# **PLANNING PROPOSAL**

# THE HUB MOUNTAIN ASH ROAD, GOULBURN ENGINEERING SERVICES REPORT

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Attachment A – Subdivision Layout - Windellama

Attachment B - Preliminary Soils Assessment, Site and Soil Evaluation

Attachment C - NorBE Assessment Wastewater Effluent Model Summaries

## 1. Roads and Lot layout

### 1.1. Preamble

The following comments relate to the plan received and referenced SUBDIVISION LAYOUT – WINDELLAMA CD-01-A by Stuart Design and Job No. 22-012.

## **1.2.** Site Features

### 1.3. Road Layout

The proposed road reserve widths are 20m in accordance with Council's Standards for Engineering Works Design Specification 2013. The new roads will incorporate table drains in accordance with Council's standard drawing SD-R 01 and include mitre drains at regular intervals. It is expected that the any intersections with an existing road will incorporate BAR/BAL treatment.

Precinct 1 has an intersection with Rosemont Road and one intersection with Barretts Lane. Precinct 2 has the single access with Mountain Ash Road whilst Precinct 3 has just the two intersections with Mountain Ash Road. This reflects the current number of driveway accesses to the existing lots. All of the proposed intersections have suitable separation from any other intersection whether it be existing or proposed.

The locations of the intersections enable suitable sight distance requirements in accordance with the Austroads guidelines.

## 1.4. Earthworks

The proposal does not include any regrading of the site and hence the required earthworks will be restricted to that required for the roads. As the topography is characterized by gently to moderately sloped hillsides, then there will not be any significant cut and fill required. There may be some works relating to stabilizing the existing 3<sup>rd</sup> order watercourses but this will largely be limited to battering back of embankments which again will only require minimal earthworks and would not require any removal of spoil from the site nor require any additional fill material to be brought onsite.

## 1.5. Lot Layout

The plans show a potential yield of 108 lots. The minimum lot size is 20 Ha. The area of some of the lots increases to allow for encroachments by watercourse setbacks and the 100yr ARI flood extents to ensure there is sufficient area for a dwelling and Effluent management Area (EMA).

The two existing dwellings have been located within future allotments (Lots 33 & 64) with allowances for the required minimum setbacks to the new boundaries. The existing effluent treatment systems will be augmented and relocated as necessary to be retained within the existing lot boundaries.

## 2. Flooding

The extent of the flooding shown on the plans was determined using Hydrological Modeling undertaken using WBNM ('Watershed Bounded Network Model' Boyd et al, 2007) which enables simulation of complex catchment behavior. TUFLOW was then used to model the hydrodynamic behavior in the watercourses and floodplains for the 100yr ARI applying a 120min critical duration.

An analysis was also undertaken of Gundary Creek applying a 720min critical duration. Gundary Creek is a large rural catchment the main channel of which is to the west of Windellama Road. The analysis determined that the rising waters from the Gundary Creek system have little impact on the site.

Below is an extract from the modelling showing the extent and depth of the 100yr ARI inundation. A significant extent of the area subject to flooding during the 100yr ARI is between 0 and 250mm.



A sensitivity analysis was also undertaken for the 50yr ARI which determined that the extent of inundation was largely similar to that determined for the 100yr ARI. The attached plans include the 100yr ARI flooding extents. The plans also show the centerlines of the drainage paths and setbacks of either 40m or, where the drainage path has caused an incision into the ground surfaces, 100m.

The analysis determined that the rising waters from the Gundary Creek system have little impact on the Planning Proposal site nor the potential future layout.

## 3. State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

The subject site is located within the Sydney Drinking Water Catchment Area. Therefore, concurrence will be required from Water NSW for any proposed development of the site relating to achieving a Neutral or Beneficial Effect (NorBE) in regards to stormwater runoff quality and effluent management.

Discussions were held with the local Water NSW officer regarding the site. The site assessment to achieve NorBE incorporated the application of the department's guidelines particularly the *Water Sensitive Design Guide for Rural Residential Subdivisions 2021*. The assessment included site inspections to classify the existing watercourses. Furthermore, there were no indications from the inspections of any areas of any salinity and/or possible contamination and there was only the one localized area of rock outcrops.

The result of the assessment is that the development site would be able to support onsite effluent management areas.

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## 3.1. Treatment of Stormwater Runoff

As discussed above, the proposed roads will incorporate table drains which will assist in treating the runoff from the roads. To offset any increase in pollutants in the runoff from the site, it is proposed that tree planting is undertaken along the main watercourses. The widths of planting would be in the order of 10-15m wide and will be fenced.

## 3.2. Effluent Management

For each lot, an area of up to approximately 2,000m<sup>2</sup> for an Effluent Management Area (EMA) has been considered in the determination of the proposed lot sizes & layout. A process in accordance with the Water NSW's guidelines 'Water Sensitive Design Guide for Rural Residential Subdivisions' was applied to support this area for an EMA to each lot.

A Site & Soil Evaluation was undertaken by ACT Geotechnical Engineers P/L which included 31 test holes across the proposed development site. The report is included in Attachment 'B'.

The data from the report was then entered into the WaterNSW's NorBE assessment tool for a number of test locations applying:

- Four bedrooms excluding a spa bath
- Rainwater water supply
- Standard Aerated Wastewater Treatment System (AWTS)
- Sub-surface irrigation for disposal
- Ground water generally >1m deep as none test holes encountered any ground water
- The calculated permeability applied where suitable
- Slope gradients were obtained from the terrain model

The AWTS system was trialed as this would be the most likely cost-effective methodology of wastewater treatment but other treatment systems would also be suitable. A spa bath was included for one of the locations and the required area of treatment was less than 2,000m<sup>2</sup>. The results of the test holes entered into the assessment tool would be indicative of the whole of the site and supported the area of 2,000m<sup>2</sup> for the EMA's. The proposed lot layout will require some additional refinement during the preparation of a Development Application including identifying the location of table drains to the proposed roads.

Attachment 'C' contains the NorBE assessment summaries with the test hole reference number shown on the top left corner.

## 4. Contamination

Currently a large area of the site is being used for agriculture which may require the use of fertilisers and possibly pesticides. The planning proposal has the potential to reduce the amount of contaminates that would currently be washed into the existing depressions and watercourses. The Site & Soil Evaluation undertaken by ACT Geotechnical Engineers P/L also included test results for the presence of organochlorine pesticides (OCP) and organophosphorus pesticides (OPP) in three locations. The results of these tests were assessed against the National Environmental Protection Measure (NEPM and were significantly below the required health-based investigation levels for residential development.

Given the results of soils testing, the proposal is considered to be in accordance with the requirements of SEPP55 - Remediation of Land and as the results presented are significantly below health requirements, remediation is unlikely to be required.

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The site is therefore considered to be low in risk with regard to contamination and is unlikely to present any concerns for future residents.

## **5. Utility Services**

## 5.1. Water Supply

The nearest Council watermain is located on the other side of the freeway approximately 1km away from the intersection of Rosemont Road and Windellama Road. It is understood that the pipe size is 100mm which is expected to have insufficient capacity to service the site.

It is therefore expected that future dwellings will be required to have not less than 46,000 litres of roof water storage for domestic purposes in accordance with the DCP.

## 5.2. Electrical

There is an overhead electrical service along Mountain Ash Drive from which it is expected that electrical power can be expanded through the proposed road layout to service the new lots.

## 5.3. Telecommunications

There are existing telecommunication services within Mountain Ash Road, Rosemont Road and Barretts Lane. Telecommunication services to the lots can be reticulated from these existing services.

### 5.4. Sewer

Connection of the site to an existing sewerage system is unavailable and therefore wastewater will be required to be treated and disposed of onsite.

## ATTACHMENT A Layout Plan





## LEGEND

100 Year ARI
 WATERCOURSE / DAM
 WATERCOURSE 40m SETBACK
 WATERCOURSE 100m SETBACK

Drawing Title. SUBDIVISION LAYOUT - WINDELLAMA Status. PRELIMINARY Plot Date. Scale. 1:5000 @ A1 Sheet No. 1 Job No. 22-012 Drawing No. CD-01-A ATTACHMENT B ACT Geotechnical Engineers Pty Ltd Report on Effluent Disposal Preliminary Soils Assessment



## ACT Geotechnical Engineers Pty Ltd

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5 July 2021 Our ref: KA/C11822

Southern Region Land Engineering Via email: greatodd.srle@gmail.com

### Attention: Grea Todd

#### **BRISBANE GROVE RURAL SUBDIVISION ROSEMONT ROAD & MOUNTAIN ASH ROAD, GOULBURN, NSW EFFLUENT DISPOSAL – SITE AND SOIL EVALUATION** PRELIMINARY SOILS ASSESSMENT

#### 1 Introduction

At the request of Southern Region Land Engineering, ACT Geotechnical Engineers Pty. Ltd carried out an effluent disposal assessment to A\$1547 "On-Site domestic wastewater management", for the proposed Brisbane Grove Rural Subdivision along Rosemont Road and Mountain Ash Road, in Goulburn, NSW.

The project comprises a new residential subdivision, and the client would like to maximize the yield by having minimum lot sizes of 20,000m<sup>2</sup> (2ha). To allow this yield, it must be proved that the land can absorb the wastewater within the desired lot size.

This Site and Soil Evaluation was conducted in general accordance with AS 1547:2012 - "On-site domestic wastewater management", "Designing and Installing On-Site Wastewater Systems: A WaterNSW Current Recommended Practice: 2019", and "The Environment & Protection Guidelines 1998 - On-Site Sewage Management for Single Households" (Silver Book).

The site details and assumptions made to assess the requirements of the effluent disposal system are outlined in Table 1 below.

The details of the site and proposed works are summarized in Table 1 below.

### **TABLE 1 – SITE DETAILS**

Area of Lots	Minimum. 2ha
Rainfall Station	070330 – Goulburn Airport AWS NSW
Evaporation Station	070263 – Goulburn TAFE

#### 2 **Effluent Disposal Site and Soil Assessment**

The proposed locations were assessed and the site limitations are addressed below.

The 1:100,000 Goulburn Geology Map documents the area to be covered by Quaternary Age residual and colluvial deposits underlain by Siluro-Devonian aged Mount Fairy Group and Bindook Group bedrock comprising Back Station Ignimbrite, Saltpetre Andesite, and Bullamalita Conglomerate.

### 2.1 Site Limitation Assessment

Table 2 below is a site assessment of the proposed lot locations, and have been assessed using Table 1 from "On-site Sewage Management for Single Households". The table used for this assessment is attached to this report.

