



PRELIMINARY GEOTECHNICAL INVESTIGATION

Proposed Subdivision Development

**112 – 126 OLD WARRANDYTE ROAD
DONVALE, VICTORIA**

Prepared for Mullum Pty Ltd C/- Verve Projects Pty Ltd

**20 June 2014
G2698.1 AA**

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GEOTECHNICAL

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PROJECT DETAILS

Project Reference	G2698.1	Rev	AA
Project Title	112 – 126 Old Warrandyte Road		
Project Location	Donvale	State	VIC
Date	20/06/2014		

CLIENT DETAILS

Prepared For (Client)	Verve Projects Pty Ltd		
Project Principal	Mullum Pty Ltd		
Client Address	Level 1, 39 Little Collins Street	Suburb	Melbourne

DISTRIBUTION

Original Held By	Ground Science Pty Ltd
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This document presents the results of the preliminary geotechnical investigation conducted 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.

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preliminary geotechnical investigation

1. INTRODUCTION

Ground Science Pty Ltd (Ground Science) has prepared this report to present the results of the preliminary geotechnical investigation for the proposed subdivision development to be located at 112 – 126 Old Warrandyte Road, Donvale, Victoria (herein referred to as the “site”). The commission was performed at the request of Daniel Dietrich of Verve Projects Pty Ltd (herein referred to as the ‘Client’) on behalf of Mullum Pty Ltd (herein referred to as the ‘Principal’).

It is understood that the proposed development will comprise of 56 residential allotments, internal access roads and associated underground services. Minor earthworks to construct building platforms will also form part of the development. The scope of works for this geotechnical investigation was conducted in general accordance with Ground Science proposal GSP2014043 AA dated 15 May 2014, which was prepared in response to the Client’s brief dated 9 May 2014.

The professional advice provided in this report is based on the information provided at the time of the report preparation and may not be valid if changes are made to the site, the development proposal or the construction methods. In the event of such changes, further advice should be sought from Ground Science.

2. OBJECTIVES

The objectives of the investigation were as follows:

- Assess the subsurface conditions at the site relevant to the proposed development;
- To provide a preliminary site classification for the proposed allotments;
- Provide preliminary advice regarding suitable founding systems;
- To provide comments and recommendations regarding excavation conditions and construction of controlled fill.

3. SCOPE OF WORKS

3.1 FIELDWORK

The fieldwork was performed on 30 May 2014 and comprised the excavation of 19 test pits (TP1 – TP19) at the locations shown on Figures 1 - 3 in Appendix A. The test pits were excavated with the use of a tracked excavator supplied and operated by Fry’s Earthmoving services and were extended to depths of between 0.6m and 2.3m below the existing surface levels. Soil samples were recovered from selected test pits for visual assessment and laboratory testing. On completion the test pits were backfilled with the excavated spoil and surface track rolled with the excavator.

The fieldwork was performed by a suitably qualified engineering geologist from Ground Science who located the test pits, supervised the drilling, recovered test samples and logged the soils.

3.2 LABORATORY TESTING

The laboratory testing comprised of 5 shrink/swell index (I_{ss}) tests, retrieved from the natural soils. The laboratory tests were conducted in Ground Science’s NATA accredited in-house testing facility located in Thomastown, Victoria. The results of these tests have been considered in the preparation of this report and



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are presented in Appendix C.

4. GEOLOGY

The Geological Survey of Victoria Ringwood mapsheet (scale 1:63,360) indicates the site is situated over Silurian aged Anderson Creek Formation siltstones and sandstones. Quaternary aged alluvial soils are expected to exist adjacent to the Mullum Mullum Creek. It should be noted that this desktop study does not take into account potential fill soils which may exist within the existing earth dams and where existing dwellings are located.

5. SITE DESCRIPTION

The site is bordered by Illawong Drive and Mullum Drive to the south and Old Warrandyte Road to the west and north. Mullum Mullum Creek is located on the northern boundary of the site. Access to the site is provided through Illawong Drive. At the time of our investigation, the topography of the site was generally variable and sloped downward steeply to moderately towards Mullum Mullum Creek. Several trees of different sizes are scattered across the site. Two existing dwellings are located on the eastern and western section of the site. Two existing earth dams are located in the vicinity of the existing dwelling located in the western portion of site and currently retain water. Existing residential dwellings border the site to the east and south. Furrows from obsolete orchards exist on the western and eastern portions of the site. Existing Aboriginal archaeological sites were noted at four different locations. Some field drainage lines were observed during the investigation. At the time of our visit, the surface of the site was trafficable by a 4WD utility vehicle and a tracked excavator.

6. SUBSURFACE PROFILE

The subsurface conditions encountered in the test pits are described in the test pit logs presented in Appendix B. In summary, the soils generally comprised of sandy silts (topsoil) which transitioned into natural silty/sandy/gravelly clays and clayey silts. Extremely weathered sandstone/siltstone deposits generally comprising of silty/sandy clay was observed to underlie the natural residual soils. Penetration refusal was encountered during the performance of most test pits with the exception of test pits TP8 and TP16. The depths at which penetration refusal was encountered is presented in the table below:

Table 1: Test Pit Penetration Refusal Depth

Test Pit No	Location	Depth of Penetration Refusal (m)
TP1	Lot 34/35	1.1
TP2	Lot 35/36	1.25
TP3	Lot 34/44	0.6
TP4	Lot 45/46	1.4
TP5	Lot 47/48	0.7
TP6	Lot 48/49/51	1.0
TP7	Lot 54/55	0.8
TP9	Lot 31	1.25



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Test Pit No	Location	Depth of Penetration Refusal (m)
TP10	Lot 25	1.2
TP11	Lot 27/28	1.0
TP12	Existing Backfilled Swimming Pool	1.3
TP13	Lot 18	0.9
TP14	Lot 22	0.7
TP15	Lot 11/12	0.9
TP17	Lot 2/3	1.35
TP18	Lot 4	1.7
TP19	Lot 12/13	1.3

Groundwater was not encountered in the test pits during the field investigation. It is noted that groundwater levels can vary seasonally and with changes in drainage conditions. Groundwater can also be locally perched within fill materials.

7. RESULTS OF LABORATORY TESTS

The results of the laboratory tests are presented in Appendix C and are summarised in Table 1:

Table 2: Laboratory Test Result Summary

Test Pit	Location	Depth Range (m)	Soil Type	Shrink/Swell Index (%)
TP4	Lot 45/46	0.3 - 0.6	Clayey SILT	0.2
TP8	Lot 37/39/41	0.3 - 0.6	Clayey SILT	0.2
TP9	Lot 31	0.3 - 0.6	CLAY	2.2
TP15	Lot 11/12	0.25 - 0.55	CLAY	1.2
TP18	Lot 4	0.3 - 0.6	Silty CLAY	0.6

8. DISCUSSION & RECOMMENDATIONS

8.1 SUBSURFACE SOIL CONDITIONS - EXISTING BACKFILLED SWIMMING POOL

Test pit TP12 was extended within the existing backfilled swimming pool located adjacent to the existing dwelling on the eastern section of the site. The soils encountered within this test pit generally comprised of uncontrolled fill which consisted of clayey silt, overlying silty clays and silty gravels at deeper depths. Trace fine to coarse sub-angular gravels were observed within the silty clay horizon.

Penetration refusal was encountered at 1.3m below the existing surface level at the time of our investigation which we anticipate to be the concrete base of the existing backfilled swimming pool. It is understood that as part of the construction works, these materials will be removed and the excavation spoils potentially used as



controlled structural fill. Based on our observations within this test pit, the silty clays are considered suitable for use as structural fill provided the soils are assessed as suitable at the time of construction. The clayey silts and silty gravels are not considered suitable for use as structural fill however may be used for non-structural fill or landscaping purposes. Given the fill soils present in this area, some oversize particles may be present within the soil matrix which should be removed prior to fill placement.

