	**0.0**	**4.5**	**4.0**	**2.0**	
Moisture Variation		**WET**	**-**	**WET**	**WET**	**WET**	
Density Ratio	%	**101.5**	**102.5**	**98.0**	**100.5**	**101.5**	

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AF**
location :	**BOTANIC RIDGE**	test date:	**13-Oct-16**

Test Number		21	22	23	24	25	26
Test location from		#429	#430	#431	#429	#430	#431
South West Corner of Lot No.		9m North	8m North	10m North	12m North	14m North	4m North
Offset (m)		15m East	16m East	18m East	24m East	24m East	24m East
Layer Number		2	2	2	3	3	3
Time of tests		-	-	-	-	-	-
Depth of Test	mm	200	200	200	200	200	200
Field Wet Density	t/m³	2.003	2.081	1.998	2.043	2.034	2.034
*Field Moisture Content	%	22.5	21.0	23.0	19.5	20.0	19.5
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	2.045	2.059	2.002	2.079	2.053	2.041
*Optimum Moisture Content	%	21.5	19.0	22.5	18.0	20.0	17.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**105**	**111**	**102**	**109**	**100**	**115**
Moisture Variation	%	**1.0**	**2.0**	**0.5**	**1.5**	**0.0**	**2.5**
Moisture Variation		**WET**	**WET**	**WET**	**WET**	**-**	**WET**
Density Ratio	%	**98.0**	**101.0**	**100.0**	**98.5**	**99.0**	**99.5**

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AG**
location :	**BOTANIC RIDGE**	test date:	**14-Oct-16**

Test Number		27	28	29		
Test location from		#427	#429	#431		
South West Corner of Lot No.		10m North	8m North	7m North		
Offset (m)		6m East	15m East	16m East		
Layer Number		2	4	4		
Time of tests		-	-	-		
Depth of Test	mm	200	200	200		
Field Wet Density	t/m³	2.030	1.993	2.060		
*Field Moisture Content	%	20.5	21.0	19.0		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.056	2.028	2.043		
*Optimum Moisture Content	%	19.0	19.5	19.0		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**108**	**108**	**100**		
Moisture Variation	%	**1.5**	**1.5**	**0.0**		
Moisture Variation		**WET**	**WET**	**-**		
Density Ratio	%	**98.5**	**98.5**	**101.0**		

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AH**
location :	**BOTANIC RIDGE**	test date:	**19-Oct-16**

Test Number		30	31	32		
Test location from		#329	#328	#327		
South West Corner of Lot		12m North	14m North	8m North		
Offset (m)		8m East	7m East	14m East		
Layer Number		1	1	1		
Time of tests		-	-	-		
Depth of Test	mm	225	225	225		
Field Wet Density	t/m³	2.129	2.054	2.052		
*Field Moisture Content	%	18.5	19.5	19.5		
Oversize Material	Wet %	0	0	0		
Sieve Size	mm	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.063	2.100	2.083		
*Optimum Moisture Content	%	18.5	19.0	18.0		
Compactive Effort Used	std / mod	STD	STD	STD		
Moisture Ratio	%	**100**	**103**	**109**		
Moisture Variation	%	**0.0**	**0.5**	**1.5**		
Moisture Variation		**-**	**WET**	**WET**		
Density Ratio	%	**103.0**	**98.0**	**98.5**		

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AI**
location :	**BOTANIC RIDGE**	test date:	**20-Oct-16**

Test Number		33	34	35	36		
Test location from		#326	#328	#330	#433		
South West Corner of Lot No.		7m North	8m North	9m North	7m North		
Offset (m)		7m East	8m East	8m East	14m East		
Layer Number		2	2	2	1		
Time of tests		-	-	-	-		
Depth of Test	mm	225	225	225	225		
Field Wet Density	t/m³	2.004	2.083	2.022	1.990		
*Field Moisture Content	%	17.0	16.5	26.5	23.0		
Oversize Material	Wet %	0	0	0	0		
Sieve Size	mm	19.0	19.0	19.0	19.0		
Peak Converted Wet Density	t/m³	2.137	2.132	1.936	2.015		
*Optimum Moisture Content	%	10.5	16.0	26.0	22.0		
Compactive Effort Used	std / mod	STD	STD	STD	STD		
Moisture Ratio	%	**162**	**103**	**102**	**105**		
Moisture Variation	%	**6.5**	**0.5**	**0.5**	**1.0**		
Moisture Variation		**WET**	**WET**	**WET**	**WET**		
Density Ratio	%	**94.0**	**97.5**	**104.5**	**98.5**		