Borehole / Location	Slope/ Direction	Exposure to sun/wind	Landform / Slope	Erosion Potential	Presence of Fill	Rock Outcrops (%)	Groundwater
A01	<10% / E	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
A02	<10% / N	High	Waxing Divergent	Low/Not evident	Not found	<10%	Not encountered
A03	10-20% / N	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
A04	10-20% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
A05	<10% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
A06	<10% / S	High	Linear/Waning Planar	Low/Not evident	Not found	<10%	Not encountered
A07	<10% / S	High	Waxing Divergent	Low/Not evident	Not found	<10%	Not encountered
A08	<10% / S	High	Waxing Divergent	Low/Not evident	Not found	<10%	Not encountered
A09	<10% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
A10	<10% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
B01	10-20% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
B02	<10% / W & SW	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
B03	<10% / W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
B04	<10% / W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
C01	<10% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
C02	<10% / W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
C03	<10% / W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
C04	<10% / E	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D01	<10% / N & W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D02	<10%	High	Linear Planar – some ponding encountered	Low/Not evident	Not found	<10%	Not encountered
D03	<10% / N	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D04	<10% / N	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered

### TABLE 2 – SITE ASSESSMENT

Borehole / Location	Slope/ Direction	Exposure to sun/wind	Landform / Slope	Erosion Potential	Presence of Fill	Rock Outcrops (%)	Groundwater
D05	<10% / N	High	Waxing Divergent	Low/Not evident	Not found	<10%	Not encountered
D07	<10% / SW	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D08	10-20% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D09	<10% / N	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D10	10-20% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
D11	10-20% / S	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
E01	<10%	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
E02	<10%	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered
E03	<10% / W	High	Linear Planar	Low/Not evident	Not found	<10%	Not encountered

### 2.2 Sub-surface Conditions

To establish the subsurface conditions, thirty-one (31) test holes were drilled at client-provided locations around the proposed subdivision. Figure 1 shows the site locality, while Figures 2 and 3 are aerial photographs showing the location of the investigation boreholes. The subsurface profiles were logged in terms of the Unified Soil Classification System (USCS). The borehole logs can be found in Appendix B.

### 2.2.1 Site Soil Properties

Based on the soil encountered and in accordance with A\$1547:2012 – "Disposal Systems for Effluent From Domestic Premises" (Reference 2), the properties of the most limiting material are summarised in Table 3 below.

Borehole / Location	Depth of Borehole (m)	Depth of Topsoil (m)	Depth of Bedrock (m)	Soil Texture	Soil Structure	Approx. Bulk Density (g/cm <sup>3</sup> )	Indicative Permeability (m/day)
A01	1.3	0.15	>1.3	Medium to Heavy Clays	Massive/weakly-structured	2.0	<0.06
A02	1.3	0.10	>1.3	Light Clays	Moderately-structured	1.8	0.06 - 0.12
A03	1.4	0.25	>1.4	Light Clays	Moderately-structured	1.8	0.06 - 0.12
A04	1.4	0.30	>1.4	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
A05	1.3	0.30	>1.3	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
A06	1.4	0.20	>1.4	Clay Loams	Weakly-structured	1.6	0.12 – 0.5
A07	1.4	0.25	>1.4	Light Clays	Moderately-structured	1.8	0.06 - 0.12
A08	1.4	0.15	>1.4	Medium to Heavy Clays	Massive/weakly-structured	2.0	<0.06
A09	1.3	0.2	>1.3	Sandy Loams	Weakly-structured	1.6	1.4 - 3.0
A10	1.2	0.2	>1.2	Clay Loams	Weakly-structured	1.6	0.12 – 0.5
B01	1.1	0.2	1.0	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
B02	1.4	0.2	>1.4	Light Clays	Moderately-structured	1.8	0.06 - 0.12
B03	1.2	0.2	>1.2	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
B04	1.4	0.2	>1.4	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
C01	0.9	0.2	0.9	Medium to Heavy Clays	Massive/weakly-structured	2.0	<0.06
C02	1.3	0.15	>1.3	Medium to Heavy Clays	Moderately-structured	2.0	<0.06
C03	1.4	0.2	>1.4	Light Clays	Moderately-structured	1.8	0.06 - 0.12

### TABLE 3 – SOIL ASSESSMENT

Borehole / Location	Depth of Borehole (m)	Depth of Topsoil (m)	Depth of Bedrock (m)	Soil Texture	Soil Structure	Approx. Bulk Density (g/cm³)	Indicative Permeability (m/day)
C04	1.3	0.3	>1.3	Clay Loams	Weakly-structured	1.6	0.12 – 0.5
D01	1.3	0.2	>1.3	Loams	Massive/weakly-structured	1.5	0.5 – 1.5
D02	1.3	0.3	>1.3	Sandy Loams	Weakly-structured	1.6	1.4 - 3.0
D03	1.3	0.15	>1.3	Light Clays	Moderately-structured	1.8	0.06 - 0.12
D04	1.3	0.2	>1.3	Light Clays	Moderately-structured	1.8	0.06 - 0.12
D05	1.3	0.2	>1.3	Loams	Massive/weakly-structured	1.5	0.5 – 1.5
D07	1.3	0.2	>1.3	Clay Loams	Weakly-structured	1.6	0.12 – 0.5
D08	1.3	0.2	1.2	Light Clays	Moderately-structured	1.8	0.06 - 0.12
D09	1.3	0.2	>1.3	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
D10	1.4	0.2	>1.4	Medium to Heavy Clays	Massive/weakly-structured	2.0	<0.06
D11	1.4	0.3	>1.4	Light Clays	Moderately-structured	1.8	0.06 - 0.12
E01	1.3	0.3	>1.3	Loams	Massive/weakly-structured	1.5	0.5 – 1.5
E02	1.3	0.2	>1.3	Clay Loams	High/moderate structured	1.6	0.5 – 1.5
E03	1.3	0.15	>1.3	Light Clays	Moderately-structured	1.8	0.06 - 0.12

### 2.2.2 Permeability Testing

Soil percolation (falling head) tests were conducted on three areas within the proposed subdivision in order to assess the permeability of the soils in the area. The percolation tests were conducted in general accordance with the falling head test method described in AS1547-1994 "Disposal Systems for Effluent From Domestic Premises".

Three (3) ~0.45m-0.5m deep test holes were excavated using a 100mm diameter hand auger at locations which were considered to be representative of typical soil conditions within the site. 100mm diameter PVC pipes were then placed inside of the test holes to ensure the stability of the walls, and a 50mm thick layer of gravel was placed over the bottom of the test hole to prevent scouring of the bottom when water is added. The holes were filled with water and left for an initial saturation of the ground. Once the falling rate of the water has stabilized, depth and time measurements were taken to calculate the permeability of the soil. The calculated permeability values are summarised in Table 4.

Test Number Location		Soil Category	Calculated Permeability (m/day)	Indicative Permeability – from A\$1547:2012 (m/day)
P1	Near A2	Light Clays – moderately structured	1.309 m/day	0.06 - 0.12
P2	Near C3	Light Clays – moderately structured	1.019 m/day	0.06 - 0.12
Р3	Near D4	Light Clays – moderately structured	1.440 m/day	0.06 - 0.12

### TABLE 4 – PERCOLATION TESTING RESULTS

### 2.2.3 Laboratory Results

Five (5) representative samples were sent to a NATA accredited environmental testing laboratory for pH, electrical conductivity, Emerson testing, and phosphorus sorption capacity. The results of these tests are summarized in Table 5. The Laboratory Certificates of Analysis are included in Appendix C.

### TABLE 5 – LABORATORY TEST RESULTS ON SOIL PROPERTIES

Coll Tool	Borehole / Sample Depth						
Soil Test	A7 (0.1m – 0.4m)	A10 (0.0m – 0.3m)	B2 (0.3m – 0.6m)	D3 (0.15m – 0.4m)	D11 (0.3m-0.5m)		
рН	6.5	5.3	5.5	5.8	6.8		
Electrical Conductivity (µ\$/cm)	36	52	34	46	52		
Emerson Class No.	5.0	5.0	5.0	5.0	5.0		
Phosphorus Sorption Capacity (mg/kg)	510	380	590	940	770		

Five (5) samples from client-specified locations were also sent to a NATA accredited environmental testing laboratory to test for the presence of organochlorine pesticides (OCP) and organophosphorus pesticides (OPP). The results of these tests, including assessment against the National Environmental Protection Measure (NEPM) 1999, (as amended 2013) human health guideline values for commercial and industrial land uses, are shown in Table 6.

Contaminant		Bore	Required health-based investigation levels (HIL) (mg/kg)				
Contaminant	A6 (0.0m – 0.2m)	B4 (0.0m – 0.2m)	C2 (0.0m – 0.4m)	D2 (0.0m – 0.2m)	D4 (0.0m – 0.2m)	Residential A <sup>1</sup>	Residential B <sup>2</sup>
OCPs (mg/kg)	<0.1	<0.1	<0.1	<0.1	<0.1	<6 (i)	<10 <sup>(i)</sup>
OPPs (mg/kg)	<0.1	<0.1	<0.1	<0.1	<0.1	< <b>6</b> (i)	<10 <sup>(i)</sup>

### TABLE 6 - LABORATORY TEST RESULTS ON SOILS FOR PESTICIDES

#### Notes:

<sup>1</sup> HIL A – Residential with garden/accessible soil (home grown produce

<sup>2</sup> HIL B – Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments

<sup>(i)</sup> Lowest OCP/OPP specified guideline value

### 4 Effluent Disposal Recommendations

The local council should be consulted regarding its on-site sewage management policy and required minimum buffer distances (depending on the proposed effluent disposal system).

A fence should be placed around the effluent disposal areas if there is a risk of children, animals or vehicles coming into the area. Signage, complying with AS1319 shall be placed in at least two places at the boundary of the application area, clearly visible to property uses, with wording such as "Recycled Water – Avoid Contact – DO NOT DRINK".

The treated effluent is not suitable for vegetable gardens or areas where people can come in contact with the effluent.

The areas should not be used for any purposes that compromise the effectiveness of the system or access for future maintenance purposes.

Should you require any further information regarding this report, please do not hesitate to contact our office.

Yours faithfully ACT Geotechnical Engineers Pty. Ltd.

Jeremy Murray Director Senior Geotechnical Engineer Attachments: Figures 1 to 3, Appendix A to D





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SOUTHERN REGION LAND ENGINEERING BRISBANE GROVE RURAL SUBDIVISION AERIAL PHOTOGRAPH AND BOREHOLE LOCATIONS						
ACT Geotechnical Engineers Pty Ltd	C11822	FIGURE 3				

APPENDIX A Location and Soil Core Photos


























































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BRISBANE GROVE	N LAND ENGINEERING E RURAL SUBDIVISION DIL CORE PHOTOS (E2)	
ACT Geotechnical Engineers Pty Ltd	C11822	FIGURE 3