8.2 SUBSURFACE SOIL CONDITIONS - ORCHARD AREA

It is understood that some areas of the site was previously utilised as orchards. Test pits TP1 - TP3 and TP13 were excavated in these areas. The soils encountered within these test pits generally comprised of a thin layer of topsoil (between 0.1m - 0.3m), which overlies natural silty clays. Penetration refusal was encountered in these test pits at depths ranging from 0.6m - 1.25m from existing surface levels.

At the time of our investigation, minor surface roots were observed however noted to not be significant. Excavations in these areas are likely to encounter some surface topsoil and potentially near surface roots before transitioning into the natural soils.

8.3 PRELIMINARY AS2870 SITE CLASSIFICATION

It is understood that the proposed development will comprise of 58 residential allotments. As per discussions with the Client, we understand that these allotments will range from approximately 1,000m² to 3,500m². The proposed building envelope locations are unknown at the time of preparation of this report. Earthworks on this site to form building platforms for the proposed residential dwellings are understood to be minimal. Cut and fill processes are understood to not exceed 1m. It is noted that some trees will be removed and some retained as part of the development.

The subsurface soil profile, level of earthworks, presence of fill, trees and reactivity of the soils will influence the site classification for the proposed allotments.

The test pits have shown a generally natural soil profile comprising a relatively thin topsoil layer, overlying natural silty clays/clayey silts of variable plasticity, which in turn overlie weathered siltstone/sandstone. Penetration refusal was encountered at variable depths over the site as shown in Table 1.

The preliminary site classification was conducted in general accordance with AS2870 (2011) 'Residential Slabs and Footings'. The following site characteristics and parameters were used in the preliminary site classification assessment:

- Climatic Zone (Figure D1): 2;
- Depth of design suction change (H_s): 1.8m;
- Soil Profile Group (Table D1): Group 3.

The site classification is assigned based on an assessment of the characteristic surface movement (y_s) in accordance with the calculation method outlined Section 2.3 of AS2870 (2011). The instability index or shrink swell index (I_{ss}) is the key parameter used in this calculation and is obtained from the laboratory shrink swell index test. For the purpose of this report, we have considered a shrink/swell index of 1.2% and 2.2%.

Based on the laboratory test results, the shrink swell index values were noted to range 0.2% to 2.2% which



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is typical of residual sedimentary deposits. The site classification applicable to various scenarios is further detailed below.

8.3.1 Natural Site

The site classification for a 'natural site' applies where a full clay profile depth of 1.8m is achieved (ie no bedrock within 1.8m), no trees are located within the influence distance of the site and the soils are natural (ie no fill).

Based on the results of the geotechnical testing, the geological setting and with reference to Table D1 of AS2870-2011, a site classification of **Class M** is considered applicable with an assessed characteristic surface movement (y_s) in the range of 20mm to 40mm.

8.3.2 Natural Site with Trees

The site classification for a 'natural site with trees' applies where a full clay profile depth of 1.8m is achieved (ie no bedrock within 1.8m) and the soils are natural (ie no fill).

A site classification of Class P is considered applicable where an allotment is in close proximity to existing individual or groups of trees which may cause abnormal moisture conditions. In accordance with AS2870 (2011), a site classified as Class P may be reclassified taking into account the presence of trees and reassessing the applicable y_s value.

Based on the results of the geotechnical testing, the geological setting, presence of trees and with reference to Table D1 of AS2870-2011, a site classification of **Class M - Class H1** is considered applicable with an assessed characteristic surface movement (y_s) in the range of 20mm to 40mm (Class M) and 40mm to 60mm (Class H1).

It should be noted that the above site classification is applicable to allotments within the influence distance of trees or in the event that tree(s) have been removed. As a guide, the influence distance should be taken as 1 x the mature height of the tree. This distance should be increased if rows or groups of trees are present.

8.3.3 Controlled Fill Site

The site classification for a 'controlled fill site' applies where a site has more than 0.4m of clay fill placed and compacted to Level 1 procedures as detailed in AS3798-2007 'Guidelines on Earthworks for Residential and Commercial Developments'.

For allotments with controlled fill, the site classification will depend on the thickness of the fill and the material used as fill. Where clay or similar cohesive soils are used as controlled fill, the site classification process will need to consider that the cracks that naturally develop within a clay profile over time with seasonal shrinkage and swelling will not be present. The absence of these cracks increases the characteristic surface movement (y_s) over that of a natural clay site. It is recommended that controlled fill materials be carefully selected and reactive clays avoided, where practicable. The onsite clays are considered suitable for use as controlled fill.

For the purpose of this report, we have assumed that the onsite clays as observed in our test pits will be used as controlled fill. Based on the results of the geotechnical testing, the geological setting and with



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reference to Table D1 of AS2870-2011, a site classification of **Class M - Class H1** is considered applicable with an assessed characteristic surface movement (y_s) in the range of 20mm to 40mm (Class M) and 40mm to 60mm (Class H1).

8.3.4 Controlled Fill Site with Trees

The site classification for a 'controlled fill site with trees' applies where a site has more than 400mm of controlled clay fill and is located within the influence distance of trees or tree groups.

Based on the results of the geotechnical testing, the geological setting, presence of controlled clay fill, presence of trees and with reference to Table D1 of AS2870-2011, a site classification of **Class H1 - Class H2** is considered applicable with an assessed characteristic surface movement (y_s) in the range of 40mm to 60mm (Class H1) and 60mm to 75mm (Class H2).

Given the potential variable site conditions once the earthworks and removal/retention of trees have been completed, individual allotments will require a site specific site classification based on the actual subsurface profile at the time of construction. Different site classifications may apply for the various allotments across the site.

8.4 BUILDING FOOTINGS

Building footings should be founded beneath any topsoil or uncontrolled fill and within the natural stiff to hard clay soils. Footings founded within these materials may be designed using a maximum allowable bearing pressure of 100kPa. Footings founded on weathered bedrock may be designed using a maximum allowable bearing pressure of 200kPa. The depth, degree and continuity of bedrock should be confirmed by a suitably qualified geotechnical engineer/engineering geologist.

The minimum founding depths for various footing types as presented in AS2870 (2011) should be adopted. Footings should not be founded within any uncontrolled fill.

It should be noted that the use of standard footings in accordance with AS2870 (2011) is only applicable for buildings having loadings and a construction style similar to that of a residential dwelling. Given the reactivity of the subsurface profile, the following precautions should be adopted to assist in the management of reactive soil movements:

- The surface of the site should be graded away from buildings such that run-off drains away and water cannot pond against the building. Where practicable the use paving against the edge of building can reduce the potential for moisture variations;
- Restrict tree planting in the vicinity of the building. On Class M sites trees should be located no closer to the building than 0.75 times their mature height and 1.0 times their mature height on Class H1 and H2 sites. This distance should be increased for groups or rows of trees;
- Plumbing, drainage and other services that have the potential to allow the ingress of water should be avoided beneath buildings. Where service trenches are to pass beneath or near to the building they should be backfilled with a low permeability material, such as compacted clay, to prevent the ingress of water. Any leaking or damaged underground services should be repaired promptly;
- During construction the exposed footing excavations in clay should not be left exposed to the



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weather for extended periods. Water should not be allowed to pond in these areas nor should they be left unprotected to dry and crack.