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

Test Methods: AS1289 5.8.1 5.7.1 2.1.1 1.2.1 (6.4)

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Approved Signatory
Date 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AJ**
location :	**BOTANIC RIDGE**	test date:	**21-Oct-16**

Test Number		37					
Test location from		#326					
South West Corner of Lot No.		8m North					
Offset (m)		7m East					
Layer Number		2					
Time of tests		-					
Depth of Test	mm	225					
Field Wet Density	t/m³	2.053					
*Field Moisture Content	%	16.5					
Oversize Material	Wet %	0					
Sieve Size	mm	19.0					
Peak Converted Wet Density	t/m³	2.101					
*Optimum Moisture Content	%	12.0					
Compactive Effort Used	std / mod	STD					
Moisture Ratio	%	**138**					
Moisture Variation	%	**4.5**					
Moisture Variation		**WET**					
Density Ratio	%	**97.5**					

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

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 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AK**
location :	**BOTANIC RIDGE**	test date:	**25-Oct-16**

Test Number		38	39				
Test location from		#335	#433				
South West Corner of Lot No.		5m North	6m North				
Offset (m)		5m East	5m East				
Layer Number		1	2				
Time of tests		-	-				
Depth of Test	mm	150	225				
Field Wet Density	t/m³	1.998	1.998				
*Field Moisture Content	%	22.0	23.0				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m³	2.073	2.061				
*Optimum Moisture Content	%	18.5	22.0				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**119**	**105**				
Moisture Variation	%	**3.5**	**1.0**				
Moisture Variation		**WET**	**WET**				
Density Ratio	%	**96.5**	**97.0**				

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

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 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **F** 03 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AL**
location :	**BOTANIC RIDGE**	test date:	**26-Oct-16**

Test Number		40	41	42	43	44	
Test location from		#301	#433	#434	#301	#303	
South West Corner of Lot No.		25m North	8m North	10m North	20m North	22m North	
Offset (m)		4m East	8m East	7m East	2m East	12m East	
Layer Number		1	3	1	2	1	
Time of tests		-	-	-	-	-	
Depth of Test	mm	225	225	225	225	225	
Field Wet Density	t/m³	1.994	2.052	2.054	2.024	2.011	
*Field Moisture Content	%	23.5	21.0	22.0	21.0	20.5	
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	1.889	1.984	2.081	2.036	2.040	
*Optimum Moisture Content	%	28.5	22.5	20.5	20.5	21.0	
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	
Moisture Ratio	%	**83**	**94**	**108**	**103**	**98**	
Moisture Variation	%	**-5.0**	**-1.5**	**1.5**	**0.5**	**-0.5**	
Moisture Variation		**DRY**	**DRY**	**WET**	**WET**	**DRY**	
Density Ratio	%	**105.5**	**103.5**	**98.5**	**99.5**	**98.5**	

Specification Requirements: 95% Standard compaction

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

Material description: CLAY (Fill)

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 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AM**
location :	**BOTANIC RIDGE**	test date:	**17-Mar-17**

Test Number		45	46				
Test location taken from		South East Corner of Lot 318	South East Corner of Lot 319				
Offset (m)		10m North 10m West	6m North 4m West				
Layer Number		Finish	Finish				
Time of tests		11:45:00	11:55:00				
Depth of Layer	mm	200	150				
Depth of Test	mm	175	125				
Field Wet Density	t/m^3	1.98	1.93				
*Field Moisture Content	%	11.0	18.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m^3	2.065	1.971				
*Optimum Moisture Content	%	13.0	21.5				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**85**	**86**				
Moisture Variation	%	**-2.0**	**-3.0**				
Moisture Variation		**DRY**	**DRY**				
Density Ratio	%	**95.5**	**98.0**				

Specification Requirements: 95% Standard compaction

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

Material description: Sandy 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 27-Mar-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AN**
location :	**BOTANIC RIDGE**	test date:	**13-Apr-17**