	3.007	
Brisban Bored	e Geove 2021 nole:E3	
	N LAND ENGINEERING	
	RURAL SUBDIVISION DIL CORE PHOTOS (E3) C11822	FIGURE 31

APPENDIX B Borehole Logs A01 to E03

orehole					Borehol	e No.	A01
OFENDIE	LUg				Sheet	1 of	
CLIENT:	South	nern F	Region Land Engineering		Job No.	C11	822
PROJECT			Grove Rural Subdivision Road & Mountain Ash Ro	ad Goulburn NSV	<b>N</b> /	n: SEE REPO	
Equipment Type Hole Diameter :	: PUSH T					evel:Not Knov rom Vertical:( :N.A.	wn )°
<i>n</i> – – – – – – – – – – – – – – – – – – –	Uepun Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
Me	$\frac{\underline{x^1 k} \cdot \underline{x^1 k}}{\underline{x^1 k} \cdot \underline{x^1 k}}$	SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
0	0.15	ML	Sandy SILT; low plasticity silt, fine to medium grey, moist.	grained sand, light brown, light	FIRM		SLOPEWASH
	0.4	СН	CLAY; medium to high plasticity clay, orange-	grey mottled, dry to moist.	STIFF TO VERY STIFF		RESIDUAL SOI
	0.8	СН	CLAY; high plasticity clay, orange-grey mottled	i, dry.	VERY STIFF		
	1.0						
	1.3		BOREHOLE TERMINA	red at 1.3m			
	-						
Logged By	1.6   /:KA	4	Date : 15/06/21	Checked By :	JM	Date :	17/06/21

orehole		h					Boreho	e No.	A02
orenoid		Jy					Sheet	1 of 1	
CLIENT:	S	outhe	ern F	Region Land Engineering			Job No.	C118	322
PROJECT				Grove Rural Subdivision Road & Mountain Ash Ro	ad Goulburn NSV		Locatio	n: SEE REPOR	Т
Equipment Typ Hole Diameter	e : Pl	JSH TU					Angle F	evel:Not Know rom Vertical: 0 <sup>6</sup> i:N.A.	
Samples	Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency	or Relative Density	Field Test Results	Geological Profile
	<u>/letres</u>	<u>x<sup>1</sup> 1<sub>2</sub> x<sup>1</sup> 1<sub>1</sub></u>	SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	-	OSE		TOPSOIL
	0.1 _	2010 - 10 - 10 - 10 - 10 - 10 - 10 - 10	ML	Silty Gravelly SAND; fine to medium grained s medium grained sedimentary gravel, brown, d	and, low plasticity silt, fine to ry to moist.	TO ME	DSE DIUM NSE		ALLUVIUM
	0.3 <u>-</u>	10000000000000000000000000000000000000	CL	Sandy Gravelly CLAY; low to medium plasticit medium grained sedimentary gravel, orange-b	y clay, fine to coarse sand, fine to rown, dry.	STI	FF		
	0.6 _		SC	Sandy CLAY / Clayey SAND; fine to coarse sa yellow-brown, orange-brown, dry.	nd, low to medium plasticity clay,	ME	FF / DIUM NSE		RESIDUAL SO
	1.0 <sup>1</sup> — -		СН	Sandy CLAY; medium to high plasticity clay, fi mottled orange-brown, dry.	ne to coarse sand, yellow-brown	STI VEF STI	FF TO RY FF		
	1.3			BOREHOLE TERMINA	red AT 1.3m				
									47/00/01
Logged E	_	KA		Date : 15/06/21	Checked By :	JN	1	Date :	17/06/21

Bore	ehole	Loa				Boreho	ole No.	A03
Don		209				Sheet	1 of 1	
CLIE	ENT:	South	ern l	Region Land Engineering		Job No	D. C118	322
PRC	DJECT			Grove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSW		on:SEE REPOR Level:Not Know	
Equipr Hole D	ment Type: Diameter : 5	PUSH T				Angle	From Vertical : 0 g : N.A.	
Samples	Casing	10	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Component Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
	Metr	$\begin{array}{c c} \mathbf{es} \\ \hline & \underline{\mathbf{x}} & \underline{\mathbf{x}} \\ \hline & \underline{\mathbf{x}} \\ \hline & \underline{\mathbf{x}} & \underline{\mathbf{x}} \\ \hline \\ & \underline{\mathbf{x}} \\ \hline \\ \hline & \underline{\mathbf{x}} \\ \hline & \underline{\mathbf{x}} \\ \hline \\ & \underline{\mathbf{x}} \\ \hline & \underline{\mathbf{x}} \\ \hline \\ & \underline{\mathbf{x}} \\ \hline \\ & \underline{\mathbf{x}} \\ \hline \\ \hline \\ \hline \hline \\ \hline \\ \hline \\ \hline \hline \\ \hline \\ \hline \hline \\ \hline \hline \hline \\ \hline \hline$	SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	<u>Ö</u> LOOSE		TOPSOIL .
	0.2		CL	Silty Sandy CLAY; low to medium plasticity fir orange-brown, moist.	es, fine to medium grained sand,	FIRM TO STIFF		ALLUVIUM .
	1.		CL-CH	Sandy CLAY; medium plasticity clay, fine to co wet.	parse sand, light brown, moist to	FIRM TO STIFF		-
Log			СН	Sandy CLAY; medium to high plasticity clay, f ferruginous nodules, light brown, brown, dry.	ne to coarse sand, fine gravel and	VERY STIFF		
		_		BOREHOLE TERMINA	IED AT 1.4m			-
Lo	gged By		•	Date : 01/06/21	Checked By :	JM	Date :	17/06/21
Gertachn	cal Engineer	'S				ACT G	eotechnical	Engineers

Bo	reh	ole	1	n				Boreho	le No.	A04
DU				J				Sheet	1 of <i>1</i>	
С	_IEN	T:	S	outhe	ern F	Region Land Engineering		Job No	C11	822
PF	ROJE	СТ				Grove Rural Subdivision	ad Caulburn NSM		on : SEE REPOP	RT
Equ Hol	uipment e Diam	Type : eter : {	: Pl	JSH TL		Road & Mountain Ash Ro	au, Goulburn, NSW	Angle I	Level:Not Know From Vertical:0 g:N.A.	
Samples		Casing		Graphic Log	U.S.C.S.	Material Description, Str Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Meisture Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
		Met	-		SM	Moisture, Structure Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
					CL	Silty CLAY; low to medium plasticity clay, son yellow-brown, light brown, trace fine gravel an to moist.	ne fine to medium grained sand, d ferruginous nodules to 5mm, dry	STIFF		ALLUVIUM -
		(	0.8 _		SC	Clayey Gravelly SAND: fine to coarse sand, fin gravel, low plasticity clay, red-brown, brown, c		MEDIUM DENSE TO DENSE		RESIDUAL SOIL
			<b>.0</b>							-
				<u>v</u> //d		BOREHOLE TERMINA	TED AT 1.4m			-
	ogge	ed By	.6	KA		Date : 15/06/21	Checked By :	JM	Date :	17/06/21
Gerta	hn cal I	Engitee	rs					ACT G	eotechnica	l Engineers

Bore	hol		n				Boreho	ole No.	A05
Dore	,		J.A.				Sheet	1 of 1	
CLIE	ENT:	S	outhe	ern F	Region Land Engineering		Job No	C118	22
PRO	JEC				Grove Rural Subdivision Road & Mountain Ash Ro	ad. Goulburn. NSW	,	on : SEE REPORT	
Equipm Hole Di	nent Ty iameter	pe : Pl r : 50m	JSH TU			, - ,	Angle I	Level: Not Knowr From Vertical: 0° g: N.A.	1
Samples	Casing	Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Compone Moisture, Structure	ristics,	Consistency or Relative Density	Field Test Results	Geological Profile
		<u>Metres</u>		SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
		0.3 <u>-</u>		CL	Silty Sandy CLAY; low plasticity fines, fine to n moist.	nedium grained sand, light brown,	FIRM TO STIFF		ALLUVIUM
		0.6 _		SC	Clayey Gravelly SAND; fine to coarse sand, fin low plasticity clay, orange-brown, some grey, c	e gravel and ferruginous nodules, ry.	MEDIUM DENSE TO DENSE		RESIDUAL SOIL
		<b>1.0</b> — -	1/1/ 1/1/ 1/1/ 1/1/ 1/1/ 1/1/ 1/1/ 1/1						-
Log		<u> </u>	<b>X</b>		BOREHOLE TERMINAT	ED AT 1.3m			
Log	ged	<u>1.6</u> By :	KA		Date : 15/06/21	Checked By :	JM	Date :	17/06/21
	cal Eng	iteers					ACT G	eotechnical	Engineers

B	orel	nole l	oa				Boreho	le No.	A06
	0.01		-09				Sheet	1 of 1	
		NT:	South	nern l	Region Land Engineering		Job No	C118	322
F	PROJ				Grove Rural Subdivision Road & Mountain Ash Ro	ad Goulburn NSW		n : SEE REPOR	
E	Equipme Iole Dia	nt Type: meter : 5	PUSH T				Angle F	_evel: Not Know From Vertical: 0 g: N.A.	
Samples	sold -	Casing Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact		Consistency or Relative Density	Field Test	Geological
Sar		ී ජී Metro	es   2	S. ∩ SM	Colour, Secondary and Minor Compone Moisture, Structure	ents,		Results	Profile
			<u>17 - 54 - 17</u> - 54 - 17 - 54 - 17 - 54 - 17 - 54 - 17	· .	Sitty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOUSE		-
		0.	2	ML	Sandy SILT; low plasticity silt, fine to medium	grained sand, light brown, moist.	FIRM		ALLUVIUM
		0.	4	CL	Silty Gravelly CLAY; low to medium plasticity sedimentary gravel, light brown, some red-bro	fines, fine to medium grained wn, moist.	STIFF		-
		0.		СН	Sandy CLAY; medium to high plasticity clay, f	ine to medium grained sand, light	STIFF TO VERY		RESIDUAL SOIL
		0.			brown, moist.		STIFF		-
/21		1.0		SC	Clayey Gravelly SAND; fine to coarse sand, fir ferruginous nodules, low to medium plasticity dry to moist.		DENSE		-
BOREHOLE/EXCAVATION LOG C11822.GPJ ACT GEO.GDT 04/07/21									-
ION LOG C		1.	4 77.77	4	BOREHOLE TERMINA	TED AT 1.4m			
(EXCAVATI									-
30REHOLE	Logo	jed By		۹	Date : 15/06/21	Checked By :	JM	Date :	17/06/21
Gegt	tehnica	l Engineer	3				ACT G	eotechnical	Engineers

Bore	hole L	oa				Boreho	ole No.	A07
Bore		Ug				Sheet	1 of 1	
CLIE	NT: S	South	ern F	Region Land Engineering		Job No	C118	322
PRO				Grove Rural Subdivision Road & Mountain Ash Ro	ad Caulburn NSW		on: SEE REPOR	Т
Equipm Hole Di	nent Type: P iameter: 50r	USH TU				Angle I	Level: Not Know From Vertical: 0 <sup>0</sup> g: N.A.	n >
Samples	Casing Depth	Graphic Log	U.S.C.S.	Material Description, Str Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compon	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
<u></u>	Metres		SM	Moisture, Structure Silty SAND; fine to medium grained sand, low rootlets, moist.		COOSE		TOPSOIL
	0.25		ML	Sandy Gravelly SILT; low plasticity silt, fine to brown, orange-brown, dry.	coarse sand, low plasticity silt,	LOOSE TO MEDIUM DENSE		ALLUVIUM
	0.5		SC	Clayey Gravelly SAND; fine to coarse sand, fi gravel, low plasticity clay, orange-brown, red-		MEDIUM DENSE TO DENSE		RESIDUAL SOIL
GEO.GD1 (MIO//21	1.0 -							-
	1.4			BOREHOLE TERMINA	TED AT 1.4m			-
Log	<u>1.6</u>  ged By:	KA	<u> </u>	Date : 15/06/21	Checked By :	JM	Date :	17/06/21
	cal Engireers				I	ACT G	eotechnical	Engineers

Bore	ho	ا ما	na					Borehol	le No.	A08
Dure			J					Sheet	1 of 1	
CLIE	ENT:	S	outh	ern F	Region Land Engineering			Job No.	C118	322
PRO	JEC				Grove Rural Subdivision	ad Oaulhama NOM	,	Location	n : SEE REPOR	г
Equipm	nent Ty	/pe : Pl r : 50m	JSH TL		Road & Mountain Ash Ro	ad, Goulburn, NSV	/	Collar L Angle F Bearing	evel:Not Knowi From Vertical: 0° g: N.A.	1
Samples	Casing	Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency	or Relative Density	Field Test Results	Geological Profile
		Metres	<u>x 1/2</u> <u>x</u> 1/2 · <u>x</u> 4 1/2 	SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass		OSE		TOPSOIL
		0.15		CL	Sandy Silty CLAY; low to medium plasticity fine red-brown, dry.	es, fine to medium grained sand,	FIF	RM		ALLUVIUM .
		0.7		CL	Sandy CLAY; low to medium plasticity clay, fin mottled orange-brown, dry.	e to coarse sand, yellow-brown	ST	IFF		RESIDUAL SOIL
		<b>1.0</b> –								
Log		1.4			BOREHOLE TERMINAT	ED AT 1.4m				
Log	ged	<u>1.6</u> By :	KA		Date : 15/06/21	Checked By :	JN	1	Date :	17/06/21
	cal Eng	giteers					Α	CT Ge	eotechnical	Engineers