8.5 SUITABLE CONTROLLED FILL MATERIALS

The onsite natural soils are considered suitable for use as controlled fill, subject to an assessment of the soil condition at the time of construction and careful sorting, mixing, as may be required. The on-site soils may be used beneath pavements provided the CBR value is not less than the design value adopted for the pavements, or else the pavements should be redesigned for the actual CBR value of the fill material, and further advice sought.

The onsite clays may be considered for use beneath buildings provided careful consideration is given to the potential for an increase in the reactivity of the profile from its natural condition due to remoulding and the loss of shrinkage cracks, as is discussed in Section 8.1.3 of this report. The low to medium plasticity clays are considered preferable. Alternative materials may be considered and further advice should be sought from Ground Science where alternative materials are proposed.

All imported soils should have a clean fill certificate. Ground Science can assist with material testing on imported soils.

8.6 BATTER SLOPES

Temporary batter slopes excavated in the natural clays soils up to 3m in height should not be steeper than 1H:1V (45°) and permanent batter slopes of up to 3m in height should not be steeper than 2H:1V (27°). It is noted that flatter batters may be required for maintenance purposes and in areas where uncontrolled fill is present. Further geotechnical advice should be sought should higher or steeper batter slopes be proposed or where batter slopes are required within uncontrolled fill soils.

Batter slopes are likely to be subject to fretting and local loss of material, particularly if exposed to weather for extended periods. Drainage should be provided at the top of batter slopes to divert runoff away from the slope face. Permanent batter slopes should also be protected from erosion by vegetation or proprietary protection systems.

**For & on behalf of
Ground Science Pty Ltd**

**Gee Singh
BE (Hons) Civil**



9. LIMITATIONS

This report only serves as a factual, limited scope geotechnical investigation for the proposed site. It must be noted that due to the limited scope of the investigation, all findings and advice provided with this report are solely for reference purposes. 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. This report does not constitute a design but may be used by others to include the details for such design.

It is assumed the site is clean of contaminated soils and Ground Science Pty Ltd does not accept any responsibility for any such 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, it should not be assumed it has been provided. If a matter is not addressed, it should not be assumed 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, even if such work has been performed by a third party suggested by Ground Science.

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.

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10. REFERENCES

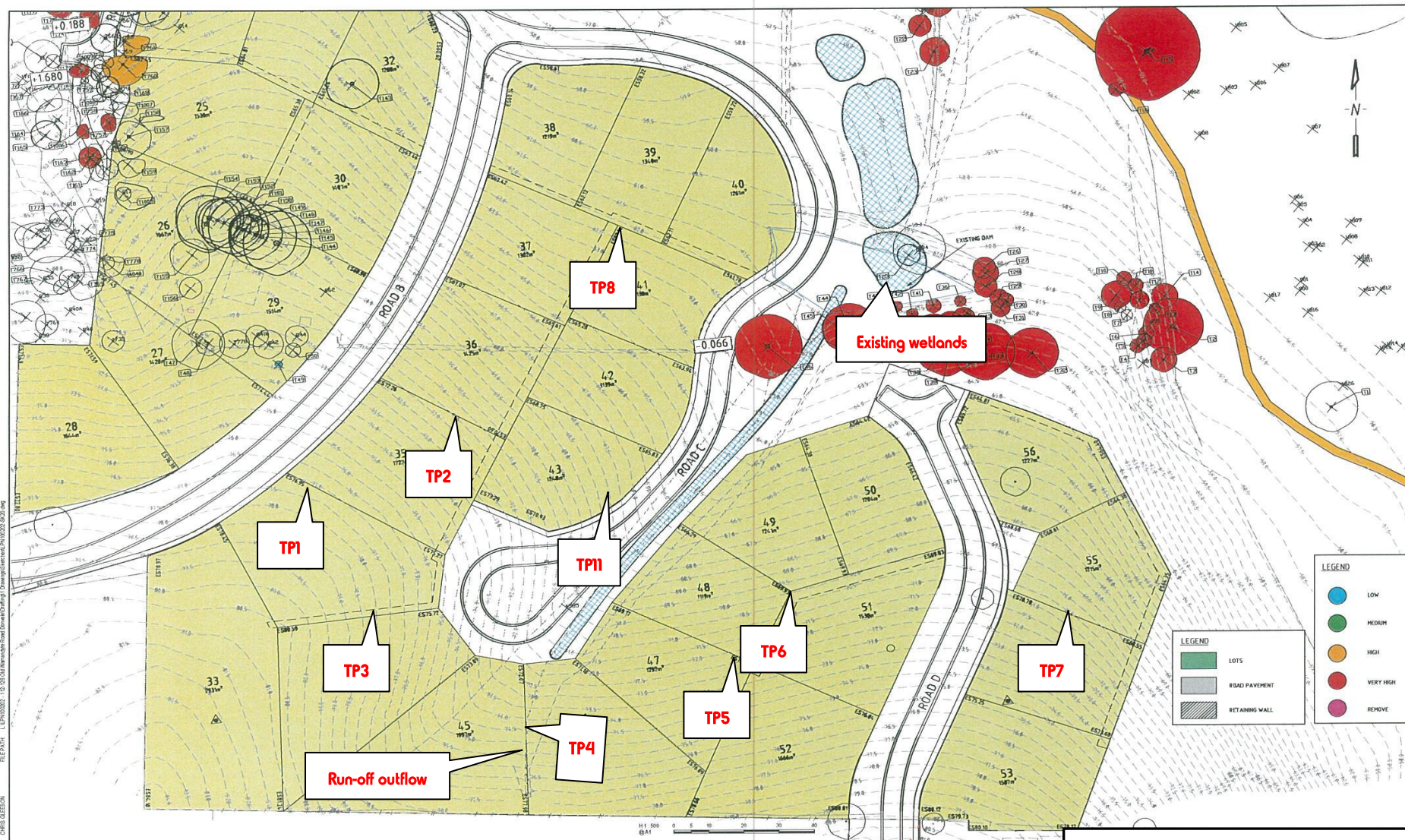
- AS1289 Testing of Soils for Engineering Purposes.
- Geological Survey of Victoria, Ringwood Geological Mapsheet, 1:63,360.
- AS2870 – 2011 Residential Slabs and Footings.
- AS3798 – 2007 Guidelines on Earthworks for Residential and Commercial Developments.



Appendix A

figures

Figure 1: Site Locality Plan



REV	DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
F	GENERAL REVISION	C.G.	B.G.	C.S.	01.05.13
E	GENERAL REVISION	C.G.	B.G.	C.S.	10.04.13
D	GENERAL REVISION	V.R.	B.G.	C.S.	08.02.13
C	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	05.02.13
B	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	17.02.12
A	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	23.05.12

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DATE: APRIL 2013

SOURCE: 112

Ground Science



Project

112 – 126 OLD WARRANDYTE ROAD

Details:

SITE PLAN & TEST LOCATIONS

Project
G2698.1AA

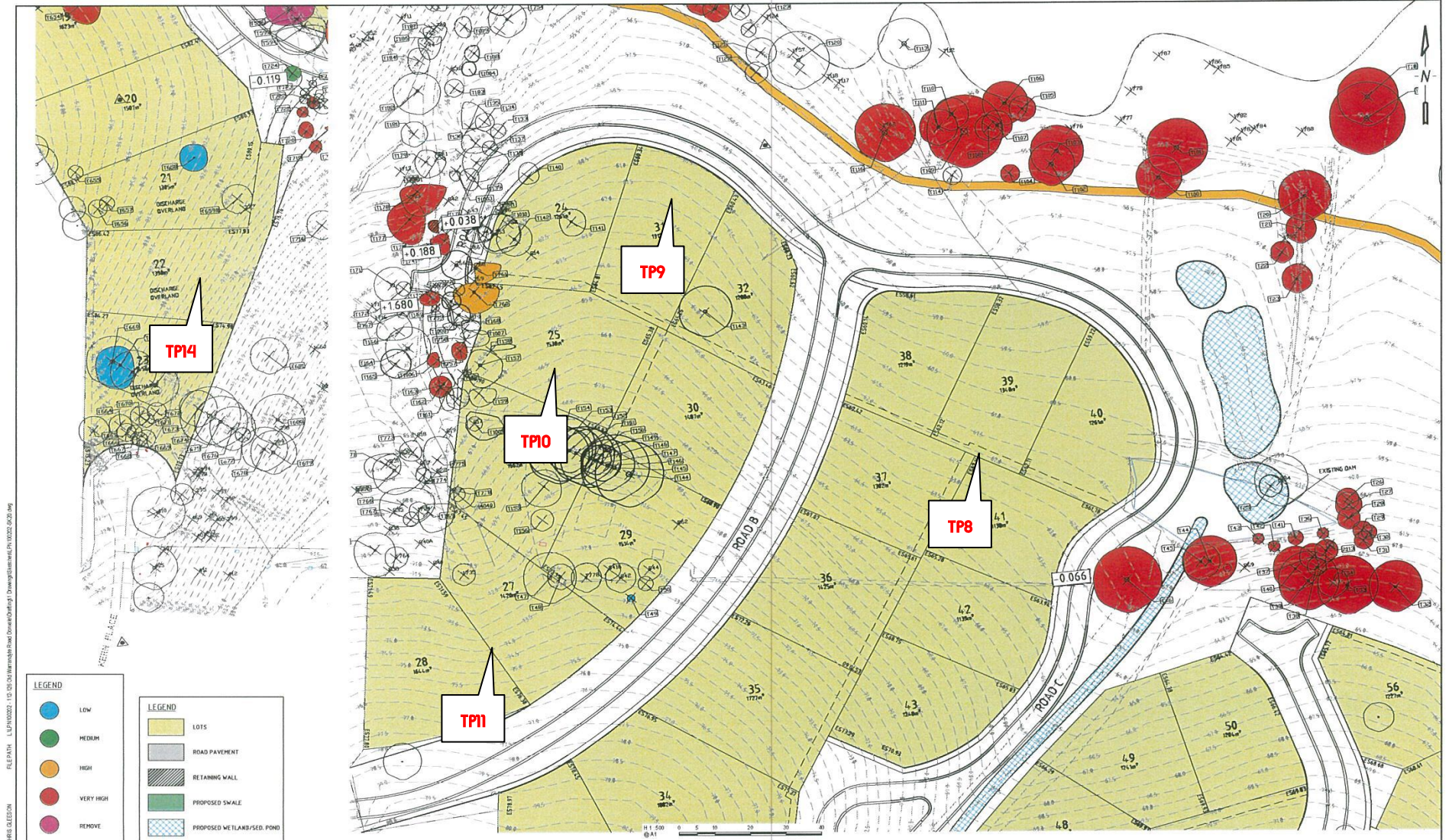
Drawn
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Drawing No
Figure 1

Checked
GS

Scale
Not to Scale

Date
20 June 2014



PLT DATE : 5/20/13 12:41 PM					
F	GENERAL REVISION	C.G.	B.G.	C.S.	01/05/13
E	GENERAL REVISION	C.G.	B.G.	C.S.	10/06/13
D	GENERAL REVISION	V.R.	B.G.	C.S.	08/02/13
C	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	05/02/13
B	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	11/02/12
A	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	23/08/12
REV	DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE

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DESIGNED	B. GLEESON
APPROVED	C.J. SANTOS
DATE	APRIL 2013
PROJECT	112-
ISSUE	

TP

Test Pit Number & Location

Ground Science



Project
112 - 126 OLD WARRANDYTE ROAD

Details:
SITE PLAN & TEST LOCATIONS

Project G2698.1AA	Drawing No Figure 2	Scale Not to Scale
Drawn TH	Checked GS	Date 20 June 2014

TREE RETENTION

VERY HIGH
VERY HIGH LEVEL OF EFFORT TO RETAIN THESE. GENERALLY OLD YELLOW BOX PROVIDING IMPORTANT LANDSCAPE AND OTHER VALUES. SOME TREES MARKED AS VERY HIGH MAY BE NEGOTIABLE WITH RESPECT TO REMOVAL, DEPENDING ON THE AGE, LOCATION, LANDSCAPE SIGNIFICANCE, ETC. A NUMBER OF YOUNGER INDIGENOUS MANNIA GUMS ALONG THE CREEK ALSO MARKED AS 'VERY HIGH', THESE ARE LESS IMPORTANT THAN THE OLD YELLOW BOX.

HIGH
EFFORT TO RETAIN THESE SHOULD BE MADE, EG WITH RESPECT TO ROADS, DRIVEWAY ENVELOPE LOCATION. GENERALLY A REASONABLE LEVEL OF FLEXIBILITY WITH RESPECT TO THEIR REMOVAL, DEPENDING ON DIFFICULTIES AND COSTS OF RETAINING THEM. A NUMBER OF YOUNGER YELLOW BOX HAVE BEEN MARKED AS 'HIGH' ON THE ROAD RESERVE ON STAGE 2. WOULD BE GOOD TO RETAIN THESE BUT NOT ESSENTIAL, ONLY IF CAN BE EASILY FITTED IN TO ROAD DESIGN.

MEDIUM
SOME EFFORT TO RETAIN BUT SHOULD NOT INTERFERE WITH DESIGN OF ROADS, ENVELOPE OR DRIVEWAY ETC IF ACCOMMODATING THESE TREES INCURS MORE THAN A MINOR COST OR REDUCES LSC, LANDSCAPE OR ENGINEERING OUTCOMES BY MORE THAN A MINOR AMOUNT.

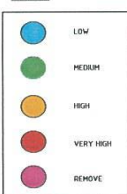
LOW / OPTIONAL
SOME EFFORT TO RETAIN FOR LANDSCAPE AND MARKETING PURPOSES, TO RETAIN THE RURAL 'COUNTRY SIDE' FEEL TO THE PROPERTY. NO ALTERATION OF ENVELOPE, ACCESS, ROADS, ETC NECESSARY UNLESS THIS CAN BE ACHIEVED EASILY AND NO OR MINIMAL COST. THESE TREES SHOULD BE RETAINED WHEN THE VEGETATION ON THE PROPERTY IS REMOVED UNDER PERMIT, BY MARKING WITH TAPE, THE LOT PURCHASERS TO BE ABLE TO REMOVE THESE AS THEY WISH.

LOW
TREES THAT CAN BE REMOVED AND PROVIDE NO IMPEDIMENT TO DESIGN OF ROADS, LOTS, DRIVEWAYS, ENVELOPES ETC. WHEN TREE REMOVALS ARE ON SITE, WE MAY MARK SOME OF THESE FOR RETENTION FOR EXAMPLE WHERE WE MIGHT HAVE HESSED ONE THAT ADDS LANDSCAPE OR MARKETING VALUE, BY MARKING, BY MARKING THESE WITH TAPE.

UNMARKED TREES AND SHRUBS

SEVERAL TREES AND SHRUBS WERE NOT MARKED ON THE PLANS, WHERE POSSIBLE I HAVE TO MARK THESE ON THE MAP AND ON THE TABLE OF NUMBERS.