Test Number		47	48	49			
Test location taken from North East Corner Backfill in Well on Lot 318		15m South 2m West	15m South 2m West	16m South 2.5m West			
Depth of Layer below F.S.L (m)		-0.6m	-0.8m	-1.0m			
Time of tests		8:20:00	8:25:00	8:30:00			
Depth of Layer	mm	200	200	200			
Depth of Test	mm	175	175	175			
Field Wet Density	t/m^3	1.89	2.03	2.08			
*Field Moisture Content	%	27.0	22.5	22.5			
Oversize Material	Wet %	0	0	0			
Sieve Size	mm	19.0	19.0	19.0			
Peak Converted Wet Density	t/m^3	1.957	2.038	2.063			
*Optimum Moisture Content	%	25.0	21.0	22.5			
Compactive Effort Used	std / mod	STD	STD	STD			
Moisture Ratio	%	**108**	**107**	**100**			
Moisture Variation	%	**2.0**	**1.5**	**0.0**			
Moisture Variation		**WET**	**WET**	**-**			
Density Ratio	%	**96.5**	**99.5**	**101.0**			

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY, medium plasticity, mottled grey & 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 19-Apr-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE B3 & STAGE 4 (LEVEL 1)**	report No.	**AQ**
location :	**BOTANIC RIDGE**	test date:	**21-Apr-17**

Test Number		50	51	52	53	54	55
Test location taken from		Lot #305	Lot #306	Lot #336	Lot #410	Lot #411	Lot #440
North East Corner		5m South	7m South	-	16m South	16m South	18m South
Offset (m)		14m West	16m West	10m West	5m West	5m West	5m West
Layer Number		1	1	1	1	1	1
Time of tests		9:30:00	9:40:00	9:50:00	10:00:00	10:10:00	10:20:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	275	275	275
Field Wet Density	t/m^3	2.12	2.09	1.90	1.87	1.83	1.96
*Field Moisture Content	%	18.5	16.0	19.0	8.5	13.0	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/m^3	2.062	2.036	2.063	1.982	1.953	1.920
*Optimum Moisture Content	%	19.0	17.5	19.0	11.0	16.0	23.5
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**98**	**92**	**100**	**78**	**82**	**100**
Moisture Variation	%	**-0.5**	**-1.5**	**0.0**	**-2.5**	**-3.0**	**0.0**
Moisture Variation		**DRY**	**DRY**	**-**	**DRY**	**DRY**	**-**
Density Ratio	%	**103.0**	**102.5**	**92.0**	**94.0**	**93.5**	**102.5**

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY medium 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 27-Apr-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE B3 & STAGE 4 (LEVEL 1)**	report No.	**AR**
location :	**BOTANIC RIDGE**	test date:	**21-Apr-17**

Test Number		56	57	58	59	60	
Test location taken from		Lot #421	Lot #422	Lot #423	Lot #439	Lot #426	
North East Corner		6m South	8m South	9m South	19m South	6m South	
Offset (m)		5m West	6m West	8m West	5m West	6m West	
Layer Number		1	1	1	1	1	
Time of tests		10:40:00	10:50:00	11:15:00	11:30:00	11:45:00	
Depth of Layer	mm	300	300	300	300	300	
Depth of Test	mm	275	275	275	275	275	
Field Wet Density	t/m^3	1.89	1.98	1.94	1.90	1.93	
*Field Moisture Content	%	21.5	17.0	22.5	25.5	21.5	
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/m^3	1.984	2.014	1.935	1.919	2.063	
*Optimum Moisture Content	%	21.0	16.5	25.0	24.5	24.0	
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	
Moisture Ratio	%	**103**	**103**	**90**	**104**	**90**	
Moisture Variation	%	**0.5**	**0.5**	**-2.5**	**1.0**	**-2.5**	
Moisture Variation		**WET**	**WET**	**DRY**	**WET**	**DRY**	
Density Ratio	%	**95.5**	**98.5**	**100.5**	**99.0**	**93.5**	

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY medium 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 26-Apr-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE B3 & STAGE 4 (LEVEL 1)**	report No.	**AO**
location :	**BOTANIC RIDGE**	test date:	**21-Apr-17**

Test Number		61	62	63	64	65	66
Test location taken from North East Corner of Lot No.		#416	#417	#418	#419	#420	#424
Offset (m)		18m South 13m West	7m South 5m West	6m South 2m West	7m South 4m West	8m South 6m West	15m South 4m West
Time of tests		10:25:00	10:40:00	10:50:00	11:00:00	11:10:00	11:16:00
Depth of Layer	mm	300	300	300	300	300	300
Depth of Test	mm	275	275	275	150	150	250
Field Wet Density	t/m^3	1.85	1.98	1.91	2.03	1.77	2.00
*Field Moisture Content	%	18.0	11.0	17.0	20.0	21.5	18.0
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/m^3	1.787	2.027	1.962	2.039	1.967	2.006
*Optimum Moisture Content	%	21.0	13.5	19.5	19.5	21.5	17.5
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**86**	**82**	**87**	**103**	**100**	**103**
Moisture Variation	%	**-3.0**	**-2.5**	**-2.5**	**0.5**	**0.0**	**0.5**
Moisture Variation		**DRY**	**DRY**	**DRY**	**WET**	**-**	**WET**
Density Ratio	%	**103.0**	**98.0**	**97.0**	**99.5**	**90.0**	**99.5**