Borehole					Boreho	le No.	A09
Derenere	Log				Sheet	1 of 1	
CLIENT:	South	ern F	Region Land Engineering		Job No	. C118	22
PROJECT			Grove Rural Subdivision Road & Mountain Ash Roa	ad, Goulburn, NSW	,	on:SEE REPORT Level:Not Knowr	
Equipment Type Hole Diameter:	: PUSH TL 50mm	JBE DI	RILL		Angle I	From Vertical : 0° g : N.A.	
Samples Casing	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Componer Moisture, Structure	ristics,	Consistency or Relative Density	Field Test Results	Geological Profile
		SM	Silty SAND; fine to medium grained sand, low prooflets, moist.		LOOSE		TOPSOIL -
	ው የሚያስት የ የሚያስት የሚያስት የሚያ የሚያስት የሚያስት የሚያ	SM	Silty Gravelly SAND; fine to coarse sand, low pl	lasticity silt, fine gravel and	LOOSE TO MEDIUM DENSE		ALLUVIUM
		CL	Silty Gravelly CLAY; low plasticity fines, fine gra grey/black, dry.	avel and ferruginous nodules,	STIFF		RESIDUAL SOIL
	1.3	CL-CH	Sandy CLAY; fine to medium grained sand, me mottled, dry.	dium plasticity clay, orange-grey	VERY STIFF		-
			BOREHOLE TERMINATI	ED AT 1.3m			_
Logged By	1.6   / : KA	\	Date : 15/06/21	Checked By :	JM	Date :	17/06/21
Ge <u>ette</u> chnical Engined	ers				ACT G	eotechnical	Engineers

Borehole		r					Boreho	le No.	<b>410</b>
Dorenoie	LOĘ	1					Sheet	1 of 1	
CLIENT:	Sou	Ither	rn F	Region Land Engineering			Job No.	C118	22
PROJECT				Brove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSW	,		n:SEE REPORT _evel:Not Known	
Equipment Type Hole Diameter :	: PUSH						Angle F	From Vertical : 0° ; N.A.	
Samples	Depth Sraphic	. D	S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Characte		Consistency	or Relative Density	Field Test	Geological
an San San San San San San San San San S	etres		.S. ⊃ SM	Colour, Secondary and Minor Componen Moisture, Structure Silty SAND; fine to medium grained sand, low p	nts,		BOSE OSE	Results	Profile
				rootlets, moist.	nasuuty siit, biowii, witi grass				
			CL	Sandy Silty CLAY; low plasticity fines, fine to m moist to wet.	edium grained sand, light brown,	FIR	RM		ALLUVIUM
	0.7		L-CH	Sandy CLAY; medium plasticity clay, fine to me ferruginous nodules to 5mm, orange-grey mottl		ST	IFF		RESIDUAL SOIL
	1.0		SC	Clayey Gravelly SAND; fine to coarse sand, low gravel and quartz, orange-grey, dry.	r plasticity clay, fine to coarse	DE	INSE		-
	-			BOREHOLE TERMINAT refusal	ED AT 1.2m				
Logged By	<u>1.6</u> y:1	KA		Date : 15/06/21	Checked By :	JN	/	Date :	17/06/21
Ge <u>rta</u> chrical Engine						Δ		eotechnical	Engineers

Borehole	<u>م ا د</u>	Da					Borehol	e No.	B01
		-9					Sheet	1 of 1	
CLIENT:	S	outhe	ern F	Region Land Engineering			Job No.	C118	322
PROJECT				Grove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSW	V		n : SEE REPOR	
Equipment Type Hole Diameter	e : Pl	JSH TU						rom Vertical : 0°	
0	Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone	eristics,	Consistency	or Relative Density	Field Test Results	Geological Profile
M	letres		SM	Moisture, Structure Silty SAND; fine to medium grained sand, low grass rootlets, moist.	plasticity silt, dark brown, with		DOSE		TOPSOIL
	0.2 _	10/0/ 10/0/1	SC	Clayey Gravelly SAND; fine to coarse sand, lo grained sedimentary gravel, brown, red-brown		MI	EDIUM ENSE		COLLUVIUM
	0.6 _		CL	Sandy CLAY; low to medium plasticity clay, fir	ne to coarse sand, brown, dry.	S1 VE S1	nff to Ry Nff		RESIDUAL SOIL
	<b>1.0</b> <sup>1</sup>			Extremely Weathered (EW) SANDSTONE; findry.	e to medium grained, light brown,		KTREMELY EAK	,	-
	-			BOREHOLE TERMINA refusal	FED AT 1.1m				
Logged B	<u>1.6</u> Зу:	KA		Date : 15/06/21	Checked By :	JN	л Л	Date :	17/06/21
Ge <u>ett</u> chnical Engi	_			2001 10/00/21	chickled Dy i			eotechnical	

Bore	hole L	oa				Boreho	le No.	B02
2010		-9				Sheet	1 of 1	
CLIE	NT: S	outh	ern F	Region Land Engineering		Job No	C11	322
PRO				Grove Rural Subdivision Road & Mountain Ash Ro	ad Goulburn NSW	/	n : SEE REPOR	
Equipm Hole Dia	ent Type: P ameter: 50n	USH TL				Angle F	_evel : Not Know From Vertical : 0 g : N.A.	
Samples	Casing Depth	Graphic Log	U.S.C.S.	Material Description, Str Soil Type: Plasticity or Particle Charact		Consistency or Relative Density	Field Test	Geological
San	ගී ථී Metres			Colour, Secondary and Minor Compone Moisture, Structure	ents,		Results	Profile
			SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
	0.2		CL	Silty Sandy CLAY; low plasticity fines, fine sa	nd, light brown, moist.	FIRM		ALLUVIUM
	0.5_		CL	Sandy CLAY; low to medium plasticity clay, fir and ferruginous nodules, red-brown, light brov	ne to coarse sand, trace fine gravel vn, some orange, dry to moist.	STIFF		-
Log	1.0 -							
	- 1.4			BOREHOLE TERMINA	TED AT 1.4m			
Log	ged By :	KA	\	Date : 01/06/21	Checked By :	JM	Date :	17/06/21
	al Engineers				1	ACT G	eotechnica	Engineers

Bor	<b>e</b> h	o	e L	oa				Boreho	e No.	B03
_0.	•			9				Sheet	1 of <i>1</i>	
CL	IEN	IT:	S	outh	ern F	Region Land Engineering		Job No.	C11	822
PR	OJ	EC				Grove Rural Subdivision Road & Mountain Ash Ro	oad, Goulburn, NSW		n : SEE REPOF .evel : Not Knov	
Equi Hole	pmer Dian	nt Ty nete	pe : Pl r : 50m	JSH TL				Angle F	rom Vertical : 0	
Samples		Casing	Depth	Graphic Log	C.S.	Material Description, Str		Consistency or Relative Density	Field Test	Geological
Sam			ص Metres		U.S	Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compon- Moisture, Structure	ents,		Results	Profile
			-		SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
			0.2 . - -		CL	Silty Sandy CLAY; low plasticity fines, fine to moist to wet.	medium grained sand, light brown,	SOFT TO FIRM		ALLUVIUM
			0.6 _		СН	Sandy CLAY; medium to high plasticity clay, f dry.	ine to coarse sand, orange-brown,	STIFF TO VERY STIFF		
			0.8 - 1.0-		CL-CH	Sandy CLAY: medium plasticity clay, fine to c brown, dry.	oarse sand, orange-brown, light	VERY STIFF TO HARD		-
			1.2			BOREHOLE TERMINA very slow prog				-
Lc	bgg	ed	<u>1.6</u> By :	KA	<u> </u>	Date : 01/06/21	Checked By :	JM	Date :	17/06/21
Geotoch	ncal	T F Eng	ineers					ACT Ge	eotechnica	l Engineers

Borehole Log	Borehole No.	<b>B04</b>
Dorenoie Log	Sheet	1 of 1
CLIENT: Southern Region Land Engineering	Job No.	C11822
BROUGET Brisbane Grove Rural Subdivision	Location : SE	EE REPORT
Equipment Type : PUSH TUBE DRILL Hole Diameter : 50mm	Collar Level: Angle From V Bearing: N.A	/ertical : 0°
Solution Solution Material Description, Structure Solution   Solution Solution Solution Solution Solution   Material Description, Structure Solution Solution Solution   Material Description, Structure Solution Solution   Motor Solution Solution Solution   Motor Solution Solution Solution   Motor Solution Solution Solution	or Relative Density	Field Geological Test Profile
	DOSE	TOPSOIL
0.2 SC-SM Silty Clayey SAND; fine to medium grained sand, low plasticity silt, light brown, dry to moist.	DOSE	SLOPEWASH
0.8 CL-CH Sandy CLAY; medium plasticity clay, fine to medium grained sand, orange-grey Mitted some red-brown dry	IRM TO TIFF TIFF TO ERY TIFF	ALLUVIUM
1.0   1.0     1.4   BOREHOLE TERMINATED AT 1.4m     1.4   BOREHOLE TERMINATED AT 1.4m     1.6   Logged By : KA   Date : 01/06/21   Checked By : JN		
Logged By: KA Date: 01/06/21 Checked By: JM		Date : 17/06/21
		chnical Engineers

Borehole L	oa				Borehole	e No.	C01
	.09				Sheet	1 of 1	
CLIENT: S	Southe	ern F	Region Land Engineering		Job No.	C11	822
			Grove Rural Subdivision Road & Mountain Ash Ro	oad, Goulburn, NSW	1	1 : SEE REPOF	
Equipment Type: F Hole Diameter : 50	PUSH TU mm	JBE DI	RILL			rom Vertical : 0	
Samples Casing Depth	Graphic Log	.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact		Consistency or Relative Density	Field Test	Geological
Metree	s 5 5 5 5	S. ∩ SM	Colour, Secondary and Minor Compone Moisture, Structure	ents,		Results	Profile
		ы	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
0.2		SM	Silty Gravelly SAND; fine to coarse sand, low grained sedimentary gravel, grey/brown, dry to	plasticity silt, fine to medium moist.	MEDIUM DENSE		ALLUVIUM
0.3		СН	Sandy CLAY; medium to high plasticity clay, f mottled red-brown, dry.	ine to coarse sand, yellow-brown	VERY STIFF		RESIDUAL SOIL
0.5		SC	Clayey Gravelly SAND; fine to coarse sand, lo medium grained sedimentary gravel, yellow-b	w to medium plasticity clay, fine to rown, dry.	DENSE		
0.9			BOREHOLE TERMINA refusal	TED AT 0.9m			
1.0	-						
Logged By	: KA		Date : 16/06/21	Checked By :	JM	Date :	17/06/21
ectochnical Engineers						otechnica	l Engineers

orehole					Boreho	le No.	C02
OFETIOLE	LUY				Sheet	1 of <i>1</i>	1
CLIENT:	South	nern I	Region Land Engineering		Job No	C11	822
PROJECT			Grove Rural Subdivision Road & Mountain Ash Ro	oad. Goulburn. NSV	v	n : SEE REPOF	
Equipment Type Hole Diameter :	: PUSH 1			, - ,	Angle F	_evel: Not Knov From Vertical: 0 g: N.A.	
	Graphic Loa	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Component Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
Me		SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
0	.15	SM	Silty Gravelly SAND; fine to coarse sand, fine low plasticity silt, grey, moist.	gravel and ferruginous nodules,	LOOSE TO MEDIUM DENSE		ALLUVIUM
		СН	Sandy CLAY; medium to high plasticity clay, fi some orange-brown, dry to moist.	ine to coarse sand, light brown,	STIFF TO VERY STIFF		RESIDUAL SO
0	.0	CH	Sandy CLAY; high plasticity clay, fine to coars 20mm, light brown, dry to moist.	e sand, trace sedimentary gravel to	VERY STIFF TO HARD		
	1.3		BOREHOLE TERMINA	TED AT 1.3m			
Logged By	- 	<u> </u>	Date : 16/06/21	Checked By :	JM	Date :	17/06/21