LEGEND



LEGEND



REV	DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
F	GENERAL REVISION	C.G.	B.G.	C.S.	03.05.13
E	GENERAL REVISION	C.G.	B.G.	C.S.	10.04.13
D	GENERAL REVISION	V.R.	B.G.	C.S.	08.02.13
C	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	05.02.13
B	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	17.12.12
A	PRELIMINARY ISSUE	V.R.	B.G.	C.S.	23.06.12

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ABN 61 755 825 232

DESIGNED: C.GLEESON

APPROVED: B.GLEESON

C.J.SANTOS

DATE: APRIL 2013

Test Pit Number & Location

TP

Ground Science



Project

112 - 126 OLD WARRANDYTE ROAD

Details:

SITE PLAN & TEST LOCATIONS

Project
G2698.1AA

Drawn
TH

Drawing No
Figure 3

Checked
GS

Scale
Not to Scale

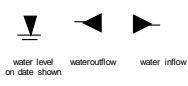
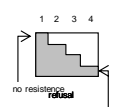
Date
20 June 2014



Appendix B

Test Pit Log Sheets

		TEST PIT LOG		Test Pit No TP1					
		JOB No : G2698.1AA							
CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd PROJECT: 112 - 126 Old Warrandyte Road LOCATION: Donvale TEST LOCATION: Lots 34/35				TEST DATE: 30-May-14 LOGGED BY: TH CHECKED BY: GS					
DRILL METHOD: Test Pit		EASTING: ND NORTHING: ND		INCLINATION: 90° SURFACE RL: ND					
DRILLING		SAMPLING		FIELD MATERIAL DESCRIPTION					
PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG				
1	2	3	4	USC SYMBOL	FIELD MATERIAL DESCRIPTION				
				CONSISTENCY DENSITY	MOISTURE				
				ADDITIONAL OBSERVATIONS					
				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil	
				CI	silty CLAY, low to medium plasticity, light grey and orange, with some fine to coarse gravel	St - VSt	D - Dp	Natural Soil	
				CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse gravel	H	D	Weathered Rock	
				Testpit Refusal @ 1.1m					
PENETRATION		CONSISTENCY		DENSITY	MOISTURE	TEST NOTES			
		Vs	very soft	Fb	friable	D	dry	PP	Pocket Penetrometer Test
		S	soft	VL	very loose	Dp	damp	U63	Undisturbed Sample 63mm
		St	stiff	L	loose	M	moist	D	Disturbed Sample
		VSt	very stiff	MD	medium dense	W	wet	Bs	Bulk Sample
		H	hard	D	dense	S	saturated	E	environmental sample
								HSV	Hand Shear Vane test
						DCP	Dynamic Cone Penetrometer Test		

		TEST PIT LOG		Test Pit No TP2	
CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd		PROJECT: 112 - 126 Old Warrandyte Road		TEST DATE: 30-May-14	
LOCATION: Donvale		TEST LOCATION: Lots 35/36		LOGGED BY: TH	
DRILL METHOD: Test Pit		EASTING: ND		INCLINATION: 90°	
HOLE DIAMETER:		NORTHING: ND		SURFACE RL: ND	
DRILLING		SAMPLING		FIELD MATERIAL DESCRIPTION	
PENETRATION RESISTANCE 1 2 3 4 WATER DEPTH (metres) DEPTH (RL)		SAMPLE OR FIELD TEST RECOVERED GRAPHIC LOG USC SYMBOL		SOIL / ROCK MATERIAL DESCRIPTION CONSISTENCY DENSITY MOISTURE ADDITIONAL OBSERVATIONS	
1.00 0.10 0.5 1.00 1.25 1.5 2.0 2.5 3.0 3.5		#1 D		OL sandy SILT, fine, dark brown L Dp Topsoil Cl silty CLAY, low to medium plasticity, light orange, with trace fine to coarse grained subangular gravel St - VSt D - Dp Natural Soil CL-C silty CLAY, low to medium plasticity, light grey VSt - H D Weathered Rock Testpit Refusal @ 1.25m	
PENETRATION		CONSISTENCY		DENSITY	
Vs very soft S soft St stiff VSt very stiff H hard		Fb friable VL very loose L loose MD medium dense D dense		D dry Dp damp M moist W wet S saturated	
TEST NOTES PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test					

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 34/44

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD:	Test Pit
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EASTING: ND


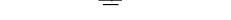
INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
						0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.10				CL-C	silty CLAY, low to medium plasticity, light grey and orange, trace fine to coarse subangular gravel	St - VSt	D - Dp	Natural Soil
						0.5	0.50	#2	D	CL	silty CLAY, low to medium plasticity, light grey and orange, some fine to coarse subangular gravel	VSt - H	D	Weathered Rock
						0.60					Testpit Refusal @ 0.6m			
						1.0								
						1.5								
						2.0								
						2.5								
						3.0								
						3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test <div style="text-align: right;">  </div>



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TEST PIT LOG

Test Pit No **TP4**
JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd
PROJECT: 112 - 126 Old Warrandyte Road
LOCATION: Donvale
TEST LOCATION: Lots 45/46 (near water outflow)

TEST DATE: 30-May-14
LOGGED BY: TH
CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING					SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS	
1	2	3	4												
						0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.10					CL-C	clayey SILT, low to medium plasticity, light orange brown	St	Dp - M	Natural Soil
							#3		U63						
						0.5									
						0.60					CI	silty CLAY, low to medium plasticity, light grey and orange	St - VS	Dp	
							#4		D						
						1.0									
						1.30					CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	H	D	Weathered Rock
						1.40						Testpit Refusal @ 1.4m			
						1.5									
						2.0									
						2.5									
						3.0									
						3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
<p>no resistance refusal</p>	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





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TEST PIT LOG

Test Pit No

TP5

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 47/48

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
						0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.10				CI	silty CLAY, medium plasticity, orange brown	St		Natural Soil
							#5	D						
						0.5								
						0.60				CL	silty CLAY, low to medium plasticity, light grey and orange, with some fine to coarse subangular gravel	VSt - H	D	Weathered Rock
						0.70					Testpit Refusal @ 0.7m			
						1.0								
						1.5								
						2.0								
						2.5								
						3.0								
						3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





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TEST PIT LOG

Test Pit No

TP6

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 48/49/51

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
						0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.10				CI	silty CLAY, medium plasticity, light grey and orange, with trace fine to medium subangular gravel	St		Natural Soil
						0.5								
						0.90				CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	VSt- H	D	Weathered Rock
						1.0	1.00				Testpit Refusal @ 1m			
						1.5								
						2.0								
						2.5								
						3.0								
						3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test



		TEST PIT LOG		Test Pit No TP7					
		JOB No : G2698.1AA							
CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd PROJECT: 112 - 126 Old Warrandyte Road LOCATION: Donvale TEST LOCATION: Lots 54/55				TEST DATE: 30-May-14 LOGGED BY: TH CHECKED BY: GS					
DRILL METHOD: Test Pit		EASTING: ND NORTHING: ND		INCLINATION: 90° SURFACE RL: ND					
DRILLING		SAMPLING		FIELD MATERIAL DESCRIPTION					
PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG				
1 2 3 4									
SOIL / ROCK MATERIAL DESCRIPTION				CONSISTENCY DENSITY	MOISTURE				
ADDITIONAL OBSERVATIONS									
				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil	
				CI	silty CLAY, medium plasticity, light grey and orange	St - VSt		Natural Soil	
				#6	D				
				CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	H	D	Weathered Rock	
				Testpit Refusal @ 0.8m					
PENETRATION		CONSISTENCY		DENSITY		MOISTURE		TEST NOTES	
		Vs	very soft	Fb	friable	D	dry		
		S	soft	VL	very loose	Dp	damp		
		St	stiff	L	loose	M	moist		
		VSt	very stiff	MD	medium dense	W	wet		
		H	hard	D	dense	S	saturated		
PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test									