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY medium plasticity grey/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-Apr-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AP**
location :	**BOTANIC RIDGE**	test date:	**21-Apr-17**

Test Number		67	68				
Test location taken from North East Corner of Lot No. Offset (m)		#425 16m South 8m West	#409 6m South 4m East				
Time of tests		11:30:00	11:50:00				
Depth of Layer	mm	275	175				
Depth of Test	mm	250	150				
Field Wet Density	t/m^3	2.00	1.84				
*Field Moisture Content	%	17.5	12.5				
Oversize Material	Wet %	0	0				
Sieve Size	mm	19.0	19.0				
Peak Converted Wet Density	t/m^3	1.922	1.909				
*Optimum Moisture Content	%	19.5	17.5				
Compactive Effort Used	std / mod	STD	STD				
Moisture Ratio	%	**90**	**72**				
Moisture Variation	%	**-2.0**	**-5.0**				
Moisture Variation		**DRY**	**DRY**				
Density Ratio	%	**104.0**	**96.5**				

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY medium plasticity grey/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 15-May-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AS**
location :	**BOTANIC RIDGE**	test date:	**9-May-17**

Test Number		69	70	71	72	73	74
Test location taken from		Lot 410	Lot 410	Lot 411	Lot 411	Lot 336	Lot 420
North East Corner of Lot		31m South 6m West	31m South 8m West	29m South 6m West	30m South 9m West	22m South 10m West	21m South 2m West
Layer Number		1	1	1	1	1	1
Time of tests		10:45:00	11:00:00	11:10:00	11:35:00	12:30:00	13:10:00
Depth of Layer	mm	250	250	250	225	275	200
Depth of Test	mm	225	200	225	200	250	175
Field Wet Density	t/m^3	1.96	2.00	1.99	2.10	2.16	2.02
*Field Moisture Content	%	15.5	26.0	17.5	16.5	16.0	16.5
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/m^3	2.021	1.992	2.052	2.072	2.127	2.045
*Optimum Moisture Content	%	15.5	23.5	17.0	16.0	15.5	16.0
Compactive Effort Used	std / mod	STD	STD	STD	STD	STD	STD
Moisture Ratio	%	**100**	**111**	**103**	**103**	**103**	**103**
Moisture Variation	%	**0.0**	**2.5**	**0.5**	**0.5**	**0.5**	**0.5**
Moisture Variation		**-**	**WET**	**WET**	**WET**	**WET**	**WET**
Density Ratio	%	**97.0**	**100.0**	**97.0**	**101.5**	**101.5**	**98.5**

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY, medium plasticity, mottled red, brown & grey, with gravel.

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-May-17

field density test results

A C N 105 704 078
13 Brock Street Thomastown Vic, **P** 03 9464 4617 **F** 9464 4618

client :	**GPR CONSULTING (WHEELERS HILL)**	job No:	**GS4050/1**
project :	**ACACIA - STAGE 3B & STAGE 4 (LEVEL 1)**	report No.	**AT**
location :	**BOTANIC RIDGE**	test date:	**9-May-17**

Test Number		75					
Test location taken from		Lot 426					
North East Corner of Lot		1m South					
		10m West					
Layer Number		1					
Time of tests		14:10:00					
Depth of Layer	mm	200					
Depth of Test	mm	175					
Field Wet Density	t/m^3	2.09					
*Field Moisture Content	%	18.0					
Oversize Material	Wet %	0					
Sieve Size	mm	19.0					
Peak Converted Wet Density	t/m^3	2.069					
*Optimum Moisture Content	%	17.5					
Compactive Effort Used	std / mod	STD					
Moisture Ratio	%	**103**					
Moisture Variation	%	**0.5**					
Moisture Variation		**WET**					
Density Ratio	%	**101.0**					

Specification Requirements: 95% Standard compaction

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

Material description: Silty CLAY, medium plasticity, mottled red, brown & grey,with gravel.

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-May-17