Rore	hole					Boreho	ble No.	C03
DOIG		LUG				Sheet	1 of 1	
CLIE	ENT:	South	ern F	Region Land Engineering		Job No	<sup>o.</sup> C118	322
PRO	JECT			Grove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSV	/	on : SEE REPOR	
Equipm Hole Di	nent Type: iameter : 5	PUSH T				Angle	Level : Not Knowr From Vertical : 0° g : N.A.	
Samples	Casing	10	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Component Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
	Metr		SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	Ŭ LOOSE		TOPSOIL
	0	2	SM	Silty Gravelly SAND; fine to medium grained s and ferruginous nodules, dark brown, dry to m	and, low plasticity silt, fine gravel oist.	LOOSE		ALLUVIUM
	0	5	CL-CH	Sandy CLAY; medium plasticity clay, fine to c red, dry to moist.	parse sand, orange-brown, some	STIFF		
	1.		СН	Sandy CLAY; medium to high plasticity clay, f mottled, dry.	ne to coarse sand, grey-orange	VERY STIFF		RESIDUAL SOIL
Log	1	4		BOREHOLE TERMINA	IED AT 1.4m			
Log	iged By		\ <b>\</b>	Date : 16/06/21	Checked By :	JM	Date :	17/06/21
	cal Engineer	8			1	ACT G	eotechnical	Engineers

Borehole Log	Borehole No.	C04
	Sheet 1 of 1	
CLIENT: Southern Region Land Engineering	Job No. C118	22
PROJECT Bosemont Road & Mountain Ash Road, Goulburn, NSW	Location : SEE REPORT	
	Collar Level : Not Known Angle From Vertical : 0° Bearing : N.A.	
Solution Solution Structure Solution Structure Solution Structure Solution Structure Solution Structure Solution	Pield Field Fest Results Results	Geological Profile
	OSE	TOPSOIL
0.3 ML Clayey Sandy SILT; low to medium plasticity fines, fine to medium grained sand, fine gravel and ferruginous nodules, light brown, moist to wet.	RM	ALLUVIUM
0.6 CH Silty CLAY; medium to high plasticity fines, orange-grey mottled, dry to moist. STI		- RESIDUAL SOIL
		-
1.3 BOREHOLE TERMINATED AT 1.3m		
1.6 1.6   Logged By : KA Date : 16/06/21   Generation of the call Engineers AC	1 Date :	17/06/21

Borehole Log			Borehol	e No.	D01
Borenole Log			Sheet	1 of 1	
CLIENT: Souther	n Region Land Engineering		Job No.	C118	322
	e Grove Rural Subdivision nt Road & Mountain Ash Ro	oad, Goulburn, NSW		n:SEE REPOR .evel:Not Know	
Equipment Type : PUSH TUBE Hole Diameter : 50mm	E DRILL			rom Vertical : 0	
Sampl	Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture	ucture eristics, ents,	Consistency or Relative Density	Field Test Results	Geological Profile
Metres	M Silty SAND; fine to medium grained sand, low rootlets, moist.		U LOOSE		TOPSOIL
0.2 (2-3, 2) N - 1 1 1 N - 1 1 1 N	IL Clayey Sandy SILT; low plasticity fines, fine to moist to wet.	medium grained sand, brown,	FIRM		ALLUVIUM
	CL Silty Gravelly CLAY; low to medium plasticity in nodules, light brown, moist.	înes, fine gravel and ferruginous	FIRM TO STIFF		
0.7 C	H Sandy CLAY; medium to high plasticity clay, fi orange-brown, orange-grey, dry to moist.	ine to medium grained sand,	VERY STIFF		RESIDUAL SOIL
	BOREHOLE TERMINA	TED AT 1.3m			
Logged By : KA	Date : 17/06/21	Checked By :	JM	Date :	17/06/21

Borehole Log		Boreho	le No.	D02
		Sheet	1 of	1
CLIENT: Southern Region Land Engir	eering	Job No.	C1 <sup>2</sup>	1822
PROJECT Brisbane Grove Rural Subdiv Rosemont Road & Mountain		16/1/	n : SEE REPO	
Equipment Type : PUSH TUBE DRILL Hole Diameter : 50mm		Angle F	Level : Not Kno From Vertical : g : N.A.	
Soil Type: Plasticity or Pa Colour, Secondary and M Moisture, Structure		Consistency or Relative Density	Field Test Results	Geological Profile
	ned sand, low plasticity silt, brown, with gras			TOPSOIL
0.2 SM Sitty Gravelly SAND: fine to med and ferruginous nodules, light b	ium grained sand, low plasticity silt, fine gra own, moist.	IVEI LOOSE		ALLUVIUM
0.7 CH Sandy CLAY; medium to high p gravel and ferruginous nodules,	asticity clay, fine to coarse sand, some fine orange-grey mottled, dry to moist.	VERY STIFF		RESIDUAL SOIL
	LE TERMINATED AT 1.3m			
Logged By : KA Date : 17/0		': JM	Date :	17/06/21

orehole					Bore	ehole No.	D03
	Log				She	<sup>et</sup> 1 of	1
CLIENT:	Sout	hern	Region Land Engineering		Job	<sup>No.</sup> C11	1822
PROJECT			Grove Rural Subdivision Road & Mountain Ash Ro	ad. Goulburn. NSV		ation: SEE REPO	
Equipment Type Hole Diameter :	: PUSH			, - ,	Ang	ar Level : Not Kno le From Vertical : ring : N.A.	
Samples Casing	10	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency or Relative	Field Field Test Results	Geological Profile
Me	<u>(res</u> )	<u>.</u> SM  	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
0	.15	CH	Sandy CLAY; medium to high plasticity clay, fi to moist.	ine to coarse sand, red-brown, dry	STIFF TC VERY STIFF		RESIDUAL SOIL
		СН	Silty CLAY; medium to high plasticity fines, so yellow-brown/grey, dry to moist.	me fine to medium grained sand,	VERY STIFF		
1		K CL-CH	Sandy Gravelly CLAY; medium plasticity clay, medium grained sedimentary gravel, yellow-br		VERY STIFF TC HARD		
	<u>1.3</u>		BOREHOLE TERMINA	TED AT 1.3m			
Logged By	<u>.</u> 6 ':K	A	Date : 16/06/21	Checked By :	JM	Date :	17/06/21
orehole Log			Borehol	e No.	D04		
--	---	--	--	---	-----------------------		
			Sheet	1 of <sup>-</sup>	1		
CLIENT: Southe	ern Region Land Engineering		Job No.	C11	822		
	ne Grove Rural Subdivision nont Road & Mountain Ash Ro	ad Goulburn NSW	,	n: SEE REPOR			
Equipment Type : PUSH TU Hole Diameter : 50mm				evel:Not Know rom Vertical:0 」:N.A.			
Casing Casing Depth Graphic Log	Material Description, Stru     Soil Type: Plasticity or Particle Characte     Colour, Secondary and Minor Compone     Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile		
Metres	SM Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL		
0.2 (* ) (*	SM Silty Gravelly SAND; fine to medium grained sa nodules, low plasticity silt, light brown, brown,	and, fine gravel and ferruginous dry.	LOOSE TO MEDIUM DENSE		ALLUVIUM		
0.7	CH Sandy CLAY; medium to high plasticity clay, fir moist.	ne sand, orange-brown, dry to	VERY STIFF		RESIDUAL SOI		
1.0-	CH CLAY; high plasticity clay, trace fine gravel and dry.	I ferruginous nodules, light brown,	VERY STIFF TO HARD				
	BOREHOLE TERMINAT	ED AT 1.3m					
Logged By : KA	Date : 16/06/21	Checked By:	JM	Date :	17/06/21		

B	ore	ho	le L	oa					Boreho	le No.	D05
-				ື່ອ					Sheet	1 of 1	
	CLIEI	NT:	S	outh	ern F	Region Land Engineering			Job No	C118	322
	PRO	JEC				Grove Rural Subdivision Road & Mountain Ash Ro	ad. Goulburn. NSW	/		on : SEE REPOR	
E	Equipme Hole Dia	ent Ty amete	/pe : Pl r : 50m	JSH TI			,,,,		Angle F	Level:Not Knowr From Vertical: 0° g: N.A.	
00	Samples	Casing	Depth Detres	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency	or Relative Density	Field Test Results	Geological Profile
					SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	-	DOSE		TOPSOIL -
			0.2		ML	Gravelly Sandy SILT; low plasticity silt, fine to & ferruginous nodules, light brown, yellow-bro	medium grained sand, fine gravel wn, dry.	TC	DOSE DIUM ENSE		ALLUVIUM -
			0.6 .	1.0/ 	SC	Gravelly Clayey SAND; fine to coarse sand, fir ferruginous nodules, low plasticity clay, orange	e to medium grained gravel and e-grey, orange-brown, dry.		EDIUM INSE		-
04/07/21			<b>1.0</b> –		СН	Sandy CLAY; medium to high plasticity clay, fi orange-grey mottled, dry to moist.	ne to medium grained sand,	VE	ERY		
J ACT GEO.GDT (			1.3								-
BOREHOLE/EXCAVATION LOG C11822.GPJ ACT GEO.GDT 04/07/21			-			BOREHOLE TERMINA	TED AT 1.3m				_
BOREHOL	Log	ged	<u>1.6</u> By :	KA	\	Date : 16/06/21	Checked By :	JN	Л	Date :	17/06/21
Ger	ht chrica	al Eng	giteers					A	CT G	eotechnical	Engineers

orehole Lo	n				Boreh	ole No.	D07
	Jg				Sheet	1 of 1	
CLIENT: So	outher	rn F	Region Land Engineering		Job No	<sup>o.</sup> C118	322
			Grove Rural Subdivision Road & Mountain Ash Ro	ad Goulburn NSW		on: SEE REPOR	
Equipment Type: PU Hole Diameter : 50m	JSH TUB				Angle	Level : Not Know From Vertical : 0° g : N.A.	n
Samples Casing Depth	raph Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone Moisture, Structure	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
Metres	<u>x</u> 1 <u>x</u> <u>x</u> <u>x</u> <u>y</u> <u>x</u> <u>x</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u> <u>y</u>	SM	Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
0.2		CL	Silty Sandy CLAY; low plasticity fines, fine to r moist.	nedium grained sand, light brown,	FIRM		ALLUVIUM
0.4	9.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5	SM	Silty Gravelly SAND; fine to medium grained s ferruginous nodules, light brown, orange-brow	and, low plasticity silt, fine gravel & n, dry to moist.	MEDIUM DENSE		
0.6		СН	Sandy CLAY; high plasticity clay, fine to mediu light brown, dry to moist.	Im grained sand, orange-brown,	VERY STIFF		RESIDUAL SO
1.0							
1.3			BOREHOLE TERMINAT	'ED AT 1.3m			
1.6							