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TEST PIT LOG

Test Pit No

TP8

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 37/38/41

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
					0.10					CL-C	clayey SILT, low to medium plasticity, mottled brown, light grey and orange, with pockets of fine to med	St - VSt	Dp - M	Natural Soil
						#7	U63							
					0.5									
					1.0									
					1.5									
					1.80						CI	silty CLAY, medium plasticity, light grey, with trace fine sand	VSt	Dp

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
 no resistance refusal	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





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TEST PIT LOG

Test Pit No

TP9

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 31

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
						0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.10				CI	CLAY, medium plasticity, mottled brown, light grey and orange	St - VSt		Natural Soil
							#8	U63						
						0.5								
						1.0								
						1.10	#9	D		CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	VSt - H	D	Weathered Rock
						1.25					Testpit Refusal @ 1.25m			
						1.5								
						2.0								
						2.5								
						3.0								
						3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test



CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 25

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND





INCLINATION: 90°


HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
					0.10					CI	silty CLAY, medium plasticity, orange brown	VSt		Natural Soil
					0.5									
					1.00					CL-Cl	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	VSt - H	D	Weathered Rock
					1.20						Testpit Refusal @ 1.2m			
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test <div style="text-align: right;">    <p>water level on date shown water outflow water inflow</p> </div>



TEST PIT LOG

Test Pit No
TP11

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 27/28

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

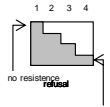
HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING			FIELD MATERIAL DESCRIPTION				
PENETRATION RESISTANCE		WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4								
				0.0			OL	sandy SLT, fine, dark brown	L	Dp	Topsoil
				0.10			CI	silty CLAY, medium plasticity, light brown and orange	St - VSt		Natural Soil
				0.5							
				0.70			CL-CI	silty CLAY, low to medium plasticity, mottled grey, brown and orange, with some fine to coarse gravel	VSt - H	D	Weathered Rock
				1.00				Testpit Refusal @ 1m			
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							

1 2 3 4



CONSISTENCY

Vs very soft
S soft
St stiff
VSt very stiff
H hard

DENSITY




Fb friable
VL very loose
L loose
MD medium dense
D dense

MOISTURE

D dry
Dp damp
M moist
W wet
S saturated

TEST NOTES

PP Pocket Penetrometer Test
U63 Undisturbed Sample 63mm
D Disturbed Sample
Bs Bulk Sample
E environmental sample
HSV Hand Shear Vane test
DCP Dynamic Cone Penetrometer Test

 water level on date shown
 water outflow
 water inflow

HAM_LOG_2.0 2009

Sheet 1 of 1



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TEST PIT LOG

Test Pit No **TP12**

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 14 filled pool

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0					CL	clayey SILT, low to medium plasticity, dark brown mottled light grey	St	Dp	Uncontrolled Fill
					0.30		#10	D		CI	silty CLAY, medium plasticity, mottled brown, grey and orange, trace fine to coarse subangular gravel	St - VSt		
					0.5									
					1.0									
					1.10					GM	silty GRAVEL, fine to coarse, brown, grey and orange	MD	D	
					1.30						Testpit Refusal @ 1.3m			
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
<p>no resistance refusal</p>	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test



CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 18

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

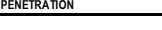



INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION						
PENETRATION RESISTANCE		WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2											
				0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsail
				0.10				CL	gravelly CLAY, low to medium plasticity, light grey mottled yellow, gravel fine to coarse grained	VSt - H	D	Natural Soil
				0.5	#11	D						
				0.80					silty CLAY, low plasticity, light grey mottled orange, with some fine to coarse subangular gravel	H		Weathered Rock
				0.90					Testpit Refusal @ 0.9m			
				1.0								
				1.5								
				2.0								
				2.5								
				3.0								
				3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <div style="display: flex; justify-content: space-around; font-size: small;"> <div>water level on date shown</div> <div>water outflow</div> <div>water inflow</div> </div>

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 22

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD:	Test Pit
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EASTING: ND





INCLINATION: 90°


HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0					OL	sandy SILT, fine, dark brown, fibrous organic inclusions (root 100mm dia) within top 200mm	L	Dp	Topsoil
					0.20					CL	silly CLAY, low to medium plasticity, light grey mottled orange and brown, some fine to medium gravel	VSt	D - Dp	Natural Soil
					0.5									
					0.60						silly CLAY, low to medium plasticity, light grey mottled orange, with some fine to coarse gravel	H	D	Weathered Rock
					0.70						Testpit Refusal @ 0.7m			
					1.0									
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test <div style="text-align: right;">    <p>water level on date shown water outflow water inflow</p> </div>



TEST PIT LOG

Test Pit No
TP15

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 11/12

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

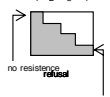
HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING			FIELD MATERIAL DESCRIPTION							
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0						OL sandy SILT, fine, dark brown	L	Dp	Topsoil
					0.25		#12	U63			CL-CLAY, low to medium plasticity, orange brown	VSt		Natural Soil
					0.60						CL silty CLAY, low to medium plasticity, orange brown, with some fine to coarse subangular gravel	H	D	Weathered Rock
					0.90						Testpit Refusal @ 0.9m			
					1.0									
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

1 2 3 4



CONSISTENCY

Vs very soft
S soft
St stiff
VSt very stiff
H hard

DENSITY




Fb friable
VL very loose
L loose
MD medium dense
D dense

MOISTURE

D dry
Dp damp
M moist
W wet
S saturated

TEST NOTES

PP Pocket Penetrometer Test
U63 Undisturbed Sample 63mm
D Disturbed Sample
Bs Bulk Sample
E environmental sample
HSV Hand Shear Vane test
DCP Dynamic Cone Penetrometer Test

water level on date shown
water outflow
water inflow

HAM_LOG_2.0 2009
Sheet 1 of 1



Ground Science
GEOTECHNICAL

TEST PIT LOG

Test Pit No

TP16

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 5, near dam

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION									
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS	
1	2	3	4												
					0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil	
					0.20		#13	D		CI-CH	silty CLAY, medium to high plasticity, orange brown mottled red	St		Natural Soil	
					0.5										
					1.0										
					1.20					CI	silty CLAY, low to medium plasticity, light grey and orange, with some fine sand	VSt			
					1.5										
					1.90					CL	sandy CLAY, low to medium plasticity, light grey	H	D		
					2.0	2.00				Testpit Terminated @ 2m					
					2.5										
					3.0										
					3.5										

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
 no resistance refusal	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





GroundScience
GEOTECHNICAL

TEST PIT LOG

Test Pit No

TP17

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 2/3

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
					0.20					CI-CH	CLAY, medium to high plasticity, mottled red, brown, grey and orange	St	Dp - M	Natural Soil
					0.5									
					1.0									
					1.10	#14	D			CL	silty CLAY, low to medium plasticity, light grey, with some fine to coarse subangular gravel	H	D	
					1.35						Testpit Refusal @ 1.35m			
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





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GEOTECHNICAL

TEST PIT LOG

Test Pit No

TP18

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lot 4

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING				SAMPLING		FIELD MATERIAL DESCRIPTION								
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
						0.0				OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
						0.20	#15	U63		CL	sandy CLAY, low to medium plasticity, light grey, sand is fine grained	F - St	Dp - M	Natural Soil
						0.5								
						0.60				CI	silty CLAY, medium to high plasticity, mottled brown, grey and orange	St	Dp	
						1.0								
						1.5								
						1.60				CL	silty CLAY, low to medium plasticity, light grey, some fine to coarse subangular gravel	H	D	Weathered Rock
						1.70				Testpit Refusal @ 1.7m				
						2.0								
						2.5								
						3.0								
						3.5								