Bor	reh	nol	le Lo	oa				Boreho	le No.	D08
20.				9				Sheet	1 of 1	
CL	IEN	IT:	S	outh	ern I	Region Land Engineering		Job No	C11	822
PR	OJI	EC				Grove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSW	/	n:SEE REPOR _evel:Not Know	
Equi Hole	pmer Dian	nt Ty nete	r : 50m	JSH TL Im	JBE DI	RILL		Angle F	From Vertical : 0 g : N.A.	
Samples		Casing	Depth	Graphic Log	U.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Charact Colour, Secondary and Minor Compone	eristics,	Consistency or Relative Density	Field Test Results	Geological Profile
			Metres	<u>, 17, 18, 18</u>	SM	Moisture, Structure Silty SAND; fine to medium grained sand, low rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
			-	<u></u>						
			0.2		SC-SM	Silty Clayey SAND; fine to coarse sand, low pl red-brown, dry to moist.	asticity fines, dark brown,	LOOSE TO MEDIUM DENSE		ALLUVIUM
			-							-
			-		· · · ·					
			0.8 <u>-</u>		SC	Clayey Gravelly SAND; fine to coarse sand, m medium grained sedimentary gravel, brown, li	edium plasticity clay, fine to ght brown, dry.	DENSE		RESIDUAL SOIL
			-	10 10 10 10 10 10 10						
			1.0 —							
			1.2 _ 1.3			Extremely Weathered (EW) SILTSTONE; fine dry.	to medium grained, light brown,	EXTREMEL WEAK	ł	BEDROCK
						BOREHOLE TERMINA	TED AT 1.3m			
			-							
Lo	bgg	ed	<u>1.6</u> By :	KA		Date : 17/06/21	Checked By :	JM	Date :	17/06/21
Ge <u>etta</u> ch	incal		ineers				1	ACT Ge	eotechnica	Engineers

Sheet       1 of 1         ODE CLIENT: Southern Region Land Engineering       Job No. C11822         PROJECT Brisbane Grove Rural Subdivision Rosemont Road & Mountain Ash Road, Goulburn, NSW       Location : SEE REPORT Collar Level : Not Known Angle From Vertical : 0° Bearing : NA.         Equipment Type : PUSH TUBE DRILL Hole Diameter : 50mm       of 1       Description, Structure Sciently or Particle Characteristics. Collar Secondary and Minor Components, Molisture, Structure       of 2 (b) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	Borehole	م ا د	n				Boreh	ole No.	D09
CLIENT:       Southern Region Land Engineering       C11822         PROJECT       Brisbane Grove Rural Subdivision Rosemont Road & Mountain Ash Road, Goulburn, NSW       Location : SEE REPORT Calar Level : Not Known Ande From Vertical : 0* Beating : NA.         Image: Southern Region Line Contract Road & Mountain Ash Road, Goulburn, NSW       Material Description, Structure Material Description, Structure Contract Rose Robins, Contract Robins, Ro	Dorchold		9				Sheet	1 of 1	
PROJECT Rosemont Road & Mountain Ash Road, Goulburn, NSW         Equipment Type : PUSH TUBE DRULL       Color Level : Not Known Angle From Vetical : 0*         Being : Not Sing Sing Sing Sing Sing Sing Sing Sing	CLIENT:	S	outhe	ern F	Region Land Engineering		Job No	<sup>2.</sup> C118	22
Equipment Type : PUSH TUBE DRILL Hele Diameter : 50mm     Material Description, Structure Searing : N.A.     Material Description, Structure Searing : N.A. <sup>1</sup>	PROJECT					ad. Goulburn. NSW			
1     1.1     2.5     SM     Silly SAND: fine to medium grained sand, low plasticity sill, thown, with grass     LOOSE     TOPSOIL       0.2     1.2     SM     Silly Gravely SAND: fine to medium grained sand, low plasticity sill, the gravel     LOOSE     ALLUVUM       0.4     Silly Gravely CLAY, invitor medium grained sand, low plasticity sill, the gravel     LOOSE     ALLUVUM       0.4     Silly Gravely CLAY, invitor medium grained sand, low plasticity sill, the gravel     LOOSE       0.4     Cl.     Sandy Gravely CLAY, invitor medium plasticity city, fine to coarse sand, fine     STIFF TO VERY STIFF       1.2     Cl.     Sandy CLAY, medium to high plasticity city, fine to coarse sand, orange-grey, dy.     VERY STIFF	Equipment Type Hole Diameter	e : Pl	JSH TU			, - ,	Angle	From Vertical : 0°	
1     1 <th>Samples Casing</th> <th></th> <th>Graphic Log</th> <th>U.S.C.S.</th> <th>Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Componer</th> <th>istics,</th> <th>onsistency or Relative Density</th> <th>Field Test Results</th> <th>Geological Profile</th>	Samples Casing		Graphic Log	U.S.C.S.	Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Componer	istics,	onsistency or Relative Density	Field Test Results	Geological Profile
0.4     Sing Gravely CLAY; ine to medium grained sand, low plasticity silt, fine gravel     LOOSE     ALLUVIUM       0.4     OL     Sandy Gravely CLAY; low to medium plasticity clay, fine to coarse sand, fine     STIFF TO VERY STIFF       0.4     OL     Sandy Gravely CLAY; low to medium plasticity clay, fine to coarse sand, fine     STIFF TO VERY STIFF       1.0     OL     Sandy Gravely CLAY; medium to high plasticity clay, fine to coarse sand, orange-grey, dry     VERY STIFF	M	<u>letres</u>			Silty SAND; fine to medium grained sand, low p	lasticity silt, brown, with grass			TOPSOIL
C.L. Sandy Gravely CLAY; tow to medium plasticity clay, fine to coarse sand, fine gravel and ferruginous nodules, orange-brown, light brown, moist.  STIFF TO STIFF		0.2 _	2.0	SM	Silty Gravelly SAND; fine to medium grained sa and ferruginous nodules, light brown, moist.	nd, low plasticity silt, fine gravel	LOOSE		ALLUVIUM
1.2     CH     Sandy CLAY; medium to high plasticity clay, fine to coarse sand, orange-grey, dry.     VERY STIFF		-		CL	Sandy Gravelly CLAY; low to medium plasticity gravel and ferruginous nodules, orange-brown,	clay, fine to coarse sand, fine ight brown, moist.	STIFF TO VERY STIFF		RESIDUAL SOIL
		1.2 _ 1.3 _	1 5 3	СН	dry.		VERY STIFF	_	
Logged By : KA Date : 17/06/21 Checked By : JM Date : 17/06/21	Logged E		KA		Date : 17/06/21	Checked By :	JM	Date :	17/06/21

Borehole					Borehol	e No.	D10
	LUg				Sheet	1 of <i>'</i>	
CLIENT:	South	ern F	Region Land Engineering		Job No.	C11	822
PROJECT			Grove Rural Subdivision Road & Mountain Ash Roa	d Coulburn NSVA		1 : SEE REPOR	RT
Equipment Type: Hole Diameter: 5	PUSH TI			u, Goulburn, NSM		evel:Not Knov rom Vertical:( :N.A.	/n °
Samples Casing	- U	U.S.C.S.	Material Description, Struct Soil Type: Plasticity or Particle Characteris Colour, Secondary and Minor Component Moisture, Structure	ticity or Particle Characteristics, dary and Minor Components, ture		Field Test Results	Geological Profile
Met	$\frac{ \mathbf{S} }{ \mathbf{Y}  \cdot  \mathbf{Y} } = \frac{ \mathbf{Y} ^{2}}{ \mathbf{Y} ^{2}} = \frac{ \mathbf{Y} ^{2}}{ Y$	SM	Silty SAND; fine to medium grained sand, low pla rootlets, moist.		Consistency as Relative Density		TOPSOIL
	2	СН	Silty CLAY; high plasticity fines, light brown, dry.		VERY STIFF		RESIDUAL SOIL
1.		СН	Silty CLAY; high plasticity fines, orange-brown, d		VERY STIFF TO HARD		
			BOREHOLE TERMINATEI	D AT 1.4m			
Logged By		\ \	Date : 16/06/21	Checked By :	JM	Date :	17/06/21

Bore	hole L	na				Boreho	le No.	D11
2010		9				Sheet	1 of 1	
CLIE	ENT: S	outhe	ern F	Region Land Engineering		Job No.	C118	322
PRO				Grove Rural Subdivision Road & Mountain Ash Roa	ad, Goulburn, NSW		n : SEE REPOR	
Equipm Hole Di	nent Type: Pl iameter : 50m	JSH TU Im	IBE DI	RILL		Angle F	rom Vertical : 0° i : N.A.	
Samples	Casing Casing Graphic Log U.S.C.S.		J.S.C.S.	Material Description, Stru Soil Type: Plasticity or Particle Characte Colour, Secondary and Minor Componer	ristics,	Consistency or Relative Density	Field Test Results	Geological Profile
	Metres		SM	Moisture, Structure Silty SAND; fine to medium grained sand, low p rootlets, moist.	plasticity silt, brown, with grass	LOOSE		TOPSOIL
	0.3		CL	Silty CLAY; low to medium plasticity fines, light	brown, moist.	FIRM		ALLUVIUM
	0.5_		CL	Silty Gravelly CLAY; low plasticity fines, fine gra orange-brown, dry to moist.	avel and ferruginous nodules,	FIRM		
	0.7		СН	Sandy CLAY; medium to high plasticity clay, fin mottled, dry.	e to coarse sand, orange-grey	VERY STIFF		RESIDUAL SOIL
	1.0-							
	1.4			BOREHOLE TERMINATI	ED AT 1.4m			
Log	iged By:	KA		Date : 16/06/21	Checked By :	JM	Date :	17/06/21
Ge <u>rtt</u> chn	cal Engineers					ACT Ge	eotechnical	Engineers

orehole					Boreho	e No.	E01
Orenoie	LUg				Sheet	1 of	1
CLIENT:	Southe	ern F	Region Land Engineering		Job No.	C11	822
PROJECT			Grove Rural Subdivision Road & Mountain Ash Ro	ad. Goulburn. NSV	v	n : SEE REPO	
Equipment Type Hole Diameter :	: PUSH TU			, - ,		evel: Not Kno rom Vertical: : N.A.	
	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure		Consistency or Relative Density	Field Test Results	Geological Profile
Me	Ites           Image: A fill of the state of th	SM	Silty SAND; fine to medium grained sand, low with grass rootlets, moist.	plasticity silt, brown, dark brown,	LOOSE		TOPSOIL
		CL	Silty Sandy CLAY; low plasticity fines, fine to of ferruginous nodules, light brown, moist.	coarse sand, trace fine gravel and	FIRM		ALLUVIUM
	0.5	CL-CH	Sandy Gravelly CLAY; medium plasticity clay, sedimentary gravel, yellow-brown, dry to mois	fine to coarse sand, fine to coarse t.	STIFF TO VERY STIFF		RESIDUAL SO
		СН	Sandy CLAY; medium to high plasticity clay, fi mottled, brown, dry.	ne to coarse sand, orange-grey	VERY STIFF		
			BOREHOLE TERMINA	TED AT 1.3m			
Logged By	/: KA		Date : 17/06/21	Checked By :	JM	Date :	17/06/21

Bore	hole L	oa				Boreho	le No.	E02
		-9				Sheet	1 of 1	
CLIE	ENT: S	outh	ern F	Region Land Engineering		Job No	C11	822
PRO				Grove Rural Subdivision Road & Mountain Ash Roa	ad, Goulburn, NSW	/	n : SEE REPOR	
Equipm Hole Di	nent Type: Pl iameter: 50n	USH TL			, ,	Angle F	evel:Not Know From Vertical: 0 g: N.A.	
Samples	Casing Depth	Graphic Log	U.S.C.S.	Material Description, Struct Soil Type: Plasticity or Particle Character Colour, Secondary and Minor Componen Moisture, Structure	istics,	Consistency or Relative Density	Field Test Results	Geological Profile
	Metres	<u>17 - 54 - 17</u> - 54 - 17 - 54 - 17 - 54 - 17 - 54 - 17 - 54 - 17	SM	Silty SAND; fine to medium grained sand, low p with grass rootlets, moist.	lasticity silt, brown, dark brown,	LOOSE		TOPSOIL
	0.2		CL	Silty Sandy CLAY; low plasticity fines, fine to me brown, moist.	edium grained sand, brown, light	FIRM		ALLUVIUM
	0.5_		CL	Silty Gravelly CLAY; low to medium plasticity fin nodules, light brown, moist to wet.	es, fine gravel and ferruginous	FIRM		
	0.9 1.0 -		СН	Sandy CLAY; medium to high plasticity clay, fine sedimentary gravel and ferruginous nodules, ora		STIFF TO VERY STIFF		RESIDUAL
	1.3			BOREHOLE TERMINATE	ED AT 1.3m			
		-						
Log	iged By:	KA	\	Date : 17/06/21	Checked By :	JM	Date :	17/06/21
ie <u>ett</u> chrie	cal Engineers					ACT G	eotechnica	Engineers

Borehole	<u>م ا د</u>	na					Borehol	e No.	E03
Borchold	,	9					Sheet	1 of 1	
CLIENT:	So	outhe	ern F	Region Land Engineering			Job No.	C11	822
PROJECT				Grove Rural Subdivision Road & Mountain Ash Ro	ad, Goulburn, NSW	v		1 : SEE REPOF	
Equipment Type Hole Diameter:	e : PL : 50m	JSH TU m	JBE DI	RILL				rom Vertical : 0	
0	Depth Settes	Maiatura Structura					Relative Density	Field Test Results	Geological Profile
	<u>ietres</u>		SM	Silty SAND; fine to medium grained sand, low with grass rootlets, moist.	plasticity silt, brown, dark brown,	Consistency	DSE		TOPSOIL
	0.15		CL	Sandy CLAY; low plasticity clay, fine to mediu trace gravel to 10mm, moist.	n grained sand, orange-brown,	FIRI	М		ALLUVIUM
	0.4		CL-CH	Sandy Gravelly CLAY; medium plasticity clay, ferruginous nodules, dry to moist.	fine to coarse sand, fine gravel and	STIF	F		RESIDUAL SOIL
	0.8		SC	Clayey SAND / Sandy CLAY; low to medium p fine sedimentary gravel, dry.	lasticity clay, fine to coarse sand,	VEF STIF DEM	F/		
	1.0								-
	1.3			BOREHOLE TERMINAT	ED AT 1.3m				
	-								
Logged B	1.6 BV :	KA		Date : 16/06/21	Checked By :	JM		Date :	17/06/21
Ge <u>eta</u> chn cal Engin	_				, <b>,</b> , ,				Engineers

APPENDIX C Laboratory Test Certificates

## Client Reference: ACT Geotechnical Engineers- C11822

Organochlorine Pesticides in soil						
Our Reference		272356-6	272356-7	272356-8	272356-9	272356-10
Your Reference	UNITS	A6	B4	C2	D2	D4
Depth		0.0-0.2m	0.0-0.2m	0.0-0.4m	0.0-0.2m	0.0-0.2m
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/06/2021	25/06/2021	25/06/2021	25/06/2021	25/06/2021
Date analysed	-	25/06/2021	25/06/2021	25/06/2021	25/06/2021	25/06/2021
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
НСВ	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	92	94	92	93

## Client Reference: ACT Geotechnical Engineers- C11822

Organophosphorus Pesticides in Soil						
Our Reference		272356-6	272356-7	272356-8	272356-9	272356-10
Your Reference	UNITS	A6	B4	C2	D2	D4
Depth		0.0-0.2m	0.0-0.2m	0.0-0.4m	0.0-0.2m	0.0-0.2m
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/06/2021	25/06/2021	25/06/2021	25/06/2021	25/06/2021
Date analysed	-	25/06/2021	25/06/2021	25/06/2021	25/06/2021	25/06/2021
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	92	94	92	93

## Client Reference: ACT Geotechnical Engineers- C11822

Misc Inorg - Soil						
Our Reference		272356-1	272356-2	272356-3	272356-4	272356-5
Your Reference	UNITS	A7	A10	B2	D3	D11
Depth		0.1-0.4m	0.0-0.3m	0.3-0.6m	0.15-0.4m	0.3-0.5m
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/06/2021	29/06/2021	29/06/2021	29/06/2021	29/06/2021
Date analysed	-	29/06/2021	29/06/2021	29/06/2021	29/06/2021	29/06/2021
pH 1:5 soil:water	pH Units	6.5	5.3	5.5	5.8	6.8
Electrical Conductivity 1:5 soil:water	μS/cm	36	52	34	46	52
Emerson Class No.	-	5.0	5.0	5.0	5.0	5.0
Phosphorus Sorption Capacity	mg/kg	510	380	590	940	770

APPENDIX D Limitations of Geotechnical Report



ACT Geotechnical Engineers Pty Lt ACN 063 673 530 5/9 Beaconsfield Street, Fyshwick ACT 2609 PO Box 9225, Deakin ACT 2600 Ph: (02) 6285 1547

# Limitations in the Use and Interpretation of this Geotechnical Report

Our Professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

The geotechnical report was prepared for the use of the Owner in the design of the subject development and should be made available to potential contractors and/or the Contractor for information on factual data only. This report should not be used for contractual purposes as a warranty of interpreted subsurface conditions such as those indicated by the interpretive borehole and test pit logs, cross- sections, or discussion of subsurface conditions contained herein.

The analyses, conclusions and recommendations contained in the report are based on site conditions as they presently exist and assume that the exploratory bore holes, test pits, and/or probes are representative of the subsurface conditions of the site. If, during construction, subsurface conditions are found which are significantly different from those observed in the exploratory bore holes and test pits, or assumed to exist in the excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between conducting this investigation and the start of work at the site, or if conditions have changed due to natural causes or construction operations and reconsult to the site, this report should be reviewed to determine the applicability of the conclusions and the recommendations considering the changed conditions and time lapse.

The summary bore hole and test pit logs are our opinion of the subsurface conditions revealed by periodic sampling of the ground as the test holes progressed. The soil descriptions and interfaces between strata are interpretive and actual changes may be gradual.

The bore hole and test pit logs and related information depict subsurface conditions only at the specific locations and at the particular time designated on the logs. Soil conditions at the other locations may differ from conditions occurring at these bore hole and test pit locations. Also, the passage of time may result in a change in the soil conditions at these test locations.

Groundwater levels often vary seasonally. Groundwater levels reported on the boring logs or in the body of the report are factual data only for the dates shown.

Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples, bore holes or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. It is recommended that the Owner consider providing a contingency fund to accommodate such potential extra costs.

This firm cannot be responsible for any deviation from the intent of this report including, but not restricted to, any changes to the scheduled time of construction, the nature of the project or the specific construction methods or means indicated in this report: nor can our company be responsible for any construction activity on sites other than the specific site referred to in this report.



# ATTACHMENT C NorBE Assessment Wastewater Effluent Model Summaries

# A01-1 NorBE Assessment

# WEM Summary

## **General Information**

WEM model ID	2334112	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	gı	egtodd.srl	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346
			104		126140

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551687.974039	Northing	4326432.862298
Dev	Slope (m/m) <b>/elopment</b>	0.06959	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	Νο
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	2.00
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	510
	Soil depth (to impermeable layer) (m)	1.30	Soil structure	Strong
	Saturated hydraulic conductivity (Ksat)(m/day)	0.06		
	Soil texture	Med-heavy clays		
Effi	uent disposal risk factors			
	Depth to water table	> 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes an	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

### **WEM Plume Map**



# A01-2 SPA NorBE Assessment

# WEM Summary

## **General Information**

WEM model ID	2334111	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	jregtodd.sr	le@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346

Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	50.0	Width (up slope)(m)	26.0
Proposed area(m2)	1300.0	Minimum Required area	1187.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	1300
Effluent volume calculated (l/day)	1300

## **WEM Model Inputs**

### Location

Eastir	ng	9551687.974039	Northing	4326432.862298	
Slope Developn	e (m/m) nent	0.06959	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A	
Deve	elopment type	Dwellings	Development detail	4 bedrooms	
Wate	er supply type	Rainwater	Spa Bath	Yes	
Conti	nuous system use	Yes			
Treat	ment system	AWTS standard	Disposal system	Irrigation sub-surface	
Site					
Lot s	ize(m2)	4000			
Subj	ect to severe frost	Νο	Bulk density(g/cm3)	2.00	
Vege	tation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	510	
Soil c (m)	lepth (to impermeable layer)	1.30	Soil structure	Strong	
	rated hydraulic conductivity :)(m/day)	1.31			
Soil t	exture	Med-heavy clays			
Effluent d	lisposal risk factors				
Depth	to water table	> 1.0			
Flood	potential of disposal system	Above 1 in 50 year ARI			
Landf	orm score	Hill crests, convex side slopes an	d plains		
Run-c	on and upslope seepage	None-low, diversion possible			
Rock	outcrops, scarp and bedrock	< 5%			
Distar	nce to drainage dpression	> 50			
	nce to watercourses and supply reservoirs	> 120			
Distar bores	nce to licenced drinking water	> 150			

## **WEM Plume Map**



# A01-3 NorBE Assessment

# WEM Summary

## **General Information**

WEM model ID	2334110	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.sr	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346

Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (l/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551687.974039	Northing	4326432.862298
Dev	Slope (m/m) velopment	0.06959	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	No
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	2.00
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	510
	Soil depth (to impermeable layer) (m)	e layer) <b>1.30</b>	Soil structure	Strong
	Saturated hydraulic conductivity (Ksat)(m/day)	1.31		
	Soil texture	Med-heavy clays		
Effi	uent disposal risk factors			
	Depth to water table	> 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes an	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

## WEM Plume Map





### **General Information**

WEM model ID	2334818	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.sr	le@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346
			104		126140

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551146.503076	Northing	4326517.820624
De	Slope (m/m) velopment	0.04222	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	No
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	1.80
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	380
	Soil depth (to impermeable layer) (m)	) <b>1.30</b>	Soil structure	Moderate
	Saturated hydraulic conductivity (Ksat)(m/day)	1.30		
	Soil texture	Light clays		
Effi	uent disposal risk factors			
	Depth to water table	> 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes an	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

### **WEM Plume Map**





### **General Information**

WEM model ID	2334823	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.sr	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346

Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551146.503076	Northing	4326517.820624
De	Slope (m/m) velopment	0.04222	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	No
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	1.80
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	380
	Soil depth (to impermeable layer) (m)	) <b>1.30</b>	Soil structure	Moderate
	Saturated hydraulic conductivity (Ksat)(m/day)			
	Soil texture	Light clays		
Eff	luent disposal risk factors			
	Depth to water table	> 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes ar	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

### **WEM Plume Map**





### **General Information**

WEM model ID	2334824	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.srl	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346
			104		126140
			105		126140
			1		853498

106

Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Special design criteria, including soil modification and soil permeability testing, will be required