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





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GEOTECHNICAL

TEST PIT LOG

Test Pit No **TP19**

JOB No : G2698.1AA

CLIENT: Mullum Pty Ltd c/- Verve Projects Pty Ltd

PROJECT: 112 - 126 Old Warrandyte Road

LOCATION: Donvale

TEST LOCATION: Lots 12/13

TEST DATE: 30-May-14

LOGGED BY: TH

CHECKED BY: GS

DRILL METHOD: Test Pit

EASTING: ND

INCLINATION: 90°

HOLE DIAMETER:

NORTHING: ND

SURFACE RL: ND

DRILLING					SAMPLING		FIELD MATERIAL DESCRIPTION							
PENETRATION RESISTANCE				WATER	DEPTH (metres)	DEPTH (RL)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC SYMBOL	SOIL / ROCK MATERIAL DESCRIPTION	CONSISTENCY DENSITY	MOISTURE	ADDITIONAL OBSERVATIONS
1	2	3	4											
					0.0					OL	sandy SILT, fine, dark brown	L	Dp	Topsoil
					0.20					CI	silly CLAY, low to medium plasticity, light grey and orange brown, some fine to coarse gravel	St - VSt		Natural Soil
					0.40						silly CLAY, medium plasticity, orange brown	VSt		
					0.5									
					1.0	1.00					some fine to coarse subangular gravel			
					1.20					CL	sandy CLAY, low to medium plasticity, light grey, some fine to coarse subangular gravel	H	D	Weathered Rock
					1.30						Testpit Refusal @ 1.3m			
					1.5									
					2.0									
					2.5									
					3.0									
					3.5									

PENETRATION	CONSISTENCY	DENSITY	MOISTURE	TEST NOTES
<p>no resistance refusal</p>	Vs very soft S soft St stiff VSt very stiff H hard	Fb friable VL very loose L loose MD medium dense D dense	D dry Dp damp M moist W wet S saturated	PP Pocket Penetrometer Test U63 Undisturbed Sample 63mm D Disturbed Sample Bs Bulk Sample E environmental sample HSV Hand Shear Vane test DCP Dynamic Cone Penetrometer Test





Appendix C

Laboratory Results



Ground Science

A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

Client:	MULLUM PTY LTD C/- VERVE PROJECTS PTY LTD	job No.	G2698.1
project:	112 - 126 WARRANDYTE RD	report No.	AA
location:	DONVALE	test date:	3-Jun-14

SHRINK / SWELL TEST RESULTS

sample identification :	# 3 (LOTS 45 / 46) depth (m)	TP4 @ 0.3 - 0.6
sample description:	silty CLAY, medium plasticity, grey, trace well weathered gravel	

SHRINK TEST

bulk density of core specimen	
1.954	t/m ³
moisture content%	32.4

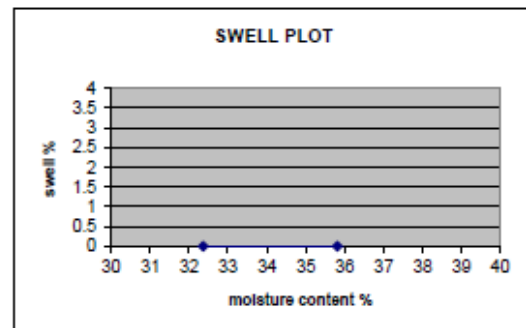
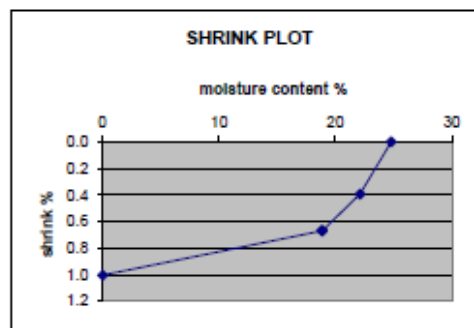
shrink on drying (%)
1.0
amount of crumbling during shrinkage
very slight

estimated inert material (%)
10.0
amount of cracking during shrinkage
very slight

SWELL TEST

moisture content (%)		estimated UCS strength (kPa)	
before test	after test	before test	after test
32.4	35.8	75	90

swell on saturation(%)	shrink / swell index: I_{ss} (%)
0.0	0.6



Notes: sampling AS 1289 1.2.1 6.5.3, 30/5/2014

Test Methods

Shrink/Swell	AS1289 7.1.1	<input checked="" type="checkbox"/>	AS1289.5.1.1	Standard Compaction	<input type="checkbox"/>
Moisture Content	AS1289.2.1.1	<input checked="" type="checkbox"/>	AS1289.5.2.1	Modified Compaction	<input type="checkbox"/>
Sampling	AS1289 1.2.1	<input type="checkbox"/>			



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10/06/2014



Ground Science

A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

Client:	MULLUM PTY LTD C/- VERVE PROJECTS PTY LTD	job No.	G2698.1
project:	112 - 126 WARRANDYTE RD	report No.	AB
location:	DONVALE	test date:	3-Jun-14

SHRINK / SWELL TEST RESULTS

sample identification :	# 7 (LOTS 37, 39, 4 depth (m) TP8 @ 0.3 - 0.6
sample description:	CLAY, high plasticity, mottled red orange brown

SHRINK TEST

bulk density of core specimen	
2.073	t/m ³
moisture content%	22.7

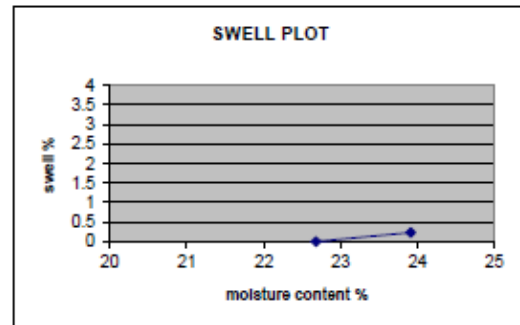
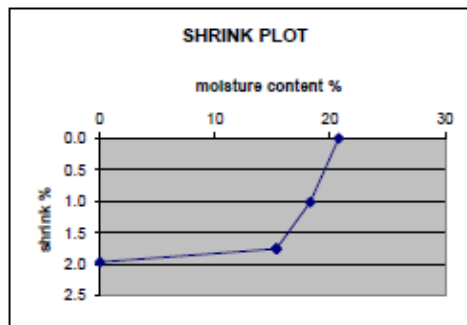
shrink on drying (%)
2.0
amount of crumbling during shrinkage
very slight

estimated inert material (%)
10.0
amount of cracking during shrinkage
moderate

SWELL TEST

moisture content (%)		estimated UCS strength (kPa)	
before test	after test	before test	after test
22.7	23.9	145	150

swell on saturation(%)	shrink / swell index: I _{ss} (%)
0.2	1.2



Notes:	sampling AS 1289 1.2.1 6.5.3, 30/5/2014
--------	---

Test Methods					
Shrink/Swell	AS1289 7.1.1	<input checked="" type="checkbox"/>	AS1289.5.1.1	Standard Compaction	<input type="checkbox"/>
Moisture Content	AS1289.2.1.1	<input checked="" type="checkbox"/>	AS1289.5.2.1	Modified Compaction	<input type="checkbox"/>
Sampling	AS1289 1.2.1	<input type="checkbox"/>			