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	20.0	Width (up slope)(m)	3.8
Proposed area(m2)	150.0	Minimum Required area	120.0
Number of trenches	2	(m2)	







Effluent volume proposed (l/day)	400
Effluent volume calculated (I/day)	600

## **WEM Model Inputs**

### Location

	Easting	9551146.503076	Northing	4326517.820624
Dev	Slope (m/m) velopment	0.04222	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
DC	-			
	Development type	Dwellings	Development detail	3 bedrooms
	Water supply type	Rainwater	Spa Bath	Νο
	Continuous system use	Yes		
	Treatment system	Septic tank	Disposal system	Absorption trench – primary effluent
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	1.80
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	380
	Soil depth (to impermeable layer) (m)	1.30	Soil structure	Moderate
	Saturated hydraulic conductivity (Ksat)(m/day)	0.06		
	Soil texture	Light clays		
Effl	uent disposal risk factors			
	Depth to water table	> 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes ar	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

### WEM Plume Map



# A06-1 NorBE Assessment

# WEM Summary

## **General Information**

WEM model ID	2334825	Associated DA number			
Model description					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.sr	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	2//835278	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278
			1		779194
			103		70346

Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

I	Easting	9551253.127413	51253.127413 Northing			
	Slope (m/m) elopment	0.05111	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A		
	Development type	Dwellings	Development detail	4 bedrooms		
,	Water supply type	Rainwater	Spa Bath	No		
(	Continuous system use	Yes				
-	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface		
Site						
	Lot size(m2)	4000				
	Subject to severe frost	Νο	Bulk density(g/cm3)	1.60		
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	500		
	Soil depth (to impermeable layer) (m)	r) <b>1.40</b>	Soil structure	Weak		
	Saturated hydraulic conductivity (Ksat)(m/day)					
:	Soil texture	Clay loams				
Efflue	ent disposal risk factors					
C	Depth to water table	> 1.0				
F	lood potential of disposal system	Above 1 in 50 year ARI				
L	andform score	Concave side slopes and foot slo	pes			
F	Run-on and upslope seepage	None-low, diversion possible				
F	Rock outcrops, scarp and bedrock	< 5%				
E	Distance to drainage dpression	> 50				
	Distance to watercourses and water supply reservoirs					
	Distance to licenced drinking water pores	> 150				

### **WEM Plume Map**



# A10-1 NorBE Assessment

# WEM Summary General Information

WEM model ID	2334828	Associated DA number				
Model description	Concept effluent treatment		gregtodd.srle@gmail.com			
Consultancy	Southern Region Land Engineering	Consultant				
Consultant reference number	T01405					
Council	Goulburn Mulwaree	Assessing officer	-			
Nominated lot	1//853498	Associated lots	Lot	Section	Plan	
Development class	Subdivision unsewered >=4 lots		2		835278	
			1		835278	
			1		731427	
			22		811954	
			23		811954	
			24		811954	

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

Easting		9550898.493270	Northing	4326683.866589	
Slope (m/m) Development		0.02291	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A	
Development	type	Dwellings	Development detail	4 bedrooms	
Water supply	type	Rainwater	Spa Bath	No	
Continuous sy	vstem use	Yes			
Treatment sys	stem	AWTS standard	Disposal system	Irrigation sub-surface	
Site					
Lot size(m2)		4000			
Subject to se	vere frost	Νο	Bulk density(g/cm3)	1.60	
Vegetation fo	r nutrient uptake		Phosphorus sorption (mg/kg)	380	
Soil depth (to (m)	Soil depth (to impermeable layer) (m)	1.20	Soil structure	Weak	
Saturated hyd (Ksat)(m/day	draulic conductivity )	0.20			
Soil texture		Clay loams			
Effluent disposal	risk factors				
Depth to wate	r table	> 1.0			
Flood potentia	l of disposal system	Above 1 in 50 year ARI			
Landform scor	re	Hill crests, convex side slopes a	nd plains		
Run-on and up	pslope seepage	None-low, diversion possible			
Rock outcrops	, scarp and bedrock	< 5%			
Distance to dr	ainage dpression	> 50			
Distance to wa water supply r	atercourses and reservoirs	> 120			
Distance to lic bores	enced drinking water	> 150			

## WEM Plume Map



# B01-1 NorBE Assessment

# WEM Summary General Information

WEM model ID	2335120	Associated DA number				
Model description	Concept effluent management					
Consultancy	Southern Region Land Engineering	Consultant	t gregtodd.srle@gmail.com			
Consultant reference number	T01405					
Council	Goulburn Mulwaree	Assessing officer				
Nominated lot	1//853498	Associated lots	Lot	Section	Plan	
Development class	Subdivision unsewered >=4 lots		2		835278	
			1		835278	
			1		731427	
			22		811954	
			23		811954	
			24		811954	

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0	
Proposed area(m2)	800.0	Minimum Required area (m2)	730.0	
Number of trenches	0	(1112)		



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551027.485516	Northing	4326943.138470	
De	Slope (m/m) velopment	on site inspection (Applicable to some disposal systems on		N/A	
	Development type	Dwellings	Development detail	4 bedrooms	
	Water supply type	Rainwater	Spa Bath	No	
	Continuous system use	Yes			
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface	
Sit				<b>.</b>	
511	Lot size(m2)	4000			
	Subject to severe frost	No	Pully donoity (a/am2)	1.60	
	Vegetation for nutrient uptake		Bulk density(g/cm3)	400	
	Soil depth (to impermeable layer)	Lawn - unmanaged	Phosphorus sorption (mg/kg)	400	
	(m)	1.00	Soil structure	High/moderate	
	Saturated hydraulic conductivity (Ksat)(m/day)	1.00			
	Soil texture	Clay loams			
Eff	uent disposal risk factors				
	Depth to water table	0.4 - 1.0			
	Flood potential of disposal system	Above 1 in 50 year ARI			
	Landform score	Hill crests, convex side slopes ar	nd plains		
	Run-on and upslope seepage	None-low, diversion possible			
	Rock outcrops, scarp and bedrock	< 5%			
	Distance to drainage dpression	> 50			
	Distance to watercourses and water supply reservoirs	> 120			
	Distance to licenced drinking water bores	> 150			

### **WEM Plume Map**



# **B02-1 NorBE** Assessment

# **WEM Summary General Information**

WEM model ID	2335121	Associated DA nu	mber			
Model description	Concept effluent management					
Consultancy	Southern Region Land Engineering	Consultant	g	regtodd.srl	e@gmail.com	
Consultant reference number	T01405					
Council	Goulburn Mulwaree	Assessing officer				
Nominated lot	1//853498	Associated lots	Lot	Section	Plan	
Development class	Subdivision unsewered >=4 lots		2		83	5
			1		83	5
			1		73	1
			22		81	1
			23		81	1
			24		81	1

Date of model run

### **WEM Model Run Summary**

Pending Model run outcome

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9550647.406968	Northing	4327243.404693
De	Slope (m/m) velopment	0.01281	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	No
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit	e			
	Lot size(m2)	4000		
	Subject to severe frost	No	Bulk density(g/cm3)	1.60
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	590
	Soil depth (to impermeable layer) (m)	1.00	Soil structure	Moderate
	Saturated hydraulic conductivity (Ksat)(m/day)	1.00		
	Soil texture	Light clays		
Effi	uent disposal risk factors			
	Depth to water table	0.4 - 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes an	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

## WEM Plume Map



# C01-1 NorBE Assessment

# WEM Summary

General	Information
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WEM model ID	2335122	Associated DA number			
Model description	Concept effluent management				
Consultancy	Southern Region Land Engineering	Consultant	9	gregtodd.sr	le@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	1//731427	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954
			3		835278

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	30.0	Width (up slope)(m)	28.0
Proposed area(m2)	840.0	Minimum Required area	730.0
Number of trenches	0	(m2)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9552297.015593	Northing	4325911.594827
De	Slope (m/m) velopment	0.01811	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A
	Development type	Dwellings	Development detail	4 bedrooms
	Water supply type	Rainwater	Spa Bath	No
	Continuous system use	Yes		
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface
Sit				<b>J</b>
510	e Lot size(m2)	4000		
	Subject to severe frost	No	Bully density (g/cm2)	2.00
	Vegetation for nutrient uptake	Lawn - unmanaged	Bulk density(g/cm3)	600
	Soil depth (to impermeable layer)	(m 0.90	Phosphorus sorption (mg/kg)	
	(m)		Soil structure	Weak/massive
	Saturated hydraulic conductivity (Ksat)(m/day)	0.06		
	Soil texture	Med-heavy clays		
Effl	uent disposal risk factors			
	Depth to water table	0.4 - 1.0		
	Flood potential of disposal system	Above 1 in 50 year ARI		
	Landform score	Hill crests, convex side slopes an	nd plains	
	Run-on and upslope seepage	None-low, diversion possible		
	Rock outcrops, scarp and bedrock	< 5%		
	Distance to drainage dpression	> 50		
	Distance to watercourses and water supply reservoirs	> 120		
	Distance to licenced drinking water bores	> 150		

### **WEM Plume Map**



# C03-1 NorBE Assessment

# WEM Summary General Information

WEM model ID	2335124	Associated DA number			
Model description	Concept effluent management				
Consultancy	Southern Region Land Engineering	Consultant	gr	egtodd.srl	e@gmail.com
Consultant reference number	T01405				
Council	Goulburn Mulwaree	Assessing officer			
Nominated lot	1//731427	Associated lots	Lot	Section	Plan
Development class	Subdivision unsewered >=4 lots		2		835278
			1		835278
			1		731427
			22		811954
			23		811954
			24		811954

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Date of model run

### **WEM Model Run Summary**

Model run outcome Pending

### Any of the sub-surface plumes reaches:

Lot boundary	N/A
Drainage depression	N/A
Top bank of watercourse	N/A
Another disposal field or onsite stormwater management system	N/A
Within 50m, and up gradient of, a licensed drinking water bore	N/A

### **Proposed Front End Design**

Length (across slope)(m)	40.0	Width (up slope)(m)	20.0
Proposed area(m2)	800.0	Minimum Required area (m2)	730.0
Number of trenches	0	(1112)	



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Effluent volume proposed (l/day)	800
Effluent volume calculated (I/day)	800

## **WEM Model Inputs**

### Location

	Easting	9551584.606226	Northing	4325773.369124	
De	Slope (m/m) velopment	0.02065	Slope is suitable based on site inspection (Applicable to some disposal systems on steep slopes)	N/A	
20	-	<b>D</b> III	,		
	Development type	Dwellings	Development detail	4 bedrooms	
	Water supply type	Rainwater	Spa Bath	No	
	Continuous system use	Yes			
	Treatment system	AWTS standard	Disposal system	Irrigation sub-surface	
Site					
	Lot size(m2)	411741			
	Subject to severe frost	No	Bulk density(g/cm3)	1.80	
	Vegetation for nutrient uptake	Lawn - unmanaged	Phosphorus sorption (mg/kg)	500	
	Soil depth (to impermeable layer) (m)	1.40	Soil structure	Moderate	
	Saturated hydraulic conductivity (Ksat)(m/day)	0.06			
	Soil texture	Light clays			
Effluent disposal risk factors					
	Depth to water table	> 1.0			
	Flood potential of disposal system	Above 1 in 50 year ARI			
	Landform score				
	Run-on and upslope seepage				
	Rock outcrops, scarp and bedrock				
	Distance to drainage dpression > 50				
	Distance to watercourses and water supply reservoirs	> 120			
	Distance to licenced drinking water bores	> 150			

### **WEM Plume Map**