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A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

Client:	MULLUM PTY LTD C/- VERVE PROJECTS PTY LTD	job No.	G2698.1
project:	112 - 126 WARRANDYTE RD	report No.	AC
location:	DONVALE	test date:	3-Jun-14

SHRINK / SWELL TEST RESULTS

sample identification :	# 8 (LOTS 31)	depth (m)	TP9 @ 0.3 - 0.6
sample description:	CLAY, high plasticity, mottled red orange brown		

SHRINK TEST

SWELL TEST

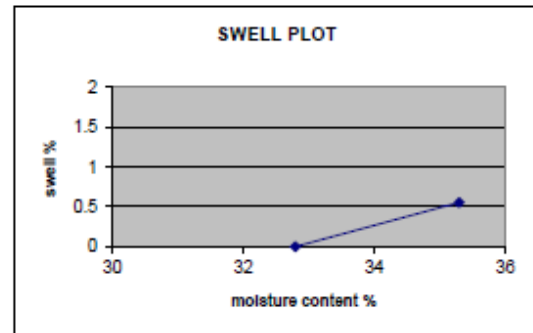
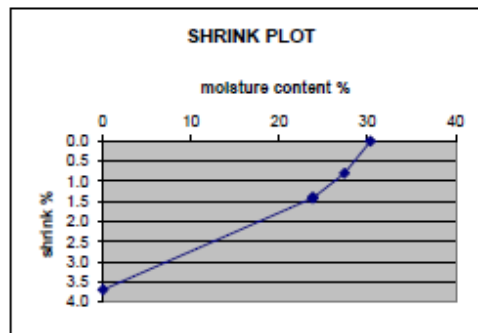
bulk density of core specimen	
1.902	t/m ³
moisture content%	32.8

moisture content (%)		estimated UCS strength (kPa)	
before test	after test	before test	after test
32.8	35.3	260	190

shrink on drying (%)
3.7
amount of crumbling during shrinkage
none

estimated inert material (%)
0.0
amount of cracking during shrinkage
high

swell on saturation(%)	shrink / swell index: I_{ss} (%)
0.6	2.2



Notes: sampling AS 1289 1.2.1 6.5.3, 30/5/2014

Test Methods

Shrink/Swell AS1289 7.1.1
Moisture Content AS1289.2.1.1
Sampling AS1289 1.2.1



AS1289.5.1.1
AS1289.5.2.1

Standard Compaction
Modified Compaction



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Ground Science

A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

Client:	MULLUM PTY LTD C/- VERVE PROJECTS PTY LTD	job No.	G2698.1
project:	112 - 126 WARRANDYTE RD	report No.	AD
location:	DONVALE	test date:	3-Jun-14

SHRINK / SWELL TEST RESULTS

sample identification :	# 12 (LOTS 11, 12) depth (m)	TP15 @ 0.25- 0.55
sample description:	clayey SILT, medium plasticity, orange/brown, with weathered gravel	

SHRINK TEST

bulk density of core specimen	
1.903	t/m ³
moisture content%	13.9

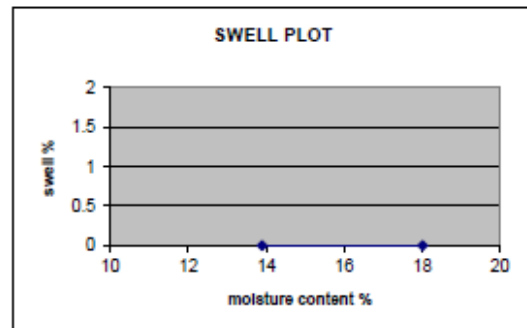
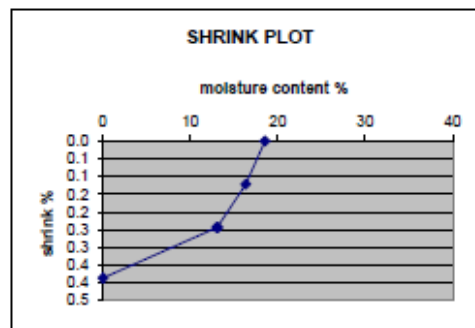
shrink on drying (%)
0.4
amount of crumbling during shrinkage
moderate

estimated inert material (%)
15.0
amount of cracking during shrinkage
slight

SWELL TEST

moisture content (%)		estimated UCS strength (kPa)	
before test	after test	before test	after test
13.9	18.0	275	300

swell on saturation(%)	shrink / swell index: I _{ss} (%)
0.0	0.2



Notes: sampling AS 1289 1.2.1 6.5.3, 30/5/2014

Test Methods

Shrink/Swell	AS1289 7.1.1	<input checked="" type="checkbox"/>	AS1289.5.1.1	Standard Compaction	<input type="checkbox"/>
Moisture Content	AS1289.2.1.1	<input checked="" type="checkbox"/>	AS1289.5.2.1	Modified Compaction	<input type="checkbox"/>
Sampling	AS1289 1.2.1	<input type="checkbox"/>			



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Ground Science

A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

Client:	MULLUM PTY LTD C/- VERVE PROJECTS PTY LTD	job No.	G2698.1
project:	112 - 126 WARRANDYTE RD	report No.	AE
location:	DONVALE	test date:	3-Jun-14

SHRINK / SWELL TEST RESULTS

sample identification :	# 14 (LOT 4)	depth (m)	TP18 @ 0.3 - 0.6
sample description:	clayey SILT, medium plasticity, brown, trace gravel		

SHRINK TEST

bulk density of core specimen	
2.004	t/m ³
moisture content%	19.4

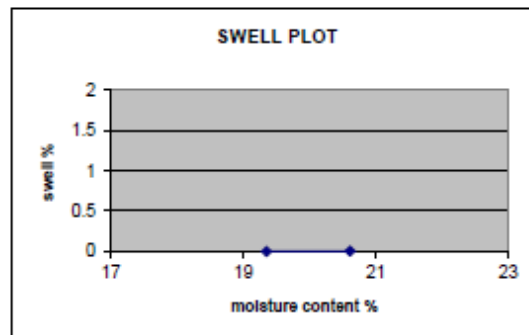
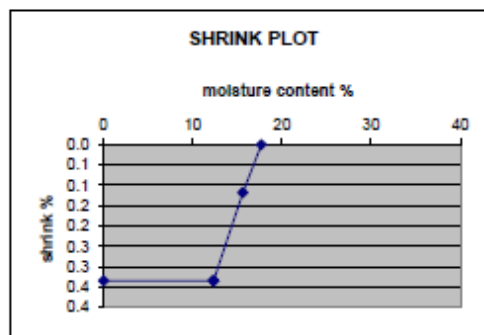
shrink on drying (%)
0.3
amount of crumbling during shrinkage
very slight

estimated inert material (%)
0.0
amount of cracking during shrinkage
slight

SWELL TEST

moisture content (%)		estimated UCS strength (kPa)	
before test	after test	before test	after test
19.4	20.6	165	155

swell on saturation (%)	shrink / swell index: I_{ss} (%)
0.0	0.2



Notes: sampling AS 1289 1.2.1 6.5.3, 30/5/2014

Test Methods

Shrink/Swell	AS1289 7.1.1	<input checked="" type="checkbox"/>	AS1289.5.1.1	Standard Compaction	<input type="checkbox"/>
Moisture Content	AS1289.2.1.1	<input checked="" type="checkbox"/>	AS1289.5.2.1	Modified Compaction	<input type="checkbox"/>
Sampling	AS1289 1.2.1	<input type="checkbox"/>			



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Appendix D

Site Photographs

















Ground Science Pty Ltd

